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CHILDHOOD MEDICAL TRAUMA AND ITS EFFECT ON EMERGING ADULT MENTAL HEALTH OUTCOMES

Emma Ceres
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CHILDHOOD MEDICAL TRAUMA AND

ITS EFFECT ON EMERGING ADULT

MENTAL HEALTH OUTCOMES

BY

EMMA CERES

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MASTER OF SCIENCE THESIS

OF

EMMA CERES

APPROVED:

    Thesis Committee:

    Major Professor   Sue K. Adams

                         Karen McCurdy

                         Steven Cohen

                         Brenton DeBoef
             DEAN OF THE GRADUATE SCHOOL

UNIVERSITY OF RHODE ISLAND
2022

ABSTRACT

Children who have been exposed to or experienced trauma are at increased risk for developing persistent reactions that impede their daily functioning. Any situation in which a child fears for their life, anticipates injury, witnesses violence, or loses a loved one can be viewed as a childhood traumatic episode (National Child Traumatic Stress Network, 2003). Moreover, those coming from low socioeconomic backgrounds find themselves especially vulnerable to the effects of trauma and mental health outcomes as a result of the disparities linked to such backgrounds (Miech et al., 1999). Existing literature suggests that a medical diagnosis, as well as subsequent complex interactions within the medical environment, can lead to the development of medical trauma (Hall & Hall, 2017). The purpose of the current study was to explore the association between medical diagnoses, race, and low-income status in childhood, and subsequent mental health outcomes in emerging adulthood. Using a biopsychosocial model, data from 4,196 participants in the AddHealth Survey were examined using logistic regression analyses. Analyses investigated the likelihood of poor mental outcomes such as anxiety, post-traumatic stress disorder (PTSD), and suicidality in participants with a history of asthma or cancer. In all regression analyses, the sample was split by White versus Non-white Minority status to explore racial differences in health outcomes, while income was dichotomized into high- and low-income status. Findings suggested income status as a significant predictor of mental health conditions in both asthma and cancer patients. Asthma significantly predicted elevated risk of anxiety in the Non-White Minority sample, and elevated risk of PTSD in both groups. With these findings in mind, practitioners

should consider the complex interactions among race, income, chronic illness and risk of poor mental health outcomes.

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CHAPTER 1

INTRODUCTION

Medical trauma in children and adolescents is a psychological and physiological response to pain, illness, and medical procedures and experiences (Kazak et al., 2016). Different from other forms of trauma with an external source (i.e., car accident, war), medical based trauma presents as an internal, ongoing threat to the individual (Edmondson, 2014). Sources of traumatic stress can vary, including external factors, such as hospital environments, unfamiliar medical staff, and invasive procedures. Additionally, internalized factors including loss of control, anticipatory anxiety, and life-threatening diagnosis (Hall & Hall, 2017) can contribute to traumatic stress. The presence of medical trauma in youth has been shown to increase the likelihood of poor mental health outcomes. In children and adolescents who encounter a significant or life-threatening medical event, it is estimated that 80% of patients will experience a traumatic stress response (Kazak et al., 2016). To that point, upwards of 25% of patient will experience *persistent* traumatic stress responses (International Society for Traumatic Stress Studies, 2021). For individuals who experience these negative symptoms, The National Child Trauma Stress Network (NCTSN) recognized that post-traumatic stress disorder, for example, is frequently an appropriate and applicable diagnosis (Locatelli, 2020).

Research suggests the presence of medical trauma in childhood has a significant impact on the likelihood of developing poor mental health outcomes. Events related to acute medical illness and medical treatment are among the post common potentially

traumatic events a child could experience (Murray & Lopez, 1996). Following traumatic exposure in children, post-traumatic stress disorder (PTSD) is the most studied psychological outcome (Alisic et al., 2011). Beyond post-traumatic stress disorder, research has begun looking at the rates of other mental health outcomes in children following exposure to trauma in the healthcare setting. Lerwick (2016) suggested that the emotions that are displayed in a child following a traumatic event are closely related to anxiety, stemming from a sense of hopelessness and fear. To that point, Sine (2008) concluded that nearly 20% of the population reports feelings of "white coat syndrome" when in healthcare settings – a phenomenon marked by adverse physical and emotional symptoms related to stress.

To expand the knowledge base between medical trauma in childhood and mental health outcomes, more research in the area is necessary. Current literature does not adequately address, for example, the connection between medical trauma experienced in childhood and suicidal ideations in emerging adulthood. Further exploration into the topic would prove beneficial not only for individuals, but clinicians and healthcare providers alike.

CHAPTER 2

REVIEW OF LITERATURE

Asthma and Mental Health Outcomes

In the United States, asthma is the most common chronic illness among children, with an estimated 6.1 million children under eighteen years old affected (National Survey of Children's Health, 2012). Between 2001 and 2010, the number of emergency room visits among asthmatic children younger than seventeen years old rose 13.3% (Nath et al., 2015). The medical procedures and interventions that are often utilized in an emergency department setting can elicit feelings of fear, hopelessness, anxiety, and frustration (Faessler et al., 2016), creating potentially traumatic experiences for children. Recognizing the underlying, internalized anxieties associated with an asthma diagnosis (Alati et al., 2015; Peters & Fritz, 2011), further research is needed to investigate the effect of these factors on mental health outcomes in youth asthmatic patients.

Katon et al., (2007) sought to explore the prevalence of anxiety-related disorders in youth with a diagnosis of asthma. Participants in the study between the ages of eleven and seventeen (n=781) with a diagnosis of asthma were interviewed, alongside a randomized control group (n=598) of similar aged respondents for comparison. Researchers utilized the Diagnostic Interview Schedule for Children (NIMH DISC-4.0) (Shaffer et al., 2000) and the Childhood Anxiety Sensitivity Index (ASI) (Silverman et al., 1995) for diagnostic purposes, as well as measurement of negative cognitive thinking related to bodily functions and ability. Results of the study showed that 16.3% of

participants with asthma met DSM-IV criteria for at least one anxiety disorder compared to that of the control group (8.3% of participants), suggesting those with asthma were nearly twice as likely to develop negative mental health outcomes (Katon et al., 2007).

This body of research lends itself to a secondary discussion, emphasizing the need to investigate the relationship between asthma-related anxiety and other social determinants of health. Richardson and colleagues (2008) explored this concept further. Recognizing that youth with asthma alone have higher costs related to healthcare utilization than those without (Grupp-Phelan et al., 2001), research was conducted to examine the effect of an existing comorbidity, looking at mental health outcomes. The Diagnostic Interview Schedule for Children NIMH (DISC 4.0) and the Pediatric Chronic Disease Scale (PCDS) were used to measure mental health outcomes and comorbidities. Health plan administrative data, such as ICD-9 diagnostic codes (Richardson et al., 2008), were used to measure and identify medical cost and services provided. Results of the research determined that 16.2% of asthmatic youth participants met DSM-IV criteria for anxiety or depressive disorders: 8.9% met criteria for anxiety disorders alone; 2.5% met criteria for depressive disorders alone; 4.8% met criteria for both disorders in conjunction (Richardson et al., 2008). Using this information, analyses were run to evaluate healthcare utilization within the aforementioned populations. It was determined that youth with an existing mental health disorder in the study had more emergency room visits, and therefore higher healthcare costs than the control group.

Previous existing data suggests that, for inner-city youth in the United States, the rates of asthma coupled with associated secondary challenges (i.e., inability to attend school, medical care necessity) are among the highest in the world (Lee et al., 2003). Additionally, children living in inner-city settings are affected by asthma at disproportionately higher rates than those living in suburban areas (Constance et al., 1999). Research by Poowuttikul, Saini, & Seth (2019) suggest that living conditions in an inner-city home setting can contribute to severity of asthma conditions, including higher exposure to cockroaches and mice, as well as poor housing quality and increased exposure to tobacco smoke. Citing the National Cooperative Inner-City Asthma Study (NCICAS), the author concluded a striking link between asthma morbidity and cockroach allergen exposure. Follow-up research from the Inner-City Asthma Consortium confirmed that reduction in exposure to these allergens was associated with reduction in asthma morbidity (Poowuttikul, Saini, & Seth, 2019).

The lived experiences unique to inner-city settings also contribute to the severity of asthma conditions. It is understood that children living in low-income urban neighborhoods are more likely to experience potentially traumatic situations involving crime, violence, gang activity, drug use, and poverty (McKay, Lynn, & Bannon, 2005). These emotionally triggering episodes are of significant importance to children with asthma, as research has drawn parallels between high emotional distress and increased severity of asthmatic symptoms (Lehrer, 1998).

Goodwin and colleagues (2009) interviewed seventy-four patients between the ages of five and eleven from the Bronx-Lebanon Pediatric Asthma Center in Bronx, NY. All participants interviewed were of minority racial status (Goodwin et al., 2009),

in an attempt to expand upon further research health outcomes of minority populations. The DISC Predictive Scales (DPS) was used to evaluate mental health outcomes, including depression, separation anxiety, generalized anxiety, panic disorder, and agoraphobia (Lucas et al., 2001). To measure severity of asthma, a 12-item questionnaire was given, with responses recorded using a Likert-type scale (Goodwin et al., 2009). Results determined that 25.7% of interviewed DSM-IV criteria for a diagnosis of anxiety or depression (Goodwin et al., 2009). These findings were significant as they were the first to gather evidence to suggest the prevalence of mental health outcomes in pediatric asthmatic patients in urban settings. This evidence was significant in furthering existing knowledge about asthma in minority populations.

Existing literature supports the relationship between a diagnosis of asthma and the development of mental health outcomes, such as anxiety. However, more research is needed to expand upon additional mental health outcomes that may affect children and adolescents with asthma, specifically those from non-white minority backgrounds. Recognizing that asthmatic patients are at a higher likelihood of developing negative mental health outcomes (Katon et al., 2007), future research would benefit from exploring rates of such mental health outcomes as post-traumatic stress disorder and suicidal ideations in asthmatic patients.

Cancer and Mental Health Outcomes

With the advancement in treatment protocols on the rise over the last several decades, mortality rates of child and adolescent cancer have decreased. It is estimated that over 80% of children and adolescents with cancer will survive at least the first five years following treatment, entering a period of remission – a significant increase from the 58% survival rate of the 1970s (American Cancer Society, 2021). With this increase, more and more individuals that were diagnosed with cancer in childhood are entering their adult years. Beyond its complexity as a disease, cancer is now often considered a traumatic life event that impacts almost all facets of well-being (Sylvestro, Mobley, & Wester, 2021). The physical, social, and emotional changes that an oncology patient experiences can be monumental. Issues associated with a cancer diagnosis, such as changes in physical appearance, increased dependence, and disruption of one's social life, have been shown to potentially complicate one's experience with the disease (Zebrack et al., 2016). These immense changes in one's life may make survivors of childhood cancer a considerably high-risk group for late stage adverse medical and psychosocial effects (Allen, 1997), including but not limited to: anxiety, post-traumatic stress disorder, fears related to reoccurrence, and survivor's guilt (Sylvestro, Mobley, & Wester, 2021).

Cantrell & Lupinacci (2008) investigated the reported health-related quality of life among childhood cancer survivors. An online survey approach was utilized to measure reported levels of physical health status; hopefulness; social support networks; and self-esteem. A small representative sample (*n=35*) took part in the survey

questionnaire, and all participants had been diagnosed with cancer between twelve and eighteen years old. At time of survey, participants were between twenty-two and twenty-eight years old (Cantrell & Lupinacci, 2008). Of those interviewed, 11.76% identified with a non-white, minority race. Results of the study determined that survivors of childhood cancer had lower reported health-related quality of life (HRQOL) than their healthy peers (Cantrell & Lupinacci, 2008). In a similar study, Crochet et al., (2019) investigated post-traumatic stress symptoms (PTSS) as a potential contributor to behavioral and mental health outcomes. Participants (n=6844, 52.55 female) from the Childhood Cancer Survivor Study (CCSS) were given a series of surveys and questionnaires measuring health behaviors, healthcare utilization, and reported rates of post-traumatic stress symptoms. All participants of the study had been diagnosed with cancer prior to age twenty-one, with a median age at diagnosis of 7.1 years. Non-white, minority participants made up 13.6% of the survey population, with a median age of 31.0 years for respondents at time of survey. Results showed that those with PTSS symptoms reported in adulthood had statistically higher rates of psychological distress, neurocognitive impairment, and other physical health conditions (Crochet et al., 2019). Results of this survey suggested the need for intervention at the time of diagnosis in childhood, as well as ongoing mental health screening and longitudinal care for adult survivors. While these studies add to the existing literature on cancer and mental health, it is unclear if similar results would be found with minority patients.

A study by Recklitis and colleagues (2006) examined suicidality in adult survivors of childhood cancer, further investigating the relationship between said phenomenon and individual cancer treatment. Suicidality and depression were measured

amongst two hundred twenty-six adult survivors of childhood cancer (*m* Age, 28.38 years; standard deviation [SD] 7.91 years) with a mean age at diagnosis of 10.08 years (Recklitis et al., 2006). While participant race and ethnicity were not accounted for in the study, the sample population was drawn from a clinic with a predominantly (93%) white, non-Hispanic population (Recklitis et al., 2006). Any suicidal ideations at the time of survey or reports of past attempts were classified as positive suicidality. In total, 12.83% of participants reported suicidality, including positive associations noted with: young age at time of diagnosis; diagnosis of leukemia, associated with more aggressive treatment regimens (Rodin et al., 2013); physical pain; and physical appearance (Recklitis et al., 2006).

Allen et al., (1997) explored the rates of anxiety in cancer patients in the United Kingdom, all of whom had been diagnosed with cancer between the ages of twelve and twenty. Participants in the study group were from a largely Caucasian (88%) ethnic background, followed by Asian/Afro-Caribbean/Mid-Eastern (7%) and mixed race (5%). Their study noted the distinctive developmental period at which participants were diagnosed, stressing the importance of further research and resources dedicated to understanding the unique psychosocial needs of adolescent cancer patients. Their longitudinal study first interviewed forty-two adolescent patients, using such screening tools as Spielberger's State Trait Anxiety Inventory (STAI) to measure anxiety levels (Allen et al., 1997). While their study did not find significant results between participant anxiety levels and those of the control groups (Allen et al., 1997), the study did raise the need for more research and attention on the matter, starting a discussion that

focused on the developmental and emotional needs of this age group while undergoing medical treatments.

Scant literature is available that looks at the significance of minority backgrounds as predictors of mental health outcomes in cancer patients. Lucket et al., (2011) investigated psychological morbidity in ethnic minority patients from data collected in the United States, Canada, Romania, and United Kingdom. For the purposes of this study, minority participants were defined as holding immigrant status or an ethnic background different from that of the majority population in their respective country. While they had significant findings for Hispanic participants from the United States (Lucket et al., 2011), data for other minority groups were lacking, suggesting the need for more diverse research on the subject. Reeves, Rodrigue, and Kneebone (2016) suggested that minority populations experience a more complex and "multidimensional" poverty than White counterparts. Additionally, health disparities stemming from economic determinants and lower quality care are higher in race and ethnic minority populations compared to those of White Americans (Bahls, 2011).

Applications for the Biopsychosocial Model

A theoretical framework was utilized to further understand the interaction between variables. The Biopsychosocial Model (Engel, 1977) suggests a more comprehensive approach to understanding medical experiences of an individual. This framework posits that care should be viewed through a more holistic lens, reflecting the complexity of influential aspects and how they impact individual development. Engel (1977) argues that health is better understood when these aspects are looked at in concurrence, rather than individually. Research by Stempel et al., (2019) suggests that

framing pediatric asthma from a biopsychosocial model can help to understand risk factors that may be interconnected. Their research looked at pediatric asthmatic patients in urban settings. The study outlined biologic factors, such as: allergen sensitivity; prenatal exposure; and genetic factors. In addition, the study detailed psychological and sociological factors for consideration, including familial stress; financial hardship; exposure to tobacco smoke; air allergens; housing instability; and access to quality healthcare. With these factors in mind, the study suggested that the development and severity of the disease is intricately linked to the psychosocial experiences of pediatric asthmatic patients (Stempel et al., 2019), echoing Engel's (1977) model.

Research has also shown the benefits of a biopsychosocial approach with regarding oncological treatments in cancer patients. A study by Ozkan and colleagues (2017) looked at biopsychosocial risk factors related to breast cancer in a sample of women. Though participant ethnic background was not accounted for in this study, employment status and education background were recorded for all participants ($n=$ 491). This study closely examined biological factors, such as: family history, age, and comorbidities, as well as psychosocial factors, including social support; economic condition; coping strategies and alcohol consumption (Ozkan et al., 2017). Sylvestro, Mobley, & Wester (2021) suggest that this comprehensive approach is especially beneficial for cancer patients given the intrinsically linked biomedical, psychological, and social impacts of cancer, adding that these impacts may not be fully understood if looked at from an individual angle. Understanding these interconnected factors, measures such as health-related quality of life (HRQL) screenings have become one of

the most widely used biopsychosocial tools in oncological care (Sylvestro, Mobley, &

Wester, 2021).

The Current Study

The current study investigates how medical trauma (i.e., cancer, asthma) impacts mental health conditions (i.e., anxiety, PTSD, and suicidal ideation) in emerging adulthood from White and Non-white Minority groups. The current study fills in the gap of minority to non-minority comparisons in health outcomes. That is, it explores how race and illness experienced in childhood influence mental health throughout the lifespan.

It was hypothesized that:

Hypothesis I: Emerging adults from racial Minority backgrounds who had been diagnosed with asthma in childhood would experience significantly higher rates of poor mental health outcomes (anxiety; PTSD; suicidality) than their White counterparts.

Hypothesis II: Emerging adults from racial Minority backgrounds who had been diagnosed with cancer in childhood would experience significantly higher rates of poor mental health outcomes (anxiety; PTSD; suicidality) than their White counterparts.

CHAPTER 3

METHODOLOGY

Procedure & Sampling

The present study used data from Waves III and Wave V from the National Longitudinal Study of Adolescent to Adult Health (AddHealth). AddHealth is the largest, most comprehensive longitudinal study of its kind. Using a nationally representative sample, data were collected from in-school and at-home questionnaires beginning in 1994, with the most recent data published from a 2018 collection. Data collection took place in five separate waves, with collection for AddHealth is still ongoing today.

Wave III was conducted in 2001-2002, when original Wave I participants were between the ages of eighteen and twenty-six years old. Data collected during this wave focused on the relationship between adolescent experiences and decision/behavior outcomes during their transition to adulthood. Questions related to relationships, marriage, childrearing, and education were also included within Wave III. In total, 4,882 respondents from the initial Wave I completed interviews in Wave III.

Wave V was the most recent wave of data collection to be conducted. In this wave, participants from the same cohort were re-interviewed between 2016-2018. Particular attention was paid to social, behavioral, environmental and biological factors to track disease and health outcome occurrence throughout the fourth decade of life. Data for Wave V was collected using a mixed mode survey, lasting approximately 90 minutes. Unique to this wave of collection, research accounted for death amongst AddHealth participants for review. A total of 4,196 valid responses were collected

from Wave V. Given the large sample size in this study, participants who had missing data for either the independent or dependent variables were omitted from the analyses.

Measures

Independent Variables

Minority Status. The present study explored demographic characteristics of its participants. **Participant Race** was originally collected from Wave V and coded into seven variables in response to the survey question *"What is your race or ethnic origin?"*, with possible responses including: White; African American; Hispanic; Pacific Islander; Alaska Native/American Indian; and Other. The present study re-coded the aforementioned variables into two categories: (1) *White* and (2) *Non-white/Minority*, in order to collapse minority groups into one variable for the purpose of equalizing the number of respondents amongst the groups.

Diagnosis of Asthma. The current study utilized **Diagnosis of Asthma** as an independent predictor variable. Diagnosis of Asthma (H3ID3) data were collected from Wave III of the AddHealth database. Participants in this Wave were asked "Have you ever been diagnosed with asthma?", indicating (0) NO or (1) YES, with 4,882 total cases.

Diagnosis of Cancer. The current study elicited **Diagnosis of Cancer** as an independent predictor variable. Diagnosis of Cancer (H3ID4) data were collected from Wave III of AddHealth's database. Participants in Wave III were asked "Have you ever been diagnosed with cancer or leukemia?", indicating (0) NO or (1) YES, with 4,882 total cases.

Dependent Variables

Diagnosis of Anxiety. The current study focused on **Diagnosis of Anxiety** as one of its dependent, outcome variables. Diagnosis of Anxiety (H5ID6I) data were collected from Wave V of the AddHealth database. Participants were asked "Has a doctor, nurse, or other health care provider ever told you that you have or had anxiety or panic disorder?". Participants indicated: (0) NO or (1) YES, with 4,196 responses.

Diagnosis of PTSD. The current study focused on **Diagnosis of PTSD** as the second dependent, outcome variable. Diagnosis of PTSD (H5ID6H) data were collected from Wave V of the database. Participants were asked "Has a doctor, nurse, or other health care provider ever told you that you have or had posttraumatic stress disorder or PTSD?". Respondents indicated: (0) NO or (1) YES, with 4,196 recorded responses.

Suicidality. The current study used **Suicidality** (H5MN8) as its third dependent, outcome variable. Data for this variable were collected from Wave V of the AddHealth database. Participants were asked "During the last 12 months, have you ever seriously thought about committing suicide?". Participants indicated (0) NO or (1) YES, with 4,196 responses recorded.

Demographic Covariates

Demographic data were collected from Wave V from the AddHealth study. The demographic data collected was presumed to be stable across the Waves and contained fewer missing data than previously collected variables in earlier waves, **see Table 1.** For analysis purposes, the mode year of collection in Wave V (mode = 2017) was used. Demographic variables including Personal Income Earnings (*Less than $5,000 - $200,000 or more*) were investigated in preliminary analyses to determine if

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they should be controlled for in secondary, multivariate analyses. Additional demographic variables for consideration included Biological Sex (*male/female*).

Personal Income Earnings was originally coded into thirteen categories based on respondent answers to the question *"In the last calendar year, how much income did you receive from personal earnings before taxes?".* The present study recoded this variable into two categories: (*1) Low Income/Poverty Level*; and *(2) High Income/Above Poverty*, based on the 2017 Federal Poverty Threshold of **$12,752.00** (US Census, 2017), as shown in **Table 1a.** The majority of the sample size reported a high-income background (*n=3365, 81.6%*), with a small representation of low-income participants (*n=760, 18.4%*). **Biological Sex** maintained its original coding of: (*1) Male* and *(2) Female*.

.

Table 1. Frequencies of Demographic Characteristics

		N	% Of N
Personal Income Earnings			
	(1) less than $5,000	430	10.4%
	(2) $5,000 to $9,999	171	4.1%
	(3) $10,000 to $14,999	159	3.9%
	(4) $15,000 to $19,999	158	3.8%
	(5) $20,000 to $24,999	227	5.5%
	(6) $25,000 to $29,999	236	5.7%
	(7) $30,000 to $39,999	448	10.9%
	(8) $40,000 to $49,999	507	12.3%
	(9) $50,000 to $74,999	811	19.7%
	(10) $75,000 to $99,999	421	10.2%
	(11) $100,000 to $149,999	348	8.4%
	(12) $150,000 to $199,999	102	2.5%
	(13) $200,000 or more	107	2.6%
Participant Race			
White	(0) Not Marked	1340	32.0%
	(1) Marked	2844	68.0%
Black/African American	(0) Not Marked	3274	78.3%
	(1) Marked	910	21.7%
Hispanic	(0) Not Marked	3778	90.3%
	(1) Marked	406	9.7%
Asian	(0) Not Marked	4028	96.3%
	(1) Marked	156	3.7%
Pacific Islander	(0) Not Marked	4146	99.1%
	(1) Marked	38	0.9%
American Indian/Alaska Native	(0) Not Marked	4063	97.1%
	(1) Marked	121	2.9%
Other	(0) Not Marked	4158	99.4%
	(1) Marked	26	0.6%
Participant Sex			
	Male	1802	42.9%
	Female	2394	57.1%

Table 1a. Demographic Characteristics in Study, Re-coded

Demographic Characteristic	% Valid (*n*)	Total
Participant Sex at Birth		N=4196
Male	42.9 (1802)	
Female	57.1 (2394)	
Participant Race [a]		N=4184
White	63.0 (2634)	
Non-White/Minority	37.0 (1550)	
Participant Income [a]		N=4125
Low/Below Poverty	18.4 (760)	
High/Above Poverty	81.6 (3365)	

a. Variable re-coded from original survey for study analyses

Data Analyses

The present study utilized the Statistical Package for the Social Sciences (SPSS) Version 27 to conduct statistical analyses in order to explore the impact of medical trauma in childhood and the development of poor mental health outcomes in emerging adulthood, while investigating the importance of covariate variables. Missing data were excluded with pairwise deletion in the bivariate correlation and subsequent analyses.

Preliminary analyses, including frequencies and descriptive statistics, were run to determine demographic variable information. Bivariate correlations were run between independent and dependent variables to determine if significant associations were present. Moderation analyses were run prior to exploratory analyses to determine if the relationship between independent and dependent variables, (i.e., medical trauma and mental health outcomes) was influenced by race.

To further investigate the role of race, a series of logistic regression analyses were run that stratified by race. In all sets of regressions, the sample was stratified by White and Non-White/Minority. The sample in the present study consisted of a largely White demographic (n=2634, 63%), compared to the non-White minority population (n=1550, 37%). Demographic factors that were significantly correlated with primary study variables were used as covariates in the regression analyses. The goal of these analyses was to explore racial differences in mental health outcomes. Specifically, it was tested to determine if asthma and cancer diagnoses yielded different rates of poor mental health outcomes, within White and Non-White/Minority populations.

CHAPTER 4

FINDINGS

Table 2 reflects the univariate analyses, such as descriptive statistics and frequencies, which were conducted to determine the sample size of demographic and primary study variables. Within the study, 16.8% of the sample reported "yes" to a diagnosis of asthma, whereas 0.8% reported "yes' to a diagnosis of cancer. When analyzing dependent variables, it was determined that 23% of participants reported a diagnosis of asthma; 7.2% reported a diagnosis of PTSD; & 7% reported suicidal ideations within the last year.

Table 3 reflects the Pearson product moment correlations that were used to explore associations among primary study variables and demographic variables to be controlled for in the main analyses. Related to asthma, analysis found significance with dependent variables PTSD and anxiety. Income was found to be significant with all dependent variables, qualifying it for inclusion into subsequent regression analyses. Gender was not shown to be significant in the correlation analysis related to cancer and anxiety, and therefore the variable was omitted from respective logistic regression.

Table 2. Primary Study Variable Frequencies & Descriptives

		Frequency	Valid %	Mean	SD	Variance
Asthma (N=4874)						
Valid	(0) No	4056	83.2			
	(1) Yes	818	16.8	0.17	0.37	0.14
Cancer (N=4879)						
Valid	(0) No	4840	99.2			
	(1) Yes	39	0.8	0.09	0.09	0.01
Anxiety (N=4184)						
Valid	(0) No	3222	77.0			
	(1) Yes	962	23.0	0.23	0.42	0.18
PTSD (N=4181)						
Valid	(0) No	3879	92.8			
	(1) Yes	302	7.2	0.07	0.26	0.07
Suicidality (N=4098)						
Valid	(0) No	3813	93.0			
	(1) Yes	285	7.0	0.07	0.25	0.07

Table 3. Bivariate correlations between predictor and outcome variables

Variable	n	M	SD	1	2	3	4	5	6	7	8
1. DX WITH ASTHMA (W3)	4874	0.17	.37	-							
2. DX WITH CANCER/LEUKEMIA (W3)	4879	0.01	.09	.06**	-						
3. DX WITH PTSD (W5)	4181	0.07	.26	.07**	.02	-					
4. DX WITH PANIC/ANXIETY DIS. (W5)	4184	0.23	.42	.07**	.03	.32**	-				
5. SERIOUSLY CONSIDER SUICIDE (W5)	4098	0.07	.25	.02	-.01	.17**	.19**	-			
6. SEX ASSIGNED AT BIRTH (W5)	4196	1.57	.49	.03	.03	.03**	.15**	-.01	-		
7. WHITE v NON-WHITE/MINORITY[a]	4184	1.37	.48	- .01	.01	-.02	-.09**	.02	.03*	-	
8. LOW INCOME/HIGH INCOME_2017[b]	4125	1.81	.39	-.03	-.04*	-.11**	-.10**	-.05**	-.17**	-.05**	-

p < .05*, p <.01 **, p<.001 ***

a. Recoded to collapse minority groups into one variable.

b. Based on 2017 US Census Poverty Threshold

Moderation analyses were run to see if the relationship between medical trauma and mental health outcomes depended on race. The first moderation explored asthma and race to determine the predictability of mental health outcomes. In this moderation analysis, 64.89% (*n*=377) of the population who had asthma was from a White racial background; 35.11% (*n*=204) was from a minority racial background. The second moderation analysis examined cancer and race to determine the same aforementioned predictability. In this regression, 60.7% (*n*=17) of the population who had cancer was from a White racial background, while 39.3% (*n*=11) was from a racial minority. The moderation analyses showed that race was not a significant moderator for either variable, as **shown in Tables 4-6.**

Table 4a. Moderation Analyses: IV=Asthma; DV= Anxiety

	B	S.E.	Wald	df	Sig.	Exp(B)
Gender (F)	0.75	0.09	69.08	1	<.001	2.13
Income (Low)	-0.52	0.1	26.93	1	<.001	0.59
Asthma (+)	0.33	0.32	1.09	1	0.29	1.39
Race (Minority)	-0.55	0.1	28.96	1	<.001	0.57
Asthma x Race	0.04	0.23	0.03	1	0.86	1.04
Constant	-0.85	0.29	8.78	1	0.003	0.43

F: female gender, (+): Presence of disease

Table 4b. Moderation Analyses: IV = Cancer; DV= Anxiety

	B	S.E.	Wald	df	Sig.	Exp(B)
Gender (F)	0.75	0.09	68.57	1	<.001	2.12
Income (Low)	-0.53	0.1	27.72	1	<.001	0.59
Cancer (+)	-0.63	1.27	0.25	1	0.62	0.53
Race (Minority)	-0.55	0.09	36.22	1	<.001	0.57
Cancer x Race	0.76	0.89	0.73	1	0.39	2.13
Constant	-0.76	0.28	7.32	1	0.01	0.47

F: female gender, (+): Presence of disease

Table 5a. Moderation Analyses: IV=Asthma; DV = PTSD

	B	S.E.	Wald	df	Sig.	Exp(B)
Gender (F)	0.23	0.15	2.45	1	0.12	1.26
Income (Low)	-0.91	0.15	37.05	1	<.001	0.4
Asthma (+)	0.44	0.48	0.85	1	0.35	1.56
Race (Minority)	-0.17	0.17	1.04	1	0.31	0.84
Asthma x Race	0.1	0.34	0.08	1	0.76	1.11
Constant	-1.3	0.45	8.5	1	0.004	0.27

F: female gender, (+): Presence of disease

Table 5b. Moderation Analyses: IV=Cancer; DV =PTSD

	B	S.E.	Wald	df	Sig.	Exp(B)
Gender (F)	0.23	0.15	2.37	1	0.12	1.25
Income (Low)	-0.93	0.15	38.85	1	<.001	0.39
Cancer (+)	-2.06	2.35	0.77	1	0.38	0.13
Race (Minority)	-0.17	0.15	1.38	1	0.24	0.84
Cancer x Race	1.46	1.49	0.95	1	0.33	4.29
Constant	-1.14	0.43	6.93	1	0.01	0.32

F: female gender, (+): Presence of disease

Table 6a. Moderation Analyses: IV=Asthma; DV = Suicidality

	B	S.E.	Wald	df	Sig.	Exp(B)
Gender (F)	-0.13	0.14	0.84	1	0.36	0.88
Income (Low)	-0.52	0.16	11.11	1	0.001	0.59
Asthma (+)	0.49	0.52	0.86	1	0.35	1.63
Race (Minority)	0.23	0.15	2.28	1	0.13	1.26
Asthma x Race	-0.26	0.37	0.5	1	0.48	0.77
Constant	-1.79	0.44	16.43	1	<.001	0.17

F: female gender, (+): Presence of disease

Table 6b. Moderation Analyses: IV=Cancer; DV = Suicidality

	B	S.E.	Wald	df	Sig.	Exp(B)
Gender (F)	0.23	0.15	2.37	1	0.12	1.25
Income (Low)	-0.93	0.15	38.85	1	<.001	0.39
Cancer (+)	-2.06	2.35	0.77	1	0.38	0.13
Race (Minority)	-0.17	0.15	1.38	1	0.24	0.84
Cancer x Race	1.46	1.49	0.95	1	0.33	4.29
Constant	-1.14	0.43	6.93	1	0.01	0.32

F: female gender, (+): Presence of disease

Following moderation analyses, cross tabs analyses were run to further explore the relationship between variables, as shown in **Table 7**. For those who reported having a diagnosis of asthma, 21% ($n=121$) were from low-income backgrounds and 35.1% ($n=204$) were of Non-White/Minority racial backgrounds. In contrast, 79% ($n=456$) were from high income background, with 64.9% ($n=377$) reporting White racial background.

For participants who reported a diagnosis of cancer, 34.6% ($n=9$) were from low-income status and 39.3% ($n=11$) reported a Non-White/Minority racial background. In contrast, 64.5% ($n=17$) reported high income status, with 60.7% ($n=17$) identifying with a White racial background.

Table 7. Percentage of study participants diagnosed with asthma and cancer, by race and income

Asthma	With Diagnosis %(n)	Without Diagnosis %(n)	Total
Low Income	21 (121)	18.2 (510)	18.6 (631)
High Income	79 (456)	81.8 (2299)	81.4 (2755)
White	64.9 (377)	63.6 (1808)	63.8 (2185)
Minority	35.1 (204)	36.4 (1037)	36.2 (1241)
Cancer	With Diagnosis %(n)	Without Diagnosis %(n)	Total
Low Income	34.6 (9)	18.5 (623)	18.6 (632)
High Income	65.4 (17)	81.5 (2741)	81.4 (2758)
White	60.7 (17)	63.8 (2170)	63.8 (2187)
Minority	39.3 (11)	36.2 (1232)	36.2 (1243)

Logistic Regression I: Asthma Predicting Anxiety, PTSD, & Suicide

The first regression looked at asthma and the likelihood of developing poor mental health outcomes, looking at White and Non-White/Minority populations, **as shown in Table 8**. Among minority groups, people who have asthma were 52% (95% CI [1.04, 2.23]) more likely to have anxiety than people who do not have asthma. Income was found to significantly increase the likelihood of adverse mental health outcomes, such as anxiety and PTSD, within both white and minority populations. Among minorities, those with asthma were shown to be 91% (95% CI [1.14, 3.26]) more likely to develop PTSD, whereas white individuals were 72% more likely than their non-asthmatic counterparts. Results showed that asthma did not significantly increase the likelihood of suicidal ideations in either population. However, income *was* found to have significance in the White sample with relation to suicidality.

Table 8. Logistic Regression: Asthma Predicting Mental Health Outcomes

	White (n=2634)				Minority (n=1550)			
	b(SE)	95% CI		OR	b(SE)	95% CI		OR
		Lower	Upper			Lower	Upper	
Anxiety								
Gender	.69 (.11)***	1.62	2.46	1.9	.92 (.18)***	1.78	3.56	2.53
Income	-.49 (.13)***	.47	.77	.61	-.58 (.17)***	.39	.78	.56
Asthma	.37 (.13)	1.13	1.85	1.5	.42 (.19)*	1.04	2.23	1.52
PTSD								
Gender	.19 (.18)	.85	1.72	1.2	.26 (.25)	.79	2.11	1.29
Income	-1.1 (.18)***	.24	.48	.38	-.58 (.25)*	.34	.93	.56
Asthma	.54 (.19)**	1.2	2.52	1.72	.64 (.27)*	1.14	3.26	1.91
Suicidality								
Income	-.54 (.21)**	.39	.87	.58	-.45 (.24)	.39	1.01	.63
Asthma	.22 (.22)	.82	1.92	1.25	-.02 (2.94)	.55	1.74	.98

p < .05*, p <.01 **, p<.001 ***

Logistic Regression II: Cancer Predicting Anxiety, PTSD, & Suicide

The second regression analysis looked at cancer and the likelihood of developing poor mental health outcomes, in the same demographic population as Regression I. Within the analysis, significance was once again found related to income, **see Table 9**. Similar to the findings in Regression I, low-income increased the likelihood of developing poor mental health outcomes. Both low-income Whites (p<.001, OR=0.53) and Minorities (p<.001, OR=0.53) were at an increased likelihood to have been diagnosed with anxiety. Among minority (p=0.02, OR=0.55) and white (p,.001, OR=0.33) individuals, those with lower income were more likely to be diagnosed with PTSD, compared to their high-income counterparts. In contrast, suicidality was one mental health outcome where income was not significantly liked to minority status. Finally, a diagnosis of cancer alone was not found to significantly increase the likelihood of any of the mental health outcomes in the study (i.e., anxiety, PTSD, suicidality).

Table 9. Logistic Regression: Cancer Predicting Mental Health Outcomes

	White (n=2634)				Minority (n=1550)			
	b(SE)	95% CI		OR	b(SE)	95% CI		OR
		Lower	Upper			Lower	Upper	
Anxiety								
Income	-.63 (.12)***	.42	.68	.53	-.64 (.17)***	.38	.73	.53
Cancer	.23 (.52)	.45	3.45	1.25	1.02 (.71)	.68	11.16	2.76
PTSD								
Gender	.19 (.18)	.86	1.74	1.22	.23 (.25)	.77	2.05	1.26
Income	-1.11 (.18)***	.23	.47	.33	-.59 (.25)**	.34	.91	.55
Cancer	-.68 (1.05)	.06	3.95	.51	.74 (1.07)	.25	17.05	2.09
Suicidality								
Income	-.57 (.20)**	.37	.84	.56	-.46 (.24)	.39	1.0	.63
Cancer	-18.8 (9697.6)	.000	.	.000	.63 (1.10)	.28	15.50	1.87

p < .05, p <.01 **, p<.001 ***

CHAPTER 5

CONCLUSION

The present study sought to examine the mental health outcomes of emerging adults from diverse backgrounds, who had experienced medical trauma as the result of acute or chronic medical diagnoses in childhood. Specifically, diagnoses of asthma and cancer were investigated to determine their associations on the development of poor mental health outcomes, including anxiety, posttraumatic stress disorder, and suicidality.

Hypothesis I explored if individuals from a racial minority background who had been diagnosed with asthma as a child would experience significantly higher rates of poor mental health outcomes, compared to their white counterparts. Moderation analysis found no significant differences between minority groups and their white counterparts. The results of logistical regression analyses demonstrated that within the minority group, those with asthma were shown to have high likelihood of developing poor mental health outcomes. These findings are consistent with existing literature. A study conducted by Bandiera et al., (2008) examined the relationship among race, asthma, and mental health. The study's participants (n=286,783) were from Hispanic (15.65%), non-Hispanic White (73.94%), and non-Hispanic Black (10.39%) racial backgrounds. Using self-reported data from the Behavioral Risk Factor Surveillance System (BRFSS), the study measured such variables as history of asthma, race/ethnic-

ity, and reported mental health. The results showed that Hispanic participants, espe-

cially those from low-income backgrounds, reported greater numbers of poor mental

health days than their non-Hispanic White counterparts, emphasizing the racial dispar-

ities in asthma prevalence (Bandiera et al., 2008).

Analysis of suicidality in asthmatics showed the presence of a protective factor,

contrary to the original hypothesis. Being of low income and minority status appeared

to be a protective factor between asthma and suicidality. This finding is supported by

existing research. Literature suggests these findings may be explained by higher expo-

sure to risk, leading to higher levels of resiliency. A study by Orthner et al., (2005) ex-

amined family strength and resilience amongst a low-income sample. Citing highly

creative and individualized strategies for coping with poor life conditions, the study

concluded that low-income families showed higher confidence in problem solving

abilities, resulting in high levels of resiliency (Orthner et al., 2005). Individual culture

may also explain this concept of resiliency in minority individuals. The concept of

Familism in Latino culture, a value that is marked by reliance on the family, may re-

sult in increased emotional support (Bandiera et al., 2008). Future research would ben-

efit from comprehensively studying race, income, and illness from an ecological per-

spective, and how they influence such health outcomes as suicidality.

Additionally, a second theme emerged in the mental health outcomes of those

with a diagnosis of asthma. Compared to those in the study diagnosed with cancer,

poor mental health outcomes in emerging adulthood were more prevalent in asthmat-

ics. This could be explained, in part, by the chronicity of asthma. As asthma is one of

the most chronic conditions in the United States, it is characterized by variable and recurring symptoms throughout life (Kewalramani et al., 2008), with fluctuating severity and clinical manifestations. With the chronic nature of the disease, this uncertainty remains with individuals throughout their life.

The current study did not yield significant findings in regression analyses related to Hypothesis II. This could have been, in part, due to the small sample size that was available from the dataset. Despite the large sample within the overall study, only thirty-nine participants reported a diagnosis of cancer. Additionally, while unable to determine, is it possible that many of the participants in the current study who had been diagnosed with cancer were in full remission, and not experiencing the daily stressors and symptoms associated with their childhood diagnosis.

Findings within the present study can also be interpreted within the Biopsychosocial Model theoretical framework (Engel, 1977), suggesting a strong association between mental health outcomes, individual health conditions, and external influences, like income and poverty status. Logistic regression analyses within the present study suggested females and low-income individuals were at higher probabilities of poor mental health outcomes. This demonstrates a direct connection to the psychological and social aspects of health, as outlined in Engel's (1977) model. Existing literature supports these findings. Belle (1990) stated that the incidence of poverty is especially pronounced in minority families, with African American female heads of households facing risk of poverty more than ten times that of their white, male counterparts (Belle, 1990). The study also underlined the significant relationship between poverty and diagnosable mental health conditions. Echoing these findings, Santiago et al., (2013)

also emphasized the relationship between poverty and mental health needs. Research added that many low-income individuals do not receive mental health services, due in part to attitudinal and societal factors (Santiago et al., 2013).

Limitations of the Current Study

Throughout the present study, a few limitations were noted. First, AddHealth's dataset consisted of self-reported responses to almost all variables. Wave III and Wave V both used self-reported, where predictor and outcome variables were drawn from, respectively. Self-reported data have a tendency to be unreliable (Devau & Sassi, 2015), and can be impacted by such factors as participant bias and comprehension of questions, including influences from language and cognitive discrepancies. Secondly, mental health measures within the database and study were limited to single constructs, an element that future research would benefit from adjusting. In addition to self-report, the present study contained a largely White/Caucasian demographic in the sample (63%) compared to the Non-White/Minority (37%) sample. This sample tended to be representative of racial diversity in the US population. However, greater diversity in future studies, including focus specific to Minority samples, would allow for greater ability to generalize findings for said populations. Another limiting factor of the present study was the large sample size. Large sample sizes have a higher likelihood of converting small differences to statistically significant findings (Faber & Fonseca, 2014). This misinterpretation can lead researchers astray when drawing conclusions from their findings, including impact on any clinical applications drawn from results. Within the data set, there were limitations noted as well. For example, suicidality was measured by asking participants about the presence of symptoms in the last

twelve months from time of survey. This excluded any suicidal ideation that may have been experienced prior to the twelve-month timeline. Additionally, the dataset contained a very small sample size for individuals reporting cancer ($n=39$), which limited the ability to find effects within the current study.

Implications and Future Directions

The present study adds to gaps in existing literature surrounding mental health conditions in racial minority populations experiencing chronic illness. Existing literature has yet to compare minority to non-minority differences in mental health outcomes. Analyses that included race and income within the study contributed to voids in the diversity of mental health research. Dichotomous income variables coded in high/low-income thresholds add to the gap in literature specifically related to poverty and its impact on mental health conditions.

The present study has strong implications for the fields of medicine, mental health services, and developmental science and psychology. First, these findings stress the importance of cultural humility for those working with low economic and minority populations. In maintaining an open, unassuming mindset towards differences in culture, health care providers and mental health professionals can gain a better understanding of how different health conditions affect different cultural backgrounds. This is a crucial element in ensuring that individuals receive comprehensive care, regardless of cultural or economic background. Citing the developmental changes that occur in an emerging adult, Dashiff et al., (2009) stressed the importance of clinician advocacy for mental health services for young adults in poverty. The findings within the current study suggest adding the same advocacy for those who have experienced illness in childhood. Findings in the present study have strong implications for policy development focused on low-income individuals who are often from minority status backgrounds, including directions in research and funding related to healthcare and mental health services. Implementation of behavioral health services during primary

care preventative visits would integrate both physical and mental health in the healthcare setting. The recent shift to virtual and telehealth medicine would also increase accessibility to care for those from low-income backgrounds. Recent research has drawn parallels to financial stability and income resources, and their importance on mental health. Ettman et al., (2020) investigated financial stress and its relationship to poor mental health. Acknowledging the disparities of mental health in poverty, Ettman et al., (2020) concluded that those with low assets and economic instability are subject to a higher likelihood of adverse mental health conditions. Findings in the present study support this research. In nearly every analysis, low income was positively associated with poor mental health outcomes.

The current study has demonstrated how individuals from minority backgrounds experience poor mental health at slightly higher rates than their White counterparts. However, future research is needed to better understand if these differences are significant. In addition to diversity among the sample population, future research would profit from a more specific target sample, focused on health-related findings. For example, a representative sample taken exclusively from a health clinic or specialized hospital (i.e., oncology dedicated health center) would provide more definitive and concrete findings with relation to mental health outcomes. Future longitudinal studies would greatly benefit from age-specific questions related to health conditions. Due to the construction of AddHealth's waves, including the age range specific to each wave, pinpointing the exact age of diagnoses was not possible. Finally, future research investigating mental health outcomes would benefit from utilization of Likert-type scales for their measures. Single-construct measures, such as those used in the current

study's database, limited responses of participants, excluding personal interpretation of mental health conditions. Instead, Likert-type scale questions such as "*On a scale from 1-5, how would you rate the severity of your anxiety*" would provide much more insight into an individual's current emotional state.

Findings in the present study suggest future directions for tiered interventions to treat medical trauma in children and adolescents. At the most individualized level of intervention, clinicians and health care providers would benefit from utilizing original mediums, including therapeutic play for patients to express their feelings related to their diagnosis. Such creative outlets allow children and adolescents to express feelings unique to their stressors and experiences. Channels like medical play (Nabors et al., 2013) allow the opportunity to cope with traumatic and stressful medical experiences, whilst simultaneously allowing clinicians to observe and interpret potential mental health outcomes in patients. At the broadest levels, interventions to address social determinants of health should have a population-wide reach (Frieden, 2010). For individuals from low-income, minority, or urban communities, targeted community-based programs would address socioeconomic factors that are often strongly associated with individual health. Public health interventions, such as mental health screenings or community outreach programs, would make these available and accessible to an expansive population. Investing in a vast array of interventions to support individuals with asthma and cancer could have a significant positive impact on mental health outcomes throughout the lifespan.

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