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CORRELATION OF ADVERSE CHILDHOOD EXPERIENCES AND SOMATIC PAIN IN ADOLESCENTS

_____

A Project

Presented to the

Faculty of

California State University,

San Bernardino

_____

In Partial Fulfillment

of the Requirements for the Degree

Master of Social Work

_____

by

Shannon Beaumont

May 2024

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Approved by:

Dr. Yawen Li, Faculty Supervisor, Social Work

Dr. Yawen Li, MSW Research Coordinator, Social Work

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ABSTRACT

This study set out to identify any correlation between exposure to Adverse Childhood Experiences (ACEs) and presence of somatic symptoms in adolescents for the purpose of implementing early intervention for adolescents who present with somatic symptoms. This study utilized data provided by the California Health Interview Survey (CHIS) and, using Statistical Packages for the Social Sciences (SPSS), identified correlative relationships between the presence of somatic symptoms an ACEs as well as somatic symptoms and demographic variables. While ACEs did not have a significant relationship with somatic symptoms ($p = 0.07; 0.06; 0.07; 0.13$), several other variables had a significant relationship with somatic symptoms, including race, insurance status, language, bodyweight, and the presence of psychological distress. These findings indicate that racial minorities disproportionately present with somatic symptoms more often than their White counterpoints, suggesting further need for investigation into resource allocation to racial minorities. Further studies would benefit from interviewing adolescents with the goal of identifying exposure to specific ACEs and the presence of somatic symptoms for a better representation of the relationship between these variables.

ACKNOWLEDGEMENTS

I would like to start by thanking my support system: my family has been incredibly supportive and helpful in navigating this project and keeping me afloat.

First, my father who has helped me understand the statistics, develop my poster, and reviewed my paper. He went through each chapter with painstaking detail so it could be the best project. He had supported me through each obstacle and helped me break down my concerns and build up my confidence.

Next, I want to thank my younger sister Jensen, who walked me through the statistics and table-making part of the project. She took the time to re-educate herself in several statistical categories to guide me in understanding my findings.

My mother provided me with daily affirmations in the last weeks of school to remind me to keep my head up and that I would succeed.

Additionally, my eldest sister, Sydney, answered whenever I called and talked me through every one of my concerns. Sydney always provided resources, support, and her own recommendations regarding the process, so I never felt alone.

Taylor, my older sibling, was always the distraction I needed. They kept me grounded and reminded me that school is more than just completing a project, but I deserve the time to laugh and play, and to always prioritize my self-care.

Thank you all for your unconditional support.

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CHAPTER ONE

PROBLEM FORMULATION

Some events that may occur in an individual's childhood can have lasting effects that lead to concerns ranging from nightmares, migraines, to even suicidality across the lifespan (McCall-Hosenfeld et al., 2014). Felitti et al. (1998) coined the term Adverse Childhood Experiences (ACEs) in a study designed to determine how violence against, or witnessed by, a child affects their longevity. ACEs are traumatic exposures experienced by an individual in their first eighteen years of life (Center of Disease Control, 2022). This concept has been introduced to the world of trauma and emphasizes the long-term effects on individuals who faced adversity early in life. Studies find that ACEs affect not only the longevity of an individual, but their quality of life following these exposures (Logan-Greene et al., 2014; Felitti et al., 1998; McCall-Hosenfeld et al., 2014). Burke-Harris (TED, 2015) suggests that individuals who answered yes on four or more of the seven identified categories on the ACE screening are 12 times more likely to develop suicidality than those with an ACE score of three of less (Felitti et al., 1998).

ACEs can have a lasting effect and the symptoms can be seen through behaviors, but also present as physical ailments including headaches, stomachaches, and other bodily pains or reactions (McCall-Hosenfeld et al., 2014). Somatic symptoms are persistent pains occurring in a specific area of the body occurring over a long period of time, possibly lifelong, without a medical explanation (Carver and Foley, 2003). This long-term pain may be found as a

side-effect of the trauma an individual has faced, just as nightmares or irritability may be seen. One-third of veterans with PTSD expressed somatic symptoms along with their diagnosis (McCall-Hosenfeld et al., 2014). Individuals with a higher score of ACEs demonstrated greater health risks, possibly due to childhood injuries, risky behaviors, or body degradation over time (Felitti et al, 1998). Those with a score of four or more ACEs present with a shorter lifespan by 20 years compared to those without any ACEs (TED, 2015). Physiological symptoms may be a side effect of mental illnesses, suggesting the question of the correlation between ACE scores and presenting somatic symptoms.

ACEs are considered the number one unaddressed health concern in the United States (TED, 2015). Physical concerns such as increased tobacco intake, obesity, and heart failure are more prevalent among those with ACEs (Monnat & Chandler, 2015). The presence of ACEs correlates negatively with employment; those with ACEs struggle more with long-term employment, work productivity, and interpersonal skills that may be necessary in a work environment (Cambron et al., 2014; Monnat & Chandler, 2015; Slack et al., 2020). Studies have found that women with ACEs struggle with employment due to their mental health, resulting in these women remaining in low-income levels (Cambron et al., 2014). Furthermore, those with higher scores on ACEs are more likely to be in poverty (Schaefer, 2018).

These implications implore for continued research and interventions on ACEs and physical and mental health. Somatic symptoms may be a single symptom to appear in those who have experienced ACEs but can indicate the

need for support for these individuals beyond the symptom itself, including mental evaluation. ACEs that occur directly on an individual by another, such as sexual abuse or physical abuse, result in higher rates of somatic symptoms across different ages, while natural disasters, including Hurricane Katrina, led to somatic symptoms primarily witnessed in adolescents (Lee et al., 2017). Research found that although women developed somatic symptoms at a higher rate than men, both displayed a positive correlation between the presence of somatic symptoms and ACE scores (McCall-Hosenfeld et al., 2014). Thus, somatic symptoms should be involved in the research due to the physiological correlation between mental health and physical health. When measuring symptoms of mental illness, social workers should keep in mind the physicality of symptoms as much as mental indicators to determine an individual's well-being.

Just as early intervention can alleviate the severity of mental illnesses, early intervention may mitigate the presence of somatic pain across those exposed to ACEs. Several studies found that the use of intervention decreases symptoms of mental illnesses, even across those with ACEs (LaBrenze, et al., 2020; Larkin, et al., 2014). If somatic pain presents as a symptom of ACEs then interventions may be necessary to support the recovery of the individual. This implication may lead to increased social work services and medical resources for children and adolescents who have survived trauma to promote a healthy lifestyle, physically and mentally. As ACEs occur when the individual is a minor, providing these social work and medical resources to youths may mitigate chronic illnesses and pain across the population.

The purpose of the proposed study is to examine the correlation between ACEs and somatic symptoms in adolescents. ACEs occur in childhood but can affect an individual's physical and mental well-being throughout their lifetime (Monnat & Chandler, 2015). Exposure to ACEs correlates with increased rates of mental illnesses, risky behaviors, and can even play a role in an individual's cause of death (Felitti et al., 1998; Monnat & Chandler, 2015). Somatic symptoms may serve as an expression of ACEs; monitoring somatic symptoms in youth may encourage early intervention and mitigate the consequences of ACEs. This study will investigate whether exposure to ACEs correlates with the expression of somatic symptoms in adolescents in California.

CHAPTER TWO

LITERATURE REVIEW

To explore the impact of ACEs on somatic symptoms is pertinent. ACEs is a leading unaddressed public health crisis due to the severity and longevity of consequences of these experiences on an individual (TED, 2015). This health crisis affects not only an individual's mental health but their physical health as well; ACEs have been linked to increased mental illnesses such as anxiety, depression, and posttraumatic stress disorder, as well as heart disease, obesity, and bronchitis (McCall-Hosenfeld et al., 2014).

Adverse Childhood Experiences

Felitti et al. (1998) formulated the concept of Adverse Childhood Experiences (ACE) with their research on the relationship between traumatic events in childhood and cause of death. ACEs assess an individual's exposure to trauma in childhood; these exposures have led to risky behaviors, mental illnesses, physical illnesses, and have contributed to death (TED, 2015; Shaefer, et al., 2018). ACEs such as physical abuse not only damage an individual's physical well-being but affects their mental health and can even alter an individual on a biological level (TED, 2015). The original ACE questionnaire assessed an individual's early exposure to trauma and comprised of 17 questions falling into seven categories: physiological, physical, sexual, substance abuse, mental illness, mother treated violently, and criminal behavior in

household (Felitti et al., 1998). ACEs address personal, family, and community experiences an individual may face in early life that are considered potentially traumatic and can have lifelong effects (Centers for Disease Control and Prevention, 2022).

Although ACEs occur in the first eighteen years of life, the consequences can be significant and even fatal. Studies have found that those who have ACEs show increased likelihood of mental and physical ailments, and that an individual's lifespan can be shortened by 20 years (Mcall-Hosenfeld et al., 2014; TED, 2015). ACEs in childhood can affect an individual's development physically and mentally; a person may understand threats differently than the general population and may utilize maladaptive coping skills such as substance use (McCall-Hosenfeld et al., 2014; TED, 2015). Research found that ACEs consistently affect adult health indicators: health risk behaviors, general poor health outcomes, chronic health conditions, and depression (Lee et al., 2020). Additionally, with each ACE someone experiences, the more severe each of the adult health indicators (Lee et al., 2020). The number of ACEs directly correlates with the severity of an individual's physical health (Larkin et al., 2014; Lee et al., 2020; TED, 2015). For every ACE someone has, they tend to have an increased number of days of illness compared to those who do not have any ACEs (McCall-Hosenfeld et al., 2014).

Somatic Symptoms

ACEs have been found to affect people physically as well as mentally, as seen from Cambron et al.'s (2014) study that found people with ACEs developed a higher rate of somatic symptoms; however, this correlation has not been addressed in adolescents who have a higher rate of developing somatic symptoms. Somatic symptoms can also develop as a side effect of a mental illness; reports of somatic symptoms increase with mental illness reports, including anxiety, depression, and posttraumatic stress disorder (McCall-Hosenfeld et al., 2014). One third of veterans with posttraumatic stress disorder have reported somatic symptoms, suggesting a correlation between trauma and somatic symptoms (McCall-Hosenfeld et al., 2014).

In McCall-Hosenfeld et al.'s (2014) study, the researchers utilized the Patient Health Questionnaire 15 (PHQ-15) scale to determine severity of somatic symptoms in patients with chronic pain. The study found interpersonal trauma specifically linked to increased rates of somatic symptoms, specifically among women (McCall-Hosenfeld et al., 2014). Women are 2.8 times more likely to develop somatic symptoms if they had at least three ACEs as opposed to men; despite the difference, somatic symptoms were more likely across both genders when interpersonal trauma was found in the individual's history (McCall-Hosenfeld et al., 2014). While these studies explore the correlation of ACEs and somatic symptoms between genders and different trauma exposures, adolescents have not been addressed when determining correlation between ACES and somatic symptoms.

The Relationship Between ACEs and Somatic Symptoms

ACEs are believed to influence an individual's physical health. According to Logan-Greene et al. (2014), those with ACEs experience longer stretches of being ill than those who do not report ACEs. Additionally, research found a correlation between ACEs and risk factors leading to early death, such as smoking, obesity, skeletal diseases, and more (McCall-Hosenfeld et al., 2014). Beyond risky behaviors, ACEs correlate with the presence of depression, general poor health outcomes, and chronic health conditions (Lee et al., 2020). Somatic symptoms can be experienced by those with cancer, skeletal diseases, and other such conditions that develop in correlation with the presence of ACEs (Felitti, 1998; Schaefer et al., 2018).

According to Lee et al. (2017), school-aged individuals developed somatic symptoms as a result of their exposure to Hurricane Katrina, as well as increased levels of posttraumatic stress disorder, anxiety, and other mental illnesses. Traumatic events have a positive correlation with somatic symptoms, especially interpersonal trauma, such as those seen in ACEs (McCall-Hosenfeld et al., 2014). According to McCall-Hosenfeld et al. (2014), incidents such as intimate partner violence and sexual trauma as well as ACEs correlated with higher reports of somatic symptoms (Spitzer et al., 1999). The correlation between ACEs and somatic symptoms are found across an individual's lifetime as found in children who survived Hurricane Katrina and those in later life who struggled with chronic pain and disease (Lee et al., 2017).

Unfortunately, the higher someone's ACE score, the greater the health consequences on that individual. According to Burke Harris (TED, 2015), individuals who score four or more on the ACE questionnaire faced a shorter lifespan of up to 20 years compared to those who had a score of zero. Cambron et al. (2014) found individuals with higher scores of ACEs more often presented with physical health issues. Logan-Greene et al. (2014) theorizes this correlation may be due to stress hormones deteriorating and prematurely aging the body, leading to negative physical health outcomes. Thus, impairments may not appear until later in life, although they begin to affect an individual following the traumatic experience.

Theoretical Conceptualization Framework

Bronfenbrenner's ecological systems theory suggests an individual is affected by various levels of communities: the microsystem which addresses an individual's immediate family; the mezzosystem which pertains to school, extracurricular activities, and the community; the exosystem which involves culture and educational support beyond the individual's immediate surroundings; and the macrosystem which is the level of the broader culture to include policies and laws that affect an individual even if they do not work directly toward the individual (Ettekal & Mahoney, 2017). The theory believes that an individual exists and is affected by their immediate environment as well as environments they have less control of, such as the community and policies affecting the state or country (Ettekal & Mahoney, 2017). War can affect an individual and may be

considered part of the micro-, mezzo, exo-, or macrosystem of the individual, as war can be difficult to determine a single source (Ettekal & Mahoney, 2017; Slack et al., 2017).

ACEs address the micro-, mezzo-, exo-, and macrosystems of an individual, even if the event does not address the individual directly: violence within the community or witnessing abuse between parents is not a direct action against the individual but can still affect their development (Trauma-Informed Care Implementation Resource Center, 2006). Although these experiences did not directly affect the individual, they are another exposure to trauma and thus increase the individual's ACE score and thus their predisposition for developing somatic symptoms (Trauma-Informed Care Implementation Resource Center, 2006). The ecological systems theory supports the belief that an individual's exposure to violence in their macrosystem can affect them as much as violence in their microsystem (Ettekal & Mahoney, 2017).

As these incidents may affect an individual's mental health, so might they affect physical health; some questions address direct abuse on the individual while others address situations that may lead to negative health outcomes in the future (Trauma-Informed Care Implementation Resource Center, 2006). The ACE questionnaire addresses traumatic events that directly impact the individual or that occur within the community and may affect the individual's sense of safety (Trauma-Informed Care Implementation Resource Center, 2006). Thus, the ecological systems theory supports the idea that experiences that happen around

the individual may affect them on a physical level as much as a mental level even if the individual was not directly physically harmed by the incident.

Major Themes and Limitations of Literature

ACEs are considered a major, unaddressed public health crisis that have long-term effects on longevity, physical health, and mental health (TED, 2015). Studies found that while ACEs correlate with the presence of somatic symptoms, more research is needed to determine the potential intermediary variables (Ettekal & Mahoney, 2017; LaBrenz et al., 2020; Lee et al., 2020; Logan-Greene et al., 2014; McCall-Hosenfeld et al., 2014; Trauma-Informed Care Implementation Resource Center, 2006). This research paper will explore the relationship between ACEs and somatic symptoms in adolescents in the state of California.

Although several intermediary variables have been measured when studying the correlation of ACEs and physical health, the correlation of ACEs and the presence of somatic symptoms in adolescents has been neglected. As this is the age group in which individuals may experience ACEs and are more likely to experience somatic symptoms as a result, this population should be studied to understand the potential of the development of somatic symptoms in relation to exposure to ACEs. This study will utilize CHIS to identify any correlation between the presence of ACEs and somatic symptoms across adolescents in California in 2021.

CHAPTER THREE

METHOD

To address the concern of how Adverse Childhood Experiences (ACEs) may contribute to the presence of somatic symptoms in adolescents, this study performed a secondary analysis of California Health Interview Survey (CHIS) (2021). CHIS surveys adults, adolescents, and children across California to gather data representative of state residents. ACEs have led to long-term physical and mental health concerns in individuals and this study examined the presence of the development of somatic symptoms across those who have experienced ACEs. Utilizing CHIS, this study cross-analyzed the presence of ACEs and somatic symptoms in the California teenage population to determine correlation of the two variables. This exploratory study assessed how ACEs scores in individuals may correlate with the development of somatic symptoms. As ACEs occur before an individual's eighteenth birthday, the teenage population of CHIS was assessed to emphasize the consequences of traumatic exposures to 12- to 17-year-olds.

Study Design

Using secondary data analysis of CHIS, this study investigated the correlation between ACEs and somatic symptoms in adolescents. UCLA Policy Institute utilized CHIS to collect data biannually using a multimode method including letters, phone interviews and/or online interviews to collect data

covering children, adolescents and adults. California is defined by a total of 58 geographical areas, creating a stratum of 44 counties and 14 sub-strata. CHIS then utilized Big Data to determine which demographic attributes across these different areas with the goal of garnering a sample representative of the California population. From these demographic differences, an additional 12 strata were determined to have an adequate representation across races and languages.

Sampling

CHIS partnered with the University of California, Los Angeles to collect the data. Random adults were chosen from each stratum, where they had the option to participate in a survey measuring the health patterns of residents of California; additionally, any children or adolescents in the home could participate with the consent of their guardian. Subjects were contacted via letter with a request to complete the survey and a two-dollar incentive. From there, subjects had the option to complete the survey via phone interview or online.

CHIS utilized a stratified sampling design to gather subjects for the survey. CHIS determines subjects from a master list of residential addresses gathered from the US Postal Service's Delivery Sequence File. The sample is stratified by race/ethnicity, income level, and geographic region. Families are contacted and when granted permission, CHIS interviews adolescents aged 12 to 17 in the home, either via phone call or online. If the adolescents are not present, CHIS will attempt contact a second time to complete the survey. CHIS oversamples

households with minors to ensure adequate representation of adolescents. Additionally, CHIS oversamples for demographics that present with higher rates of health disparities, such as African American, Asian, and Latino households. CHIS provides two-dollar incentives for contributing individuals to increase participation rates. The stratified sampling CHIS utilizes provides an adequate representation of adolescents in California.

A total of 1,192 adolescents across the 58 geographic areas completed the interview for CHIS data; 1,088 by web interview and 104 by phone interview. The number of teenage interviewees is lower than adults and children due to the adolescent needing guardian permission and completing the survey, whereas the data for children is collected by the parents. CHIS utilized a multi-method approach to interview the participants, contacting them through the phone and collecting the data through phone or online interviews.

Data Collection and Instruments

Quantitative data was analyzed via CHIS 2021 where the information has already been collected. The survey weighed for varying demographic attributes, including but not limited to: race, socioeconomic status, primary spoken language, sex, gender identity, age, and more, across 58 geographical areas. A total of 1169 adolescents aged 12 to 17 completed the screening with a mean age of 14.7.

To examine the presence of ACEs, the study identified nine questions that pertain to ACEs; see Appendix A. Previous studies that identified the presence of

ACEs utilized a breakdown of each ACE and measured the correlation of the various ACEs experienced (Gold, 2021). The study then used an F-test for the null hypothesis regarding various races and ethnicities with a significance of $p = 0.09$ (Gold, 2021). The study presented with significance pertaining to specific ACEs; for instance, witness of substance abuse correlated with race and ethnicity presented as significant, while the death of a parent did not present with a significance in consideration of race and ethnicity.

Although no CHIS related studies focused on the presence of somatic symptoms, several inspected the presence of chronic symptoms. One such study measured significance by a two-tailed p-value of $p < 0.05$ (Huang, 2020). With consideration of these significance measurements, this study measured the significance of correlation with a p-value of $p < 0.1$. The significance was measured by the correlation of the nine ACE related questions and eight questions pertaining to somatic symptoms; refer to Appendix A.

Data Overview

This study utilized the data provided by the 2021 California Health Interview Survey (CHIS), a survey completed by a total of 1192 adolescents aged 12 to 17, across 58 geographical areas; 44 strata and 14 sub-strata. To ascertain an adequate sample size of adolescents, the survey oversampled for households with adolescents. Additionally, the survey oversampled households of demographics that present with higher rates of health disparities, such as African American, Latino, and Asian households.

Utilizing the Statistical Packages for the Social Sciences (SPSS), correlation between ACEs and somatic symptoms was analyzed. This study identified four variables in the survey that represented somatic symptoms: doctor visits in the past year, number of school days missed in the past month, self-reported health, and visits to the ER. Variables that corresponded with ACEs, as seen in Appendix A, were recoded into the single variable, “Has Adverse Childhood Experiences.” Then, t-tests, crosstabulations, linear regression analyses, and logistical regression analyses, were used to identify any correlations between ACEs and the four somatic symptom identifiers.

Utilizing linear regression models and logistical regression models, correlation significance was identified for the individual demographic and independent variables against the dependent variables.

Procedures

CHIS data pertaining to adolescents in 2021 was downloaded and the data was processed through Statistical Package for the Social Sciences (SPSS) to determine the correlation between ACEs and the presence of somatic symptoms. Using SPSS, this study analyzed the data previously collected by CHIS to identify the correlation between ACEs and the presence of somatic symptoms in adolescents. Statistical significance was determined by a correlation level of 95% or higher.

Protection of Human Subjects

The identity of the human subjects has been and will continue to be confidential. As this data was collected by CHIS, all identifying information was removed for the study to be open to the public. Thus, completing the secondary data analysis provided an understanding of the California teenage population without identifying any individual.

Data Analysis

The independent variable assessed was ACEs and the dependent variable is somatic symptoms. Utilizing CHIS data, the correlation between ACEs and somatic symptoms in adolescents was analyzed through SPSS. The researcher gathered the various data points relating to each variable from CHIS; i.e., the data for each of the nine questions relating to ACEs and the data for each of the four questions pertaining to somatic symptoms. This study assigned codes to the various answers to each question; questions and answer codes were transcribed into SPSS. Then, range, variance, mode, median, and mean were calculated using correlation and a bivariate analysis. Using SPSS, this study utilized bivariate statistical analysis to determine the correlation between ACEs and the presence of somatic symptoms in adolescents.

Summary

This study examined the presence of Adverse Childhood Experiences as well as the presence of somatic symptoms of adolescents in California through the secondary data analysis of CHIS 2021 for adolescents. Nine questions

relating to ACEs and four questions pertaining to somatic symptoms were considered and gathered in examining the data. Using SPSS, this study analyzed and determines the correlation between ACEs and the presence of somatic symptoms in adolescents in California.

CHAPTER FOUR

RESULTS

Introduction

This study set out to determine if exposure to Adverse Childhood Experiences (ACEs) lead to increased reports of somatic symptoms. Using the California Health Interview Survey (CHIS), four markers of somatic symptoms, the dependent variables, were identified: number of doctor visits in the past year, number of days of school missed in the past month, number of visits to the ER in the past month, and self-reported health. These variables were measured against a series of demographic variables as well as identified social support and ACEs to identify significance in the relationship between ACEs and each dependent variable.

Upon approval from the IRB, this study collected data from CHIS and identified four dependent variables: number of doctor visits in the past year, number of days of school missed due to health reasons in the past month, number of ER visits in the past year, and self-reported health. These dependent variables were analyzed for a relationship with ACEs, which was recoded from 9 variables, as seen in Appendix A. ACEs were measured alongside demographic information to each dependent variable to recognize potential factors that also contribute to the identified dependent variables. These demographic variables include age, sex, race, language, family type, household size, poverty level, diagnosis of asthma, likelihood of having had psychological distress in the past

year, overweight or obese by CDC 2010 recommendation, current health insurance coverage, and social support.

One thousand, one hundred and sixty-nine adolescents (female = 558) partook in this study through the interviews conducted by CHIS. Demographic variables accounted for age, social support, ACE, gender, ethnicity, poverty level, language, family type, household size, current presence of asthma, recognized overweight or obesity by CDC 2010 recommendation, current health insurance coverage, and accounted for the presence of absence of psychological distress. Visualization in Table 1. Demographic variables were measured for those who reported exposures to ACEs (*n* = 470) and those who did not (*n* = 699). More females than males reported exposure to ACEs (female = 241, 51.30%; male = 229, 48.70%). Whereas more males than females reported not having exposure to ACEs (female = 317, 45.40%; male = 382; 54.60%). Adolescents were defined as 12–17-year-old individuals, with an average age of 14.87 (SE = 1.59) for those with ACEs and 14.37 (SE = 1.69) for those without.

While CHIS oversampled African American, Asian, and Latino households, White households had the greatest response rate to the survey (*n* = 689; 37.5%). Most White individuals reported not having ACEs (*n* = 391; 55.90%) as opposed to the White individuals who did (*n* = 298; 63.41%). Fifty Asian individuals reported exposure to ACEs (10.60%), while 126 did not (18.00%). Of those who identified as a single race other than Asian or White, 67 (2.80%) reported exposure to ACEs, compared to 101 (3.00%) who did not. Across all the

identified ethnicities, more respondents did not have exposure to ACEs compared to those who did. These statistics can be seen in Table 1.

Additionally, individuals across multiple poverty levels identified as not having ACEs compared to those who did, except 100%-199% FPL which had higher rates of having ACEs (*n* = 93; 19.80%) than not having ACEs (*n* = 87; 12.4%). In the 0%-99%, more identified as not having ACEs (*n* = 52; 7.4%) compared to those who did (*n* = 48; 10.2%). Those who reported as being in the 200%-299% income level reported more without ACEs (*n* = 69; 9.9%) than those who reported having ACEs (*n* = 51; 10.9). Finally, those who reported the highest rates of income more often reported not having ACEs (*n* = 491; 70.2%) compared to those who reported exposure to ACEs (*n* = 278; 59.1%).

Table 1. Demographics.

Variable	ACEs (n = 470)	Without ACEs (n = 699)	
	Mean(SD)/Percentage	Mean(SD)/Percentage	p
Age	14.87 (1.59)	14.37 (1.69)	<.001
Social Support	17.67 (5.86)	14.63 (5.11)	<.001
Sex			0.047
Female	51.30%	45.40%	
Male	48.70%	54.60%	
Ethnicity			0.005
Latino	39.40%	35.20%	
Non-Latino Asian	9.10%	17.20%	
Non-Lation White	41.30%	34.90%	
Non-Latino, Other One Race	2.80%	3.00%	
Non-Latino, Two+ Races	7.40%	9.70%	
Poverty Level			<.001
0-99% FPL	10.20%	7.40%	
100-199% FPL	19.80%	12.40%	
200-299% FPL	10.90%	9.90%	
300% FPL and Above	59.10%	70.20%	
Language			<.001
English	70.40%	58.90%	
Spanish or Other Non-English Language	2.10%	3.60%	
English and Spanish	18.10%	22.70%	
English and One Other Language	7.20%	13.00%	
Two or More Other Languages	2.10%	1.70%	
Family Type			<.001
Married with Kids	58.10%	90.80%	
Single with Kids	41.90%	9.20%	
Household Size			<.001
2-3	38.30%	19.70%	
4	32.30%	45.50%	
5+	29.40%	34.80%	
Current Asthma	13.00%	7.20%	<.001
Overweight or Obese (CDC2010 Recommendation)	34.90%	30.30%	0.101
Currently Insured	98.70%	99.30%	0.33
Likelihood of having had Psychological Distress in the Past Year	48.70%	25.90%	<.001

Language was broken down into several categories which included English, Spanish or other non-English language, English and Spanish, English and one other language, and two or more other languages. Each language reported without being exposed to ACEs, as seen in English speakers (*n* = 412; 58.9%), Spanish or other one language (*n* = 25; 3.6%), English and Spanish (*n* = 159; 22.7%), English and one other language (*n* = 91; 13.0%), and two or more other languages (12; 1.7%). These compare to the lower numbers of those who reported experiencing ACEs: English (*n* = 331; 70.4%), Spanish or other one language only (*n* = 10; 2.1%), English and Spanish (*n* = 85; 18.1%), English and one other language (*n* = 34; 7.2%), and two or more other languages (*n* = 10; 2.1%). To run the tests, however, these were further categorized into those who speak English, those who are bilingual, and those who speak a language other than English.

Single-parent families presented as more often having exposure to ACEs (*n* = 197; 41.90%) than without (*n* = 64; 9.20%). This variable is one of the few variables across all the demographics that presented with higher numbers for ACEs than without; within households made up of 2-3 people, 180 individuals reported exposure to ACEs (38.30%) compared to the 138 those without (19.70%); individuals with asthma also presented with greater numbers with ACEs (*n* = 61; 13.00%) than without (*n* = 50; 7.20%); individuals who expressed not having experienced psychological distress also reported higher numbers in exposure to ACEs (*n* = 229; 48.70%) than those without (*n* = 181; 25.90%).

Several variables collected from CHIS represented positive childhood experiences and were recoded into social support. These identifiers included "How often felt supported by friends," "How often felt family stood by you during difficult times," and "How often felt safe and protected by adult in home." An extensive list can be found in Appendix A. Of the 1169 adolescents who took part in the study, 470 identified as having ACEs (*m* = 17.67; SD = 5.86) and 699 reported not having ACEs (*m* = 14.63; SD = 5.11).

Finally, this study identified nine signifiers to represent ACEs, including "Have you ever witnessed violences in the community," "Have you ever lived with someone who had a drug problem," and more that can be seen in Appendix A. Most of the sample reported not having ACEs (*n* = 470) compared to those who did not (*n* = 699).

To understand the effects of ACEs upon the individual dependent variables, this study ran regression models. Multiple linear regressions were used to analyze the correlation between ACEs and the number of days of school missed in the past month and the number of doctor visits in the past year. The results of these multiple linear regressions are shown in Table 2. Due to the categorical nature of the number of ER visits in the past year and self-reported health, logistical regression analyses were conducted and can be found in Table 3.

Days of School Missed in the Past Month

A multivariate linear regression analysis was conducted to examine the relationship between the number of days of school missed in the past month and the demographic variables, social support, and ACEs. The model was not found to be significant, [$F(19, 725) = 2.684$, $p > 0.05$]. Despite the overall model not being significant, being currently insured was found to have a significant, positive effect on the number of days of school missed in the past month (ß = 1.48, p = 0.01). See Table 2 for a visualization.

Table 2. Linear Regression for Number of Doctor Visits in the Past Year and Number of Days of School Missed in the Past Month.

Variable	Doctor Visits			Missed School		
	B	SE	p	B	SE	p
Age	0.05	0.03	0.18	-0.01	0.03	0.86
Social Support	0.00	0.01	0.72	0.01	0.01	0.58
Female	0.10	0.11	0.36	-0.14	0.09	0.13
Latino	-0.31	0.15	0.04	0.09	0.13	0.50
Non-Latino Asian	-0.47	0.19	0.02	-0.11	0.16	0.50
Non-Latino, Other One Race	0.00	0.34	1.00	-0.27	0.26	0.31
Non-Latino, Two+ Races	-0.24	0.21	0.24	0.25	0.18	0.15
100-199% FPL	-0.27	0.24	0.26	0.09	0.20	0.64
200-299% FPL	-0.14	0.26	0.60	-0.15	0.22	0.49
300% FPL and Above	-0.06	0.22	0.77	-0.31	0.18	0.09
Bilingual	0.08	0.14	0.58	-0.13	0.12	0.28
Non-English	-0.21	0.27	0.44	-0.33	0.23	0.14
Single with Kids	-0.05	0.16	0.73	0.15	0.13	0.25
Household Size	-0.02	0.08	0.80	-0.07	0.07	0.28
Current Asthma Status	-0.22	0.19	0.26	-0.15	0.18	0.39
Overweight or Obesity Status (CDC 2010 Recommendation)	0.01	0.12	0.95	-0.08	0.10	0.46
Insurance Status	-1.21	0.27	0.04	1.48	0.57	0.01
Likelihood of having had Psychological Distress in the Past Year	-0.15	0.13	0.25	0.04	0.11	0.69
Has Adverse Childhood Experiences	-0.24	0.13	0.07	-0.20	0.11	0.06
R^2		0.03			0.07	

Table 3. Logistic Regression for Self-Reported Health and ER Visits.

Variable	Self-Reported Health		ER Visits	
	Exp(B)	p	Exp(B)	p
Age	0.98	0.76	1.05	0.42
Social Support	1.13	0.00	1.01	0.80
Female	1.35	0.22	1.06	0.74
Latino	1.60	0.15	1.19	0.50
Non-Latino Asian	0.60	0.33	1.99	0.06
Non-Latino, Other One Race	1.41	0.61	0.42	0.05
Non-Latino, Two+ Races	2.83	0.01	0.89	0.74
100-199% FPL	1.39	0.53	1.27	0.50
200-299% FPL	2.54	0.09	1.19	0.66
300% FPL and Above	1.90	0.20	1.59	0.15
Bilingual	1.44	0.21	0.53	0.01
Non-English	1.06	0.93	0.60	0.25
Single with Kids	1.07	0.82	1.12	0.64
Household Size	1.21	0.24	1.19	0.19
Current Asthma Status	0.67	0.24	1.02	0.95
Overweight or Obese Status (CDC2010 Recommendation)	0.43	0.00	0.88	0.54
Insurance Status	0.00	1.00	257146668.23	1.00
Likelihood of having had Psychological Distress in the Past Year	0.42	0.00	1.51	0.05
Has Adverse Childhood Experiences	0.67	0.13	1.47	0.07
Nagelkerke R	0.23		0.05	

These findings do not support the hypothesis that exposure to ACEs correlates with the number of days of school missed in the past month by adolescents in California ($p = 0.06$).

Number of Doctor Visits in the Past Year

The overall logistic regression model used - which consists of individual background variables, social support, and ACEs – significantly predicts the number of doctor visits in the past year, $F(19, 1149) = 1.763$, $p < 0.05$, as evidenced in Table 2. ACEs did not present as significantly correlated with the number of doctor visits in a year, but numerous demographic variables did. Latino and non-Latino Asian adolescents presented with significant correlation with the number of doctor visits in a year ($p = 0.04$; $p = 0.02$). Additionally, being currently insured correlated with the number of doctor visits in a year ($p = 0.04$).

These findings do not support the hypothesis that exposure to ACEs correlates with the number of days of school missed in the past month by adolescents in California.

Visits to the ER in the Past Year

A logistic regression analysis was conducted to examine the relationship between visits to the ER within the past year and demographic variables, social support, and ACEs. The model was found to have low predictability [x^2 (DF) = 0.051, $p < 0.05$], as shown in Table 3. Visits to the ER in the past year did not present with a significant relationship with ACEs; however, there were significant

relationships with three other variables: adolescents who reported as one race other than Latino (Exp(B) = 0.42; p = 0.048), being bilingual (Exp(B) = 0.89; p = 0.007), and those who likely have had psychological distress in the past year (Exp(B) = 1.51; p = 0.049). Those who identified as a race other than Latino, White, or Asian, and those who identified as being bilingual correlated with not visiting the ER. Those with psychological distress in the past year were less likely to visit the ER.

These findings do not support the hypothesis that exposure to ACEs correlates with the number of days of school missed in the past month by adolescents in California.

Additionally, insurance status presented with a large Exponential of Beta [Exp(B) = 257,146,668.23; p = 1.00). This indicates an issue with the dataset and does not accurately represent the correlation between insurance status and ER visits.

Self-Reported Health

The logistic regression model for self-reported health was statistically significant [Wald = 513.281, $p < 0.001$, Nagelkerke $R^2 = 0.215$]. Participants who have social support had 12.8% higher odds of reporting poor health Exp(B) = 1.128, $p < 0.001$, as seen in Table 3. While there was no significant relationship between ACEs and self-reported health, there was one variable that did show significant positive correlation: individuals who identified as two races other than Latino [Exp(B) = 2.83; p = 0.01]. Negative correlation applied to having social

support [Exp(B) = 1.13; $p < .001$]; likely not having had psychological distress in the last year [Exp(B) = 0.42; $p < 0.001$]; being overweight or obese as defined by CDC 2010 [Exp(B) = 0.43; $p < 0.001$].

Summary

Four somatic symptom variables were identified, and none presented with a significant correlation to ACEs. However, each variable presented with a significant correlation with at least one other demographic variable: doctor visits correlated significantly with reports of being Latino, being non-Latino Asian, and being currently uninsured; missing school correlated significantly with being currently uninsured; poor self-reported health correlated significantly with social support, being two races other than Latino, reports of being overweight or obese by CDC 2010 recommendation, and being likely to have had psychological distress.

CHAPTER FIVE

DISCUSSION

Introduction

While several studies have analyzed the significant relationship Adverse Childhood Experiences (ACEs) has with specific demographics, there has been no study focusing on the somatic symptoms developed with exposure to ACEs among adolescents. Adolescents present with somatic symptoms more than adults or children, as recognized in the aftermath of Hurricane Katrina (Lee, et al., 2017). Hurricane Katrina presented as a specific event identified by Lee et al. (2017), which limits the scope of the findings; this present study proposes that adolescents develop somatic symptoms in response to ACEs. The purpose of this study is to identify a relationship between the presence of ACEs and somatic symptoms, and if the correlation is considered statistically significant.

While this study presented with no significant correlation between ACEs and the four identified somatic symptom indicators – doctor visits in the past year, missed school in the past month, visits to the ER in the past month, and self-reported health – each somatic symptom presented with significant correlation with at least one demographic variable, and as many as four, as indicated in Tables 2 and 3.

Adverse Childhood Experiences

ACEs did not have significant correlation with any of the somatic symptom identifiers; however, three of the four relationships are consistent with the expectations of this study. ACEs positively correlated with increased number doctor visits in the past year, missed days of school, and self-reported poor health. Having ACEs has a negative relationship with ER visits, meaning those with ACEs are less likely to go to the ER. This may be due to the cost of visiting the ER, as individuals with ACEs are more likely to be in poverty and women who have experienced ACEs are less likely to have consistent employment which can affect their insurance status and thus access to healthcare (Cambron et al, 2014).

Days of School Missed in the Past Month

While ACEs did not pose significance with the number of days of school missed in the past month, being uninsured presented with a significant positive correlation, meaning those without insurance more often missed school than those who did not. McCall-Hosenfeld et al. (2014) found that individuals who were exposed to ACEs struggled with illness longer than those who did not; for each ACE an individual faced is how many additional days that individual may battle that illness. Thus, if a student has exposure to four ACEs, they are likely to have an additional four days of illness than someone who has not faced any ACE. Without insurance to visit a doctor and receive adequate treatment, these individuals may struggle with their illness not only longer than those who do not have ACEs, but also those who do have ACEs but have health insurance.

Doctor Visits

The number of doctor visits in the last year did not present with a significant correlation with exposure to ACEs; however, being Latino, non-Latino Asian, and being uninsured did, as seen in Table 2. Those who reported as at least one of these variables had fewer doctor visits in the past year.

Without health insurance, individuals are less likely to visit the doctor and receive adequate treatment. The lack of insurance prevents individuals from visiting the doctor due to the costs. Lack of access to resources can result in fewer doctor visits and thus increased missed school days.

Additionally, Latino and non-Latino Asian individuals may be less likely to visit the doctor due to cultural reasons. According to a study conducted by Zhao et al. (2010), some Asian women found their culture was not respected by U.S. healthcare professionals. These women did not feel supported by their healthcare providers due to a feeling a lack of sympathy regarding their embarrassment in undressing for treatment purposes (Zhao et al., 2010). With these cultural differences experienced by Latino and Asian demographics, they may be less likely than others to visit the doctor.

Furthermore, race may influence insurance status and thus contributes to why these races may not visit the doctor. Immigrants have a more difficult time accessing health insurance than U.S. citizens (Alegria, et al., 2005). Latino individuals, particularly Mexican individuals, are less likely to have health insurance (Alegria, et al., 2005). The intersectionality of these demographics may

influence why Latino individuals are not visiting the doctor as often as other ethnic groups.

Visited the ER in the Past Year

Exposure to ACEs did not have a significant correlation with visits to the ER in the past year; however, individuals who reported as being one race other than Latino, bilingual, and not having had psychological distress significantly correlated with more ER visits.

As mentioned above, cultural differences may affect an individual's willingness to go to the ER. Whether due to different medical approaches or feeling unsupported due to cultural differences, individuals who identify as a race other than White, Asian, or Latino may not visit the ER. Emergency room staff may have implicit racial biases that result in poorer support for racial minorities and may influence the likelihood of going to the ER for individuals that identify as a racial minority (Lopez et al., 2010). These cultural concerns may also contribute to why bilingual individuals do not go to the ER. Not only are immigrants and minorities less likely to have insurance, but the cultural disparities and potential racial biases these individuals may face may deter them from visiting the ER (Lopez, et al., 2010).

Furthermore, reports of psychological distress in the past year correlated with not visiting the ER in the past year. This may be due to low self-esteem and feelings of unworthiness. Although depression and other mental illnesses correlate with increased physical illnesses, individuals with mental illnesses are

more likely to visit their primary care physician (Wun et al., 2011). Due to the rapport already built with a primary care provider, individuals may feel more supported and less judged visiting their doctor rather than going to the ER and perhaps feeling stigmatized (Zhao et al., 2010). This supports why those who reported psychological distress did not correlate significantly with visiting the doctor. This may also contribute to why there is not a significant correlation between ACEs and visits to the ER; those who are exposed to ACEs may prefer meeting with their primary care provider for support from someone they are comfortable with and who knows their history.

Self-Reported Health Status

Finally, reports of poor health did not have a significant correlation with exposure to ACEs. Rather, individuals who reported as two races other than Latino, being likely having had psychological distress in the last year, being overweight or obese by CDC 2010 recommendation, and not having social support had significant correlation with reports of poor general health.

Reports of identifying as two races other than Latino correlated with poor self-reported health; this may be in part due to “identity conflict” (Urdy et al., 2003). Urdy et al. (2003) identified greater health and behavioral risks among mixed race individuals, across all races. Urdy et al. (2003) theorizes these risks may be associated with “identity conflict,” a concept in which an individual feels pressured to define themselves but identifies themselves in multiple categories.

The stress of this conflict may contribute to self-reports of poor general health, as stress correlates with poor general health (Logan-Greene et al., 2014).

Additionally, having had psychological distress in the past year may correlate with poor self-reported health due to the physical effects that correlate with mental illnesses such as depression (McCall-Hosenfeld, 2014). As seen in those with PTSD, from Hurricane Katrina or being a veteran, somatic symptoms and other illnesses may develop (Lee et al., 2017). This may result in individuals reporting poor general health.

Additionally, those who reported not having social support also self-reported poor general health. A support system serves as a protective factor against physical ailments, including cancer, and even correlates with longer lifespans (Uchino, B. N., 2009). This supports the concept that ACEs that regard interpersonal issues have a more damaging effect on an individual's health than other identified ACEs (McCall-Hosenfeld et al., 2014).

Overweight or obesity also correlated significantly with poor self-reported health. This may be due to health concerns that arise with poor diet, as well as chronic illnesses and diseases that can develop with obesity, such as hypertension, diabetes, and cardiovascular diseases (Ali & Crowther, 2005).

Strengths and Limitations

CHIS previously gathered and coded all the data, providing a large sample to represent the population and identifiable data to variables. However, as this survey did not target ACEs and somatic symptoms, this study had to review the

variables and determine which were considered ACEs or somatic symptoms. This meant some of the ACEs identified in the ACE questionnaire created by Felitti et al (1998), were not gathered, such as experiencing sexual abuse. Additionally, somatic symptoms may be difficult to define via previously gathered data as the interview questions could not be targeted toward specific identifiers, such as “Have you ever visited the doctor for a physical ailment and were not given a diagnosis.” The lack of thorough questions pertaining to ACEs and somatic symptoms may lead to inadequate representation. Further studies should utilize specific questions relating to ACEs and somatic symptoms.

While Lee et al. (2017) found that adolescents developed somatic symptoms in response to traumatic events more often than children or adults, some somatic symptoms take longer to affect the body. For instance, acute or chronic traumatic events can deteriorate stress hormones and affect the body overall (Logan-Greene et al., 2014). Studies found correlation between exposure to ACEs and cancer, skeletal diseases, and other poor health outcomes; these forms of somatic symptoms may take years or decades to develop (Felitt et al., 1998; Schaefer et al., 2018). This supports the belief suggested by Logan-Greene et al. (2014) that exposure to ACEs can age stress hormones at an accelerated rate and affect the body later in life. Thus, exposure to ACEs in adolescence may trigger a biological response but the overall effect on health may be delayed until adulthood.

Recommendations for Social Work Practice, Policy, and Research

While this study did not find significance in the relationships between ACEs and the four identified somatic symptom indicators, several demographic variables presented as significant for each dependent variable. The relationships between these variables and the identified somatic symptom indicators should be further explored, especially those that experienced psychological distress in the past year. Psychological distress may be related to ACEs or another traumatic event, or mental illnesses, and this may lead to the presentation of somatic symptoms.

Additionally, future studies should explore the effect poverty has on adolescents. Lee et al., (2020) advocates that poverty should be included as an ACE due to the damaging effects it can have on one's livelihood, their access to resources, and even long-term health. This study skewed toward middle- to upper-class individuals, thus neglecting those struggling with finances. This may correlate with insurance status and thus how poverty level can affect an adolescent's overall health. To ensure accurate representation of adolescents from an array of socioeconomic status, future studies should identify how poverty specifically affects an adolescent's somatic symptoms, and further, how these financial levels may correlate with the presence of ACEs.

Conclusion

This study hypothesized a correlation between ACEs and somatic symptoms in adolescents due to increased rates of diseases, suicidality, disorders such as somatic symptom disorder, and shorter expected lifespans that

correlate with exposure to ACEs (Monnat, S. M. et & Chandler, R. F., 2015; TED, 2015). The more ACEs someone reports, the more damaging effects on their quality of life, including prolonged illnesses, the development of diseases such as cardiovascular and skeletal, and the development of mental illness (Logan-Greene et al., 2014; McCall-Hosenfeld et al., 2014). Logan-Greene et al. (2014) believes ACEs can deteriorate stress hormones at an accelerated level which affects an individual's overall physical health. Thus, identifying physical symptoms in an adolescent may serve as a warning sign and should be treated with early intervention.

This study focused on adolescents due to the higher prevalence of somatic symptoms in adolescents compared to children and adults as seen in the study conducted by Lee et al. (2017) about the effects of Hurricane Katrina. If the study found a significant correlation between ACEs and somatic symptoms in adolescents, then somatic symptoms could be recognized as a sign of ACEs and may promote early intervention to prevent prolonged exposure to ACEs as well as mitigate long-term physical effects developed alongside ACEs.

However, this study did not find a significant relationship between ACEs and somatic symptoms. Rather, the identified markers of somatic symptoms presented with correlation with various demographic variables, including race, language, self-reported health, insurance status, lack of social support, and being overweight or obese by CDC 2010 recommendation. These findings suggest disparities across different demographics in the development of somatic symptoms. Thus, while this study did not find a significant relationship between

ACEs and somatic symptoms, other demographics are disproportionately presenting with somatic symptoms and should be studied further.

While the results did not support the hypothesis of this study, the use of CHIS limited the scope of the practice. The secondary data analysis provided a large sample of adolescents in California, but as the survey was not focused on ACEs and somatic symptoms, the data lacked several variables that would support a more well-rounded investigation of the relationship between ACEs and somatic symptoms. Further studies would benefit from interviewing adolescents with the goal of identifying exposure to ACEs and the presence of somatic symptoms for a better representation of the relationship between these variables.

APPENDIX A

CHIS (2021) SURVEY QUESTIONS

CHIS (2021) questions pertaining to Adverse Childhood Experiences

ACE_T……..Has Adverse Childhood Experiences

Section O…..Adverse Childhood Experiences

TL62……..Someone living with you has ever been arrested and booked for breaking the law

TQ1……Ever lived with anyone mentally ill or /dal or severely depressed

TQ2……Ever lived with anyone who had alcohol or drug problem

TQ3……Ever lived with a parent who served jail or prison time

TQ4……Ever lived with a parent who got divorced or separated

TQ5……Ever seen or heard adults in home physically fight each other

TQ6……Ever been victim of violence or witness violence in neighborhood

CHIS (2021) questions pertaining to social support

TQ10……..How often felt able to talk to family about feelings

TQ11……..How often felt family stood by you during difficult times

TQ12……..How often felt safe and protected by adult in home

TQ13……..How often had at least two non-parent adults take genuine interest

TQ14……..How often felt supported by friends

TQ15……..How often felt sense of belonging at school

TQ16……..How often enjoyed participating in community traditions

PCE……Positive Childhood Experiences Scale

CHIS (2021) questions pertaining to somatic symptoms

ACMDNUM...# of doctor visits past year

ER……..……ER visit within the past year

TB1……General Health Condition

Section B…..Health status and health conditions

Section H.....Health care utilization and access

TB4…….# of days of school missed for health problems – past month

TF16…….# of times visited medical doctor in past 12 months

TF3……....Visited emergency room for own health in past 12 months

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