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Resilience as a Moderator Between Adverse Childhood Events and Health in Motherhood

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Walden University
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Abstract

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by

Katherine Walker-Schneider

MA, Walden University, 2015

BS, University of Oregon, 2000

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Psychology

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Abstract

The purpose of this study was to examine the effects of adverse childhood events (ACEs) and motherhood on a weighted linear composite of health status and health harming behavior, while moderating for a measure of resilience. Felitti's theory of ACEs and Garmezy's theory of resilience are the theoretical framework for this study. The research questions that are addressed in this study are how ACEs and resilience affect health-related outcomes in women and how motherhood influence health-related outcomes as a function of ACEs when moderated by resilience. A quantitative research design with a convenience sample was used to anonymously survey 205 women (104 mothers, 101 nonmother). The survey included the 10-item ACEs questionnaire, the 10-item Connor-Davidson Resilience Scale short version, and two 15-item health and health behavior questionnaires. Once data were collected a three-way multivariate analysis of variance (MANOVA) was conducted using SPSS that showed correlation between negative health outcomes and ACEs, Motherhood and the triple interaction of ACEs, resilience, and motherhood. Women with ACEs had 1.04 points higher health scores than those without ACEs, mothers had 1.38 points higher health scores than nonmothers, mothers with ACEs and high resilience had a negative health score 1.4 points higher than mothers with high resilience and no ACEs. Implications for this study include the use of conclusive statistical data to support programs for family services and women's outreach programs that could help prevent the cycle of ACEs in families and help mothers understand the role of ACEs and resilience on the impact of becoming a mother.

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Dedication

This dissertation is dedicated to my father Richard, who is no longer with us. Thank you for always believing in me and loving me for who I am. I would not be the woman, mother, friend, or human that I am today without the unconditional love, support, and guidance you gave. I wish you could be here to see this day, to see the person I have become and how you have inspired me.

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I could not have completed this dissertation without the support of so many amazing individuals. First, I would like to thank my mother Beth, whose unwavering support and belief has been both my rock and my guiding light throughout this process. When I was not sure I had the ability to finish, she always believed for me. Next, I would like to thank my son Jamie, who is my reason for being. I would not be the person I am today if it were not for our relationship, and how you push me every day to be better.

I would like to thank my committee member Dr. Elizabeth Essel for supporting me in this process. I appreciate your patience and flexibility during these difficult times.

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Chapter 1: Introduction to the Study

Introduction

The more a child is exposed to adverse childhood events (ACEs), such as (a) physical, psychological, and sexual abuse; (b) mental illness; (c) violence against their mother; and (d) criminal behavior, the more likely they are to experience negative health outcomes as an adult (Felitti et al., 1998). Part of the relationship between ACEs and health outcome can be explained by a person's level of resilience, which is the ability to overcome or adapt to negative experiences (Luthar, 2006), in that ACEs have less of an effect on health outcome among subjects whose resilience level is high. What is missing from the literature is an assessment of the combined effect of ACEs and motherhood on health outcome, while holding resilience constant. Motherhood is especially noteworthy given a common correlate of ACE exposure is poor parenting skills. This study will help identify a population that may benefit from resilience training as a therapeutic intervention, and it may open the door to more specific program evaluation tools and public health resources to encourage resilience in families.

This chapter will outline the major contributions to the field of ACEs and resilience research, and it will highlight studies that have looked at the impact of both ACEs and resilience on parents' health-related outcomes. It then will present a detailed problem statement followed by the purpose and research hypotheses of the proposed study. Subsequent sections will briefly describe the nature of the study, assumptions, scope and delimitations, limitations and then the significance of the study. Finally, the chapter will end with a brief summary that will lead into Chapter 2 and the literature review.

Background

The background for this study begins with the two studies relating ACEs and resilience to health outcomes. Felitti et al. (1998) provided the landmark study of ACEs as they relate to health status with data collected by the Centers for Disease Control and Prevention ([CDC]-Kaiser Permanente study). Garmezy (1971, 1985, 1991) is considered one of the primary pioneers of resilience theory making the connection between adverse events and factors that protect against negative outcomes.

Many studies have furthered the work done by Felitti and Garmezy particularly by looking at the effects of both ACEs and resilience on health and behavioral outcomes of individuals who have experienced ACEs (Arincorayan et al., 2017; Bellis et al., 2014; Kolomeyer et al., 2016; Logan-Greene et al., 2014; Manfred et al., 2017; Sexton et al., 2015). In a meta-analysis of 37 studies that involved risk analysis and included 100 or more participants, Hughes et al. (2017) found that individuals who suffered from multiple ACEs had a higher risk for negative health-related outcomes; the largest risk involved drug use, and both interpersonal and self-directed violence at an odds ratio of more than seven when compared to those without ACEs. Several studies have addressed the effect of resilience on negative outcomes in adults and concluded that there is a buffering effect by resilience that can last throughout the lifetime (Logan-Greene et al, 2014; Manfred et al, 2017). One prominent resilience factor that has been associated with being protective against the negative effects of ACEs is that of positive relationships that are formed and maintained in childhood (Bellis et al., 2014; Bellis et al., 2017; Arincorayan et al., 2017). Fewer studies have looked at different effects of ACEs or trauma on motherhood, parenting, health, and the role of resilience (Kolomeyer et al., 2016; Sexton et al, 2015).

Kolomeyer et al. (2016) looked at how ACEs related to negative parenting outcomes and found that reflective functioning played a significant role in parenting behaviors. Sexton et al. (2015) looked at the relationship between childhood trauma and resilience on postpartum mothers as they related to post traumatic stress disorder (PTSD) and major depressive disorder (MDD) and found that resilience had a buffering effect in relation to psychopathology.

This study will fill a gap in the research by observing the combined effects of ACEs and motherhood on health outcomes, while moderating for resilience. The finding that high levels of ACE exposure is related to having poor parenting skills (Hughes et al., 2017; Kolomeyer et al., 2016) underscores the need for gaining a better understanding of the relationship among ACEs, motherhood, resilience and health-related outcomes as it relates to community outreach programs and women's health workers in providing effective tools to mothers suffering from the effects of ACEs.

Problem Statement

ACEs are a significant problem affecting people in the United States and around the world. Felitti et al. (1998) developed an instrument that measures ACEs in seven categories of household dysfunction and abuse that occur prior to the age of 18. The categories are physical abuse, psychological abuse, sexual abuse, substance abuse, mental illness, violence against mother, and criminal behavior. ACEs and their relationship to negative mental, physical, and health-harming behavioral outcomes have been studied at length (Bellis et al., 2014; Felitti et al., 1998; Hughes et al., 2017). Nevertheless, 59% of adults surveyed in recent studies reported having one or more ACE based on the continued ACEs data collected by the CDC through the Behavioral Risk Factor

Surveillance Systems (BRFSS), which are state based data collected and reported to the CDC (CDC, 2016). The largest year for ACE data collection through the BRFSS occurred in 2010 in which 10 states and the District of Columbia reported ACEs results on 53,784 participants to the CDC. Additionally, 32 states and the District of Columbia included ACE related questions on a BRFSS survey between the years 2009 and 2014 (CDC, 2016). The overwhelming prevalence of ACEs indicates a need for additional research into ACEs treatment and prevention.

Resilience training can be an effective tool for treatment targeting the negative effects of ACEs (Chandler et al., 2015). A person who has experienced adversities, can overcome negative outcomes, and lead a productive life is described as resilient (Howard et al., 1999). There are many factors that may explain how resilience is developed and maintained; these factors may include general external support, an individual adult confidant during childhood, or a physiological reaction such as allostasis where the brain attempts to protect itself and returns to a state of plasticity to overcome adversity (Bellis et al., 2017; Howard et al., 1999; Karatoreos & Mcewen, 2013). Although there is not a consensus on how resilience is conceptualized, there is a general theme in the literature that there is a relationship between ACEs, negative outcomes, and resilience (Garmezy, 1985; Logan-Greene et al., 2014; Manfred et al., 2017). Understanding which resilience factors, as previously described, mitigate the effects of ACEs could contribute to the development of effective treatments for the negative outcomes associated with ACEs in the family setting.

Women who suffer from ACEs are more likely to exhibit poor parenting skills, and individuals who suffer from ACEs are more likely to be involved in health-harming

behaviors such as violence, drug use, and self-harm (Hughes et al., 2017; Kolomeyer et al. 2016). Women are typically the primary caregiver for children in both dual parent and single-parent households (Grall, 2016; Working Mothers Issue Brief, 2016), with 80% of children in single-parent homes residing with the mother (Grall, 2016). Therefore, because women are often the primary caregivers of children, and ACEs are associated with various risks such as poor parenting skills, drug use, violence, and self-harm, determining what resilience factors potentially protect mothers from negative outcomes could reduce the risk of a continuous cycle and overall prevalence of ACEs and inform intervention efforts (Hughes et al., 2017; Kolomeyer et al., 2016). Mothers who are suffering from the negative effects of their own ACEs could perpetuate the cycle by exposing their children to ACEs (Kolomeyer et al., 2016); therefore, understanding the relationship between resilience factors and health-related outcomes in motherhood could help prevent this ACEs cycle. Studies have described relationships among ACEs, resilience, and adult health outcomes, but there has not been a study concerning the combined effects of ACEs and motherhood on health outcomes, while moderating for resilience. It is this gap in the literature on which this study focuses.

Purpose of the Study

The purpose of this quantitative study is to examine the effects of ACEs and motherhood on a weighted linear composite of health status and health harming behavior, while moderating for a measure of resilience. The research design and the statistical analysis will account for differences in health status and health harming behavior (health-related outcomes) that can be attributed to motherhood and ACE, moderating for resilience.

Research Questions and Hypotheses

Research Question 1 (RQ1): What is the relationship between ACEs and negative health-related outcomes in women?

$H_0$1: ACEs are unrelated to negative health-related outcomes in women.

H_a1: Higher scores on the ACE will be related to higher negative health-related outcome scores in women.

Research Question 2 (RQ2): How is resilience related to negative health-related outcomes in women?

$H_0$2: Resilience is unrelated to negative health-related outcomes in women.

H_a2: Higher measures of resilience will be related to lower negative health-related outcome scores in women.

Research Question 3 (RQ3): How does resilience influence the relationship between ACEs and negative health-related outcomes in women?

$H_0$3: The effects of ACE on negative health-related outcomes will not change in relation to resilience in women.

H_a3: The effects of ACE on negative health-related outcomes will be reduced by higher resilience in women.

Research Question 4 (RQ4): How does motherhood influence negative health-related outcomes?

$H_0$4: Mothers will not differ in their negative health-related outcomes.

H_a4: Mothers will show higher negative health-related outcome scores compared to nonmothers.

Research Question 5 (RQ5): How does motherhood influence negative health-related outcomes as a function of their ACEs?

$H_0$5: Mothers will not differ in their negative health-related outcomes in relation to ACEs.

H_a5: Mothers will show higher negative health-related outcome scores in relation to greater ACEs compared to nonmothers.

Research Question 6 (RQ6): How does motherhood influence negative health-related outcomes as a function of resilience?

$H_0$6: Mothers will not differ in their negative health-related outcomes in relation to resilience.

H_a6: Mothers will show lower negative health-related outcome scores in relation to greater resilience compared to nonmothers.

Research Question 7 (RQ7): How does motherhood influence negative health-related outcomes as a function of ACEs when moderated by resilience?

$H_0$7: Resilience will not moderate the relationship between ACEs and negative health-related outcomes in mothers or nonmothers.

H_a7: Resilience will moderate the relationship between ACEs and negative health-related outcomes in mothers, but not in nonmothers.

Theoretical Framework for the Study

The Felitti et al. (1998) study was a collaboration between researchers and Kaiser Permanente and the CDC. Felitti's theory of ACEs postulates that ACEs are directly related to health and behavioral outcomes in adults. This theory is now the benchmark and standard for ACEs research, it is the primary theory and questionnaire used in ACEs

studies in the US during the past 2 decades. The primary hypothesis of the ACEs theory is that the higher the ACEs score the higher the likelihood of having negative outcomes later in life.

Garmezy's (1991) theory of resilience postulates that resilience is the ability to adapt to maintain primary functioning. It is not necessarily immunity to adversity but adaptability to environment. Although there are several prominent resilience researchers, Garmezy (1991) is widely considered the founder of resilience research. There are several variations of resilience theory that followed, including those of Rutter (2006), Ungar (2005), and Werner (1995), that expand, converge, or overlap with his original theory.

ACEs, resilience and motherhood are the three independent variables being used in this study so using the original theories and the basis for decades of research is important to the authenticity of the research questions at hand.

Nature of the Study

The nature of this study was quantitative. The variables and analysis were conducted using a quantitative method to better understand the relationships between motherhood, ACEs, resilience factors, and health-related outcomes. The variables of this study are motherhood (mother versus nonmother), ACEs (as measured by the ACEs survey, 10 item yes or no), resilience (as measured by the Connor-Davidson Resilience scale short, 10 item 5 point scale), health status (cardiac, cancer, stroke, COPD, and diabetes, as measured by the CDC female health questionnaire, 15-item yes or no), and health-harming behaviors (as measured by the CDC health behavior questionnaire, 15-item yes or no).

This study was a nonexperimental design as data was collected anonymously through internet survey engines (SurveyMonkey and Prolific). Using a 3-way (motherhood, ACE, and resilience) MANOVA, this quantitative study should help quantify how motherhood, ACEs, and resilience are related to health-related outcomes. The ACEs questionnaire used in the CDC-Kaiser Permanente ACEs study, and the ACEs short (both publicly available on the CDC website) are commonly used in studies involving ACEs (CDC, 2016, Bellis et al., 2017). The Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003) has been shown to be reliable and valid and has been widely used in research on resilience (Martinez Vizcaino et al., 2011).

This study was quantitative in nature and analyzed data collected through internet survey. ACEs (independent variable) was treated as categorical with 5 levels (0, 1, 2, 3, and 4 or more ACEs). Resilience factor (independent variable) was treated as categorical, either as dichotomous based on median split, or with 3 levels, depending on the frequency distribution. Motherhood (independent variable) is a single dichotomous categorical variable. The dependent variable of health-related outcomes was a weighted linear composite (latent variable) of health status and health-harming behaviors, used in a three-way MANOVA. In the event that one of the multivariate main or interaction effects was statistically significant, post hoc tests included univariate analyses of variance and multiple comparison tests. These tests will isolate specific main and simple effects.

Definitions

Motherhood was considered a female over the age of 18 who has had legal custody of at least one child at least 50% of their time since birth.

Resilience is the ability to overcome the negative effects of adversities experienced to lead a productive and fulfilling life (Howard et al., 1999).

Adverse Childhood Experiences (ACEs) is an event or events that takes place in a person's life prior to the age of 18 and falls within the seven categories of abuse and household dysfunction. These categories include phycological abuse, physical abuse, sexual abuse, substance abuse, mental illness, violence towards mother, and criminal behavior (Felitti et al, 1998).

Health status is a diseases or conditions that are on the top of the mortality ratings in the United States and consist of heart disease, cancer, stroke, emphysema (COPD), chronic bronchitis, hepatitis, diabetes, and skeletal fractures (Felitti et al., 1998).

Health Harming Behaviors are habits or behaviors that result in negative health effects or health risks. These factors include sedentary lifestyle, obesity, smoking, drug use, alcoholism, excessive sexual partners in a lifetime that exceed 50, history of sexually transmitted disease, depression, and suicide attempts (Felitti et al., 1998). Health-related outcomes are the combined effects of the individual's health status and health harming behaviors.

Assumptions

This was an anonymous survey based on both past and current experiences, the assumption is that participants completed the survey to the best of their ability. There is the possibility of recall bias based on the premise that adults are being asked to recall events from childhood. In order to avoid recall bias, a younger population would need to be used which both presents ethical issues and is not plausible for the purpose of this study due to the comparison group of adult mothers.

Another assumption is that participants were honest about their qualifying factors to participate in the study. Because this is an anonymous questionnaire, there is no way of verifying the participants qualifications so I took them at their word. Because the research design convince sample that was chosen for this study is the most practice design, this assumption was necessary.

Scope and Delimitations

The scope of my research took three areas of research -- ACEs, Health-related outcomes, and Resilience -- and looks at them as they relate to motherhood. This is a gap in the research that has not been addressed and could lead to insights into how these factors are affected by becoming a mother and how motherhood is affected by these factors.

Felitti et al.'s (1998) theory of ACEs was used, as further described in Chapter 2. This theory focuses on seven categories of abuse and neglect. The overall theory of trauma or childhood trauma was not addressed due to its broad spectrum of possible factors.

This study did not investigate mothers who have lost custody of their children as it would not fully represent how the variable of resilience interacts with motherhood. Motherhood must be maintained without interruption. This does however limit the results and narrow the definition of motherhood for the purpose of this study. This study involved motherhood, resilience and ACEs as this is an interaction that needs to be studied, however it may not be generalizable due to the specificity of the population and the research design.

Limitations

This study had several limitations. It used a convenience sample and research design. As mentioned in a previous section, this choice will constrain generalizability which is a limitation. Recall bias and honesty are also limitations that were previously mentioned that cannot be accounted for, however the survey is anonymous, and participants were informed of the importance of truth in research. Another limitation was due to the voluntary nature of the participation that could lead to selection bias. This was addressed during statistical analysis when reviewing data and outliers.

Significance

The potential contributions of this study include those to the broader understanding of how resilience can develop in different populations and how the interaction of ACEs and motherhood relates to overall health outcomes. Specific implications are for public policy and community outreach programs. Because the study yields insights into factors specific to mothers that predict or even encourage resilience, it could be used to inform program evaluations and interventions.

Summary

ACEs and resilience have had a great deal of attention due to the overwhelming conclusions that point to ACEs leading to negative health outcomes (Nurius et al., 2016; Felitti et al., 1998; Rosinki et al., 2018) and that there are factors that encourage resilience (Garmezy, 1991; Rutter, 2013). Parenthood is one of the biggest lifechanging events in a person's life, and mothers are significantly the ones doing the parenting (Grall, 2016) so this study attempted to fill the gap in the research on how ACEs and resilience relates to motherhood.

Chapter 2: Literature Review

Introduction

ACEs are a significant problem affecting people in the United States and around the world. Felitti et al. (1998) developed an instrument that measured ACEs in seven categories of household dysfunction and abuse that occur prior to the age of 18. The categories are physical abuse, psychological abuse, sexual abuse, substance abuse, mental illness, violence against mother, and criminal behavior. ACEs and their relationship to negative mental, physical, and health-harming behavioral outcomes have been studied at length (Bellis et al., 2014; Felitti et al., 1998; Hughes et al., 2017). Nevertheless, 59% of adults surveyed in recent studies reported having one or more ACE based on the continued ACEs data collected by CDC through BRFSS, which are state based data collected and reported to the CDC (2016). The largest year for ACE data collection through the BRFSS occurred in 2010 in which 10 states and the District of Columbia reported ACEs results on 53,784 participants to the CDC. Additionally, 32 states and the District of Columbia included ACE related questions on a BRFSS survey between the years 2009 and 2014 (CDC, 2016). The overwhelming prevalence of ACEs indicates a need for additional research into ACE treatment and prevention.

Resilience training can be an effective tool for treatment targeting the negative effects of ACEs (Chandler et al., 2015). A person who has experienced adversities, can overcome negative outcomes, and lead a productive life is described as resilient (Howard et al.,1999). There are many factors that may explain how resilience is developed and maintained; these factors may include general external support, an individual adult confidant during childhood, or a physiological reaction such as allostasis where the brain

attempts to protect itself and returns to a state of plasticity to overcome adversity (Bellis et al., 2017; Howard et al., 1999; Karatoreos & Mcewen, 2013). Although there is not a consensus on how resilience is conceptualized, there is a general theme in the literature that there is a relationship between ACEs, negative outcomes, and resilience (Garmezy, 1985; Logan-Greene et al., 2014; Manfred et al., 2017). Understanding which resilience factors mitigate the effects of ACEs could contribute to the development of effective treatments for the negative outcomes associated with ACEs in certain populations, such as mothers.

Many studies show the relationship between ACEs, resilience, adult health outcomes, and health harming behaviors, but a gap in the research is understanding this relationship among mothers. Women who suffer from ACEs are more likely to exhibit poor parenting skills, and individuals who suffer from ACEs are more likely to be involved in health-harming behaviors such as violence, drug use, and self-harm (Hughes et al., 2017; Kolomeyer et al., 2016). Women are typically the primary caregiver for children in both dual parent and single-parent households (Grall, 2016; Working Mothers Issue Brief, 2016), with 80% of children in single-parent homes residing with the mother (Grall, 2016). Therefore, because women are often the primary caregivers of children, and ACEs are associated with various risks such as poor parenting skills, drug use, violence, and self-harm, determining what resilience factors potentially protect from the negative outcomes for mothers could reduce the risk of a continuous cycle and overall prevalence of ACEs and inform intervention efforts (Hughes et al., 2017; Kolomeyer et al., 2016). Mothers who are suffering from the negative effects of their own ACEs could

perpetuate the cycle by exposing their children to ACEs, understanding the relationship between these factors in mothers could help prevent this ACEs cycle.

The purpose of this quantitative study is to examine the relationship between ACEs and a weighted linear composite of health status and health harming behavior, while moderating for a measure of resilience among mothers and nonmothers. The research design and the statistical analysis will account for differences in health status and health harming behavior (health-related outcomes) that can be attributed to motherhood and ACE, moderating for resilience.

In this chapter, I began by discussing the strategy used for the literature review search including the search criteria and databases used. Followed by the theoretical foundation for the current study along with the conceptual framework for each major area that will be focused on in the study, ACEs, resilience, and motherhood. Moving on to the literature review, each section will focus on one main area of research with appropriate subcategories. ACEs will include the subcategories of medical outcomes, mental health outcomes, health risk behaviors, and other areas of research. Resilience will include subcategories of personal/developmental, familial, social, genetic/neurobiological, and policies and practices. Motherhood has no subcategories due to the limitations in the current research. Finally, there will be a section that discusses the gap in the research leading to the current study.

Literature Search Strategy

The databases used to search for literature that involved the variables included in this study were Thoreau at Walden University, Google Scholar, and ProQuest. The primary search terms that were used during this literature review were *Adverse Childhood*

Events, Adverse Childhood Experiences, ACEs, Resilience, Health, Health Harming, and *Motherhood.* Combinations of search terms included *Adverse childhood experiences* or *ACEs* and *Resilience, Adverse childhood experiences* or *ACEs* and *Motherhood, Resilience* and *Motherhood, Adverse childhood experiences* or *ACEs* and *Health* or *Health harming, Resilience* and *Health* or *Health harming, Motherhood* and *Health* or *Health harming, Adverse childhood experiences* or *ACEs* and *Motherhood* and *Health, Resilience* and *Motherhood* and *Health*. Additional search terms that were used during the extended literature review and in conjunction with primary terms were *Parenting, Social, Family, Education, Academic, Military, Trauma, Loss, Personality, Socioeconomic, Intergenerational, Cycle of Violence, Neurobiological, Biological,* and *Cost.*

The original ACEs study dates back to 1998 and Garmezy's work dates back to 1971, the original research and reference material will include dates as early as 1971. Current literature will primarily include work from 2015 to 2019 however there are some key works were included from outside that date range. Literature will be used from peer-reviewed sources or government agencies such as the CDC.

Theoretical Foundation

The two theories that will be used as a foundation for this study will be Felitti et al.'s (1998) theory of ACEs and Garmezy's (1971, 1985, 1991) theory of resilience. Felitti et al.'s (1998) theory of ACEs pioneered research in the field and addressed the effects of ACEs on health status. There are seven categories of ACEs used in Felitti et al.'s original study that are still used to measure ACEs today. These categories are physical abuse, psychological abuse, sexual abuse, substance abuse, mental illness,

violence against mother, and criminal behavior. The health outcomes that were measured in Felitti et al.'s study included heart attack, cancer, stroke, chronic obstructive pulmonary disease (COPD), and diabetes. Felitti et al. found that as ACEs increased so did the occurrence of negative health-related outcomes. Felitti et al. reported that participants with four or more ACEs were 1.6 times more likely to have diabetes, 3.9 times more likely to have COPD, 2.4 times more likely to have a stroke, 1.9 time more likely to have any cancer, and 2.2 times more likely to have a heart attack when compared to those with 0 ACEs. The framework Felitti et al. used in their landmark study is still being used today. The approach provides a guideline for tracking and measuring ACEs.

There are several theories that involve resilience. The primary theories are by Warner and Smith (1998), Garmezy and Rutter (1983) and Garmezy (1971, 1985, 1991). For this study, Garmezy's (1971, 1985, 1991) theory will be used. Garmezy (1971, 1985, 1991) is considered one of the founders and innovators of resilience theory and recognized that there are both risk factors and resilience factors that need to be evaluated when analyzing adult outcomes. Garmezy (1991) identified resilience as the ability of children to form protective factors to overcome stressful or adverse life events. Garmezy's (1991) theory identified three major types of resilience factors: individual, familial, and support. Individual factors can include things such as temperament and intelligence; familial factors can include socioeconomic status and family dynamic and support; and support factors can include external support, such as from a school or church (Garmezy, 1991).

Conceptual Framework

ACEs

Adverse childhood experiences (ACEs) were categorized and defined by a landmark study by Felitti et al. (1998) that was a collaboration between the researchers, Kaiser Permanente, and the CDC. The ACEs study links exposure to seven categories of adverse childhood events, which include abuse and household dysfunction, to physical risk factors and major disease outcomes (Felitti et al., 1998). The seven categories of ACEs as defined by Felitti et al. (1998) are physical abuse, psychological abuse, sexual abuse, substance abuse, mental illness, violence towards mother, and criminal behavior. The ten categories of health risk factors as defined by Felitti et al. (year) are obesity, sedentary lifestyle, alcohol abuse, drug abuse, drug abuse by parents, smoking, depression, suicide attempts, history of sexually transmitted disease and sexual promiscuity; the categories of health factors are heart disease, cancer, stroke, Chronic Obstructive Pulmonary Disease (COPD), diabetes, hepatitis or jaundice, and bone fractures. Felitti et al. (year) found that with an increase in ACEs there was an increase in risk for health harming behavior and adult disease, this study continues to be the benchmark for ACEs research today.

As we strive for answers and insights into how ACEs shape and mold the adult outcome, many researchers have used this foundation to explore other questions and correlations regarding ACEs. The current research will use the concept of ACEs as one of the key variables within the study.

Resilience

Resilience is a complex theory to unravel and has many definitions, a history of research stemming from the early 1970's, and an ever-growing field of developing concepts. Norman Garmezy is often referred to as the founder of resilience research, however there are several other researchers who also can be considered as key founders of the theory including Michael Rutter, Emmy Werner, and Michael Ungar. Although there is not an agreed upon definition of resilience there are common themes that make up the overall concept of resilience. The general theme that emerges among all of the definitions is that resilience includes a negative experience, some form of protective factor(s), and an unexpected positive or nonnegative outcome despite the negative experience (Garmezy, 1973; Rutter, 2006; Ungar, 2005; Werner, 1995). A commonly used and concise definition presented by Luthar (2006) is that resilience is "positive adaptation despite adversity" (p. 741). Were the definitions tend to depart is when it comes to what the protective factors are and how they come into play. There has been substantial research into how and why resilience is formed, everything from biological aspects to social and economic structures. Although many breakthroughs have been made, and knowledge has been developed, there is still no formula for resilience. There are strategies that may help and ideas for both preventative and therapeutic measures, however there is no one agreed upon method to induce resilience. Until we gain a better understanding of how this process is developed and maintained further research will in this area will need to continue. One way of continuing research in such a highly researched area is to narrow the variables and the population to gain a better precise understanding in specific structures, people and situations. The current study will use

Garmezy's theory of resilience and the framework provided by these key theorists to formulate the variable of resilience.

Motherhood

Motherhood may seem like a straightforward idea, however when it comes to research there are many factors that play a role in this concept. What is it to be considered a mother? Does the birth of a child make someone a mother? What about adoption? There has been little research in the area of ACEs and resilience that has focused specifically on mothers. Many of the studies surrounding mothers describe mothers as either having given birth or as having children of a specific age range but do not give a definition of what it is to be a mother (Kolomeyer et al., 2016; Wiig et al., 2017). The current study will use a more defined idea of what motherhood is based on both birth and the raising of children.

A Review of the Literature

ACEs

Adverse childhood events (ACEs) have been linked to many long-term negative health and behavioral outcomes such as major disease, smoking, obesity, early or unintended pregnancy, sexually transmitted disease, and suicide attempts (Felitti et al, 1998; Anda et al, 1999; Dietz et al, 1999; Hillis et al, 2000; Williamson et al, 2002). The researchers involved in the landmark ACEs study continued to use the data collected in the study for more than a decade after the original study. Analyses were performed on the effects of ACEs on different populations and for different outcomes, they also included mediating and moderating factors, and to this day researchers are using this information as a basis for additional research in the field of ACEs.

Medical Outcomes

It has been established that ACEs are related to negative adult health outcomes, beginning with Felitti et al.'s work in 1998 and continuing to this day. Felitti et al. (1998) determined that as the number of ACEs increased so did the likelihood for major adult illness such as heart disease, cancer, stroke, lung disease, and diabetes. The researchers discovered that there was a graded relationship between the number of ACEs and the number of major illnesses reported, meaning that as the number of ACEs reported increased so did the number of illnesses (Felitti et al., 1998). There are indications that these health factors may be a contributor to early mortality in those that have experienced increased exposure to ACEs by as much as 15 years (Brown et al, 2009; Dong et al., 2005; Felitti et al., 1998; Karatekin & Ahluwalia, 2016).

Physical outcomes as they relate to ACEs have now been examined from many different perspectives including minor ailments such as the common cold to overall well-being (Nurius et al., 2016; Rosinki et al., 2018) and also different age groups including young children (Hunt et al., 2017; McKelvey et al, 2017). Links between Asthma, ADHD and behavioral problems with children that have been exposed to ACEs at an early age have been seen in early adolescents and even toddlers (Bethell et al., 2014; Hunt et al., 2017; McKelvey et al., 2017) and supports a need for early detection and interventions (Friemoth, 2014; Walker & Walsh, 2015).

In a systematic review of the literature Petruccelli et al. (2019) links ACEs to five medical outcomes; fracture, sleep disturbance, somatic pain or headache, GI disease, and respiratory disease. In the original ACEs study (Felitti et al., 1998) the health outcomes that were associated with ACEs were cancer, lung disease, heart disease, liver disease,

and fracture. In a 14 state review that included over 130,000 participants Waehrer et al. (2020) found ACEs to be most associated with asthma, arthritis, COPD, and cardiovascular disease. All of these diseases are defined as chronic diseases (lasting one or more years) by the CDC, heart disease and stroke are the leading cause of death of Americans and leading the nation in healthcare costs at nearly $200 billion per year (CDC, 2019b).

Over 20 years of research has shown that there is a link between ACEs and health outcomes. With both the personal and financial losses involved in this ongoing cycle it is important to continue to carry on the research goal of finding answers that drive us towards the prevention of these long-term outcomes. In order to get a better idea of the direct relationship between ACEs and health-related outcomes some research has focused specifically on ACEs effect on one health outcome such as obesity, headache occurrence, or lung disease or even on a specific population such as women (Anda et al., 2001; Remigio-Baker et al., 2015; Williamson et al., 2002).

Mental Health Outcomes

Felitti et al. (1998) also established a connection between an increase in ACEs and the likelihood of developing a mental health disorder or dysfunction. Since that time there has been a substantial amount of work linking ACEs to negative mental health outcomes. Mental health dysfunction is a substantial problem in the United States, according to the National Institute of Mental Health (NIH) (2017) the estimated lifetime occurrence for some of the leading mental health issues include 21.4% for mood disorders, 31.1% for Anxiety, and 6.8% for PTSD. The prevalence of ADHD in children has dramatically increased from 7.8% in 2003 to 11% in 2011 (data gained from the

National Survey of Children's Health, 2003 to 2011, no additional data is available). According to the CDC in 2016 Suicide was the tenth leading cause of death in the United States with a toll of 44,965 which more than doubled the number of homicides that year of 19,362. Suicide was the second leading cause of death of those aged 10-34 (13,525) topped only by unintentional injury and the fourth leading cause of death of those aged 35-54 (15,467) topped by unintentional injury, heart disease and cancer (CDC, 2016). Suicide is not just a US issues, according to the World Health Organization (2019) in 2016 suicide was the 2nd leading cause of death for those aged 15-29.

There has been consistently increasing incidence of mental health occurrences in the United States and evidence of a connection between ACEs and mental health outcomes. Along with other mediating factors ACEs have been linked to suicide in late life along with increased suicidal behavior throughout life (Cleare et al., 2018; Sachs-Ericsson et al., 2016). Similar connections have been made between ACEs and suicide in other countries such as Canada and Germany (Fuller-Thomson et al., 2016; Westermair et al., 2018). Anxiety is one of the most common mental health issues in the US with a lifetime prevalence of about 31% of the population followed closely by mood disorder with include any disorder that affects the emotional state such as depression and bipolar disorder at around 21% of the population (NIH, 2017). Research indicates that there is a relationship between the total ACEs reported and the occurrence of anxiety and mood disorders in retrospective studies (Poole et al., 2017; Sachs-Ericsson et al., 2107; Westermair et al., 2018). The relationship between ACEs and mood and anxiety disorders has also been found to have both a mediating and a moderating effect on the outcome of health (Sachs-Ericsson et al., 2017). Although a great deal of the research has been

focused on how ACEs can contribute to the mental health outcomes of adults, there is some recent data that links ACEs to childhood mental disorders such as ADHD showing children with 4 or more ACEs as 2-3 times more likely to present with ADD/ADHD than those without ACEs (Hunt et al., 2017; Mckelvey et al., 2018).

ACEs have been linked to effects on both children (Balistreri & Alvira-Hammond, 2016; Liming and Grube, 2018) and adult (Garcia et al., 2017; Hughes et al., 2016; Mosley-Johnson et al., 2018) as they relate to overall well-being. Mosley-Johnson et al. (2018) in a longitudinal study looked at how adults with ACEs compared to those without ACEs as they relate to overall life satisfaction and psychological well-being and concluded that those that experienced ACEs, in particular abuse and household dysfunction, had significantly lower scores in all areas tested (life-satisfaction, psychological well-being, and social well-being). In a systematic review of literature, Liming and Grube (2018) found that children exposed in early childhood to 2 or more ACEs had a higher rate of negative overall well-being outcomes. According to the CDC in 2016 there were more than 6 million children in the US diagnosed with ADHD (CDC, 2019c). There have been several ways the ACEs and ADHD have been linked, from ACEs in the mother linked to ADHD in the children (McDonald et al., 2019) to ACEs and abuse of children being linked to ADHD in the child (Brown et al., 2017; Fuller-Thomson et al., 2014; Jimenez et al., 2017). ADHD is not the only childhood issue that has been linked to ACEs, overall behavioral problems have also been linked to ACEs (Clarkson, 2014; Hunt et al., 2017; McDonald et al., 2019). Brown et al (2017) compared children with and without ADHD and ACE scores and found that children with 2 or more ACEs were significantly more likely to have higher levels of ADHD and that children

with ADHD presented with higher scores in all ACE areas. McDonald et al (2019) in a longitudinal study of mothers and their children found that mothers who experienced 3 or more ACEs exhibited more negative parenting abilities, higher levels of health harming attitudes such as smoking and drinking and had lowing coping abilities. The children of the mothers in this group of 3 or more ACEs had more behavioral and temperament problems (McDonald et al., 2019).

Health Risk or Health Harming Behaviors

Health risk behavior can be difficult as a researcher as it can affect both physical and mental health outcomes so it can be troublesome to categorize to operationalize. Health risk behavior can include (but is not limited to) activities such as smoking, alcohol and drug abuse, risk taking, illegal activities, sedentary lifestyle, high risk sexual behavior, and attempted suicide. While there may be some crossover between health harming behavior, mental health, and medical conditions, for instance suicide attempts can be categorized as mental health-related and obesity can be categorized as health-related, health harming behaviors is its own category as it focuses on the lifestyle and actions of the individual and not strictly the outcomes (Khrapatina & Berman, 2017; Umeda et al., 2015). Exposure to ACEs has been linked to increased risk of adult health risk behavior and in some cases increase in health risk behavior in those prior to adulthood (Brown & Shillington, 2017; Felitti et al., 1998; Khrapatina & Berman, 2017).

According to the National Institute on Drug Abuse (NIH, 2018) More than half of adults in the US have taken illicit drugs in their lifetime and nearly 40 percent of those 18 to 25 have taken illicit drugs in the last year, and close to 25 percent of adolescents from 12 to 17 have taken illicit drugs in their lifetime. There tends to be a graded relationship

between exposure to ACEs and risk of drug related risk behavior both in adolescence and adulthood. Although mediating factors such as outside support and socioeconomic status may influence the outcomes of these risk behaviors there is still a substantial relationship between ACEs exposure and drug use (Brown & Shillington, 2017; Forster et al., 2018).

Smoking can lead to major health issues including lung disease, heart disease and cancer, and according to the CDC (2019) in 2017 about 14 percent of adults currently smoked cigarettes. Smoking has been used as an emotional coping mechanism and tends to remain high among those with mental illness (Anda et al., 1999; CDC, 2019). Smoking is another health harming behavior that has been linked to individuals that have reported increased exposure to ACEs (Anda et al., 1999; Rehjopf et al., 2016).

Alcohol abuse is one of the leading preventable causes of death in the US and has been linked to higher ACEs scores (Crouch et al., 2018; Fuller-Thomson et al., 2016; Liu et al., 2016). Fuller-Thomson et al. (2016) found a significant relationship between abuse, including indirect parental domestic abuse) and drug and alcohol abuse. Liu et al. (2016) found similar results in a male population of alcoholics. The researchers found that the participants had much higher instances of ACEs and in particular those that were related to physical and emotion abuse than those of nonacholic participants (Liu et al., 2016). Crouch et al. (2017) found that all categories of ACEs were associated with elevated levels of alcohol consumption.

Suicide, suicidal behavior and self-harm are mental health issues, but they are also health risk behaviors as these behaviors can lead to health risks and/or death. The risk of attempted suicide and multiple hospitalizations for self-harming behavior has been linked to exposures to ACEs. Lifetime risk of suicide attempts when associated with any

exposure to ACEs were 2 to 5 times greater than for those with no exposure (Dube et al., 2001). Individuals who had multiple self-harming hospitalizations where nearly 2 and a half times more likely to have suffered 4 or more ACEs then their counterparts who were hospitalized for the first time, they were also found to be nearly twice as likely to have an intent to die (Cleare et al., 2018). Given that suicide is the leading cause of death between those aged 10 to 34 the link between ACEs and suicidal behavior and self-harming behavior should be seen as an important health risk behavior (NIMH, 2017).

Sexual risk behavior are those behaviors that can put someone at higher risk for health-related problems such as sexually transmitted diseases, infections or unwanted pregnancy. Sexual risk behavior can include early sexual activity, unprotected sex, and multiple sexual partners. According to the CDC there were nearly 1.6 million reported cases of chlamydia in 2016 and more than 38,000 reported cases of HIV in 2017 (CDC, 2017), sexual risk behavior has been linked to ACEs (Brown et al., 2016; Hillis et al., 2001; Marshall et al., 2017). Some of the behaviors that are considered sexual risk behaviors are early sexual activity, diagnosis of a sexually transmitted disease (Brown et al., 2016), unprotected sexual contact, sex with multiple partners at one time, sex while intoxicated, or with the use of intravenous drugs (Marshall et al., 2017).

Obesity is a condition that can lead to many other health-related problems including diabetes, high blood pressure, gallstones, joint problems and other health risks (NIH, 2017). According to the National Health Institute a person with a body mass index (BMI) over 25 is overweight and over 30 is obese and over 40 is extremely obese. Based on 2013-2104 statistics it is estimated that over 70 percent of adults in the United States are either overweight or obese (NIH, 2107). Obesity can be a result of a combination of

poor food intake decisions, lack of physical activity and an overall sedentary lifestyle, and as it can lead to many other health dysfunctions it is considered a health harming behavior and exposure to ACEs has been linked to adult obesity (Rehkopf et al., 2016; Williamson et al., 2002).

Criminal behavior including nonviolent crimes, violent crimes and domestic violence offences are health risk behaviors as they can lead to injury, incarceration, or death. This type of criminal behavior in adolescents has been linked to ACEs and have an increased effect for those that had faced what could be considered more complex ACEs (Fagan, 2005; Rebbe et al., 2017).

Other Areas of ACEs Research

There are many areas of mediating and moderating factors that have been looked at in the current research. Such factors include the disproportionate relationship between income and ACEs (Halfon et al., 2017), the effects of socioeconomic status on ACEs and outcomes (Baglivio et al., 2017) and the relationship between race and ACEs (Rebbe et al., 2017). Other factors are how the co-occurrence of ACEs relates to outcomes (Dong et al., 2004), the relationship between childhood ACEs and adult adversities (Nurius et al., 2015) along with what role resilience plays in ACEs and overall outcomes (Bethell et al., 2014).

Other areas of ACEs outcomes research include the cycle of violence, neurological impacts, behavioral impacts, parenting, gender, and quality of life. Cycle of Violence theory posits that those exposed to violence as children are at a higher risk of engaging in violent behavior (Fagan, 2005) this includes intimate partner violence (Jackson, 1996; Pournaghash-Tehrani & Feizabadi, 2009), Gang activity, violent crimes

(Rebbe et al., 2017), and negative parenting (Dubowitz et al., 2001; Kolomeyer et al., 2016). Behavior outcomes in adolescents are another area that have been investigated in relationship to ACEs, the impact of ACEs has been linked to overall delinquency (Brown & Shillington, 2017), childhood rule breaking, mood dysregulation (Hunt et al., 2017), Aggressive behavior (Mckelvey et al., 2017), ADHD (Hunt et al., 2017; Mckelvey et al., 2018), and academic dysfunction (Mckelvey et al., 2018). Other impacts that have been investigated are issues such as quality of life (Balistereri & Alvira-Hammond, 2016), views on impacts of ACEs (LaNoue et al., 2013), neurological effects such as threat recognition (Chu et al., 2016), and early interventions (Read & Bentall, 2012; Walker & Walsh, 2015). Another area (that will be looked at in greater detail in another section) is the relationship between ACEs and women (Rebbe, et al., 2017), parenting behaviors (Agarwal, 2015; Hunt et al., 2017) and Motherhood (Borja et al., 2019; Dubowitz, et al., 2001; Kolomeyer et al., 2016; Mash & Johnston, 1983); Sexton et al., 2015; Wigg et al., 2017).

It has been well studied that ACEs are linked to numerous negative adult outcomes both physical and psychological, however in recent years more research has studied the biological and neurobiological effects of ACEs (Rinne-Albers et al., 2017; Vai et al., 2017). Rinne-Albers et al. (2017) compared the grey matter of adolescents with PTSD that had experienced sexual abuse to a control group and found that there is a connection between grey matter volume and abuse that may be related to difficulty processing emotions.

It has been established that individuals who experience ACEs are more likely to have a wide range of negative adult outcomes, however the intergenerational cycle of

abuse is an area that has not been vastly researched. Lê-Scherban et al. (2018) looked at 350 parent-child dyads to see the effects of parental ACEs on children's health. The researched found that increased ACEs score of the parent was related to higher overall negative health score of the child (Lê-Scherban et al., 2018).

Jai and Lubetkin (2020) took a new approach to looking at ACEs and health outcomes by looking at adjusted mortality based on ACE score and also gender. According to the research using the Behavioral Risk Factor Surveillance System (BRFSS) over a two-year period they discovered that there is a significant decrease in years lived based on ACEs reported (Jai & Lubetkin, 2020). Based on the analysis done by Jai and Lubetkin (2020) there is a 9.5-year difference between those reporting 3 or more ACEs and those reporting none, and the impact was almost three times higher for women than for men.

The relationship between income, ACEs, and outcomes later in life have been looked at by many researchers (Cohen-Cline et al., 2019; Halfon et al., 2107; Hargreaves et al., 2019). Much of the research has focused on how low-income populations are affected by ACEs. Cohen-Cline et al. (2019) looked at low-income population and the underlying factors involved in ACEs, while Hargreaves et al. (2019) looked at low-income populations and ACEs as they related to health care. There is substantial research that concludes there is a relationship between ACEs and negative outcomes, however according to Halfon et al. (2017) there is not a substantial income separation. Haldon et al (2017) found that there were high instances of ACEs in nearly all levels of income (other than the highest), the conclusion being that ACEs may not be income related and there is a need for preventative care and intervention across all socioeconomic levels.

The effects of ACEs are not strictly an issue facing the US population, research has been conducted worldwide that indicates similar relationship between ACEs and health, mental health, and health risk behaviors (Davidson et al., 2016; Read & Bentall, 2012; Scott et al., 2011; Umeda et al., 2015; Westermair et al., 2018). Scott et al. (2011) conducted a cross sectional study that spanned 10 countries with over 18,000 participants and found results that were consistent with similar ACEs studies conducted in the US. The researchers associated 6 major medical conditions to an ACEs score of 3 or more. Westermair et al. (2018) also found consistent results in a study conducted in Germany. The researchers found a relationship between ACEs score and mental health outcomes. Umeda et al. (2015) found similar results with a moderating effect of low socioeconomic status in Japan. Similar results have been found in studies conducted in both Canada and the UK (Davidson et al., 2010; Fuller-Thomson et al., 2016; Read & Bentall, 2012). These similarities in findings in different counties indicate that the relationship between ACEs and health-related outcomes is not a cultural phenomenon. Additional research that could lead to effective preventative resources could have a substantial world-wide impact.

Cost

ACEs have been linked to some of the top chronic diseases in the US such as heart disease, cancer, stroke, diabetes, and obesity (Rehkopf et al., 2016; Felitti et al., 1998). In conjunction with these chronic diseases ACEs have also been linked to some of the leading rick factors that are considered health harming behaviors such as smoking, sedentary lifestyle and alcohol abuse (Khrapatina & Berman, 2017; Rehkopf et al, 2016). According to the CDC these chronic diseases and rick factors are some of the costliest to

the US medical economy (CDC, 2019d). The US spends 3.5 trillion dollars a year in health costs, 90% of this expenditure is devoted to chronic conditions and mental health (CDC, 2019d). Heart disease and stroke kill more than 859,000 Americans each year accounting for nearly $200 billion in health care costs and $131 billion in lost productivity, Cancer claims nearly 600,000 lives with more than 1.6 million diagnosed each year (CDC, 2019d). Smoking is the number one cause of preventable deaths in the US and costs $170 billion per year in health care and alcohol use is the cause of 88,000 deaths and an economic cost of $249 billion (CDC, 2019d).

Resilience

Resilience and ACEs have similar theoretical backgrounds and it is of little surprise that the two concepts are consistently researched together. Both Resilience theory and ACEs theory believe that there are risk factors that increase the likelihood of negative outcomes later in life (Felitti et al, 1998; Greene et al., 2003). However, ACEs theory focuses on specific childhood events and how they relate to negative adult outcomes (Felitti et al., 1998) whereas resilience theory does not limit the negative childhood events to specific events and looks at the resilient or rebounding outcomes and looks at what factors may have been protective and helped in this resilient outcome (Garmezy, 1991; Rutter, 2013). Many researchers have looked at resilience over the years however there are several that can be seen as key to resilience research (Shean, 2015). Norman Garmezy is known as the founder of resilience research, he began his career doing research into the pathology of children raised by parents with schizophrenia (Garmezy, 1961), but he is considered the founder of resilience research for being the first to publish findings on resilience in 1971 (Garmezy, 1991), but is also known for his

landmark longitudinal study in 1987 called “Project Competence” that looked at how children overcame rather than suffered from adversity (Garmezy, 1987; Shean, 2015). Other significant resilience researchers include Michael Rutter whose work began, similar to Garmezy, by looking at children of parents with schizophrenia but in the process discovered resilience. Rutter focuses strongly on environment and resources as the key to resilience (Rutter, 2007; Rutter, 2013). Emma Werner is known for her longitudinal study conducted on 698 infants born in Hawaii, she categorized resilience factors as individual, family and community and the predictability of one’s internal and external environment as important factors (Werner, 1998). Suniya Luthar is known for research with inner city youth (Luthar, 1991). Ann Masten, who was also a student of Garmezy, is known for her longitudinal study that focused on psychosocial resources and resilience (Masten, 1999). Dr Michael Ungar has focused his research on cross-cultural resilience research and founded the International Reliance Research Center, his work spans more than 14 countries and more than two decades (Shean, 2015). Ungar believes that it is not solely characteristics of the individual or the environment that led to resilience but a combination of the two and that it is important to understand culture and background to understand resilience (Ungar, 2005; Ungar, 2013). Ungar looked at resilience as a culturally specific concept that is complex and needs to be seen with all of its complexities and contexts to be understood (Ungar, 2011).

There are many areas that have been researched in relation to resilience and the different factors that contribute to both early and later life adaptation and development of resilience (Karatoreos & Mcewen, 2013; Luthar, 2015). Some research focuses on the developmental factors involved in adversity and resilience (Luthar, 2015; Masten, Best,

& Garmezy, 1990: Werner, 1995), others in the environmental factors (Bellis et al., 2017; Garmezy, 1991), and yet others on the neurobiological perspective (Karatoreos & Mcewen, 2013), and finally aspects of intervention and social policy as factors of resilience research (Chandler, et al., 2015; Cicchetti, 2016; Hendrick & Young, 2013; Steverman & Shern, 2017). There have been three major categories that have been identified in relation to resilience research as factors that relate to resilience; personal or dispositional factors, familial factors, and social support factors (Werner, 1998; Garmezy, 1991). Children who are resilient to adversity are not impenetrable to the effects of these negative events, they are however more capable of coping and carrying out daily activities such as work and paying bills (Werner, 1995; Garmezy, 1991). It is a good reminder that although resilience is related to overall competence in life, some of these individuals still experience negative health outcomes, sadness, stress, and difficulty in areas such as relationships (Garmezy, 1991).

Personal/Developmental

There are individual and developmental factors that have been identified as being contributing factors to encourage resilience in in adversity during childhood, some of these factors include temperament, locus of control, and intelligence (Werner, 1995; Werner, 1998; Wertlieb et al., 1987). Temperament as a factor in resilience in childhood can be seen as a child that is easy to interact with and has few problems, one that is outgoing and does not display negative behavioral attributes or moods (Werner, 1995; Werlieb et al., 1987). These temperamental patterns are linked to the ability to develop coping skills, reach out for assistance when needed, and externalize problems (Werner, 1995; Werlieb et al., 1987). Temperamental patterns that have been studied as they relate

to resilience include such things as locust of control, self-confidence, empathy, and optimism (Acar Sivri et al., 2019; Georgescu et al., 2019; Phillips et al., 2019). Phillips et al. (2019) linked temperament of children who have experienced adversity to reduced risk-taking behavior and increased resilience. Other research has indicated that both environment and temperament are linked to higher levels of resilience across different levels of adversity (Acar Sivri et al., 2019; Georgescu et al., 2019). Internal locust of control, the belief that one has control over their environment, has been linked to higher resilience in youth (Luthar, 1991; Werner, 1989). Intelligence is another factor that has been linked to resilience, some research indicates that individuals with high levels of intelligence who were exposed to adverse childhood events were more likely to maintain regular levels of adjustment (Kandel et al., 1988, Luthar & Zigler (1991). However, other research has indicated that intelligence has the opposite effect and may even be considered an inhibiting factor to resilience (Luthar, 1991; Zigler & Farber, 1985).

Familial

A strong family network with support systems has also been linked to increases in resilience (Werner, 1995). Maltreatment in the home environment has been related to lower rates of resilience (Luthar, 2015), a strong family environment has a positive relationship with resilience in the face of adversity (Luthar, 2105; Conger & Conger, 2002). Strong family support has been linked to aspects of resilience such as life satisfaction, self-sufficiency, self-esteem, and reduced rick of suicide (Grevenstein et al., 2019; Zortea et al., 2019). Household disruption, including parental separation is included as an ACE, however this does not mean that there cannot be strong family connection that can help encourage resilience. Napora (2019) found that similar resilience

can be linked to children that have consistent relationships with a single parent or grandparent in families where there is an absent father.

Social

An emotional support person in childhood is another factor that has been linked to resilience outcomes in children that have experience adversity (Werner, 1995; Bellis et al., 2017). Although children who have experienced negative home environments have been shown to have negative developmental outcomes and tend to show less resilience (Luthar, 2105), there is evidence that a trusted adult outside of the family can offset some of these effects and possibly support resilience (Bellis et al., 2017; Reis & Collins, 2004). Social support has been shown to mitigate some of the effects of adversity and facilitate resilience in a number of situations including PTSD, terror attacks, natural disaster and ACEs (Aliche et al., 2019; Mesidor & Sly, 2019; Racine et al., 2018). Social support can come in many forms, from peers, community, religious organizations, or other social support group. Aliche et al., 2019 found that after a terror attack the individuals that both had perceived social support and had found direction or meaning in their lives had higher levels of resilience. Other studies had similar results that indicate social support as a factor in resilience with relation to posttraumatic growth (Aliche et al. 2019; Mesidor & Sly, 2019), maternal antepartum risk as related to ACEs (Racine et al., 2018), and specific populations such as American Indian youth (Roh et al., 2015).

Genetic/Neurological

The role of genes has been an increasingly researched area in the field of resilience. There have been several genetic factors that have recently been identified as being linked to resilience or lack of resilience to childhood trauma (James et al., 2017;

Terock et al., 2019; Wang et al., 2018). Recent research has indicated that there is an interaction effect between variations of the FKBP5 gene (Terock et al., 2019; Wang et al., 2018) and the apolipoprotein E (apoE) gene (James et al., 2017) and resilience after adverse childhood events. Although these results do not imply that genes are the only factor on resilience there is an indication that individuals with the FKBP5 gene may be more susceptible to negative mental health outcomes (Wang et al., 2018) and those with certain types of the apoE gene may be more prone to resilience (James et al., 2017). It was previously believed that as a person matured the neural pathways also matured from plastic to a more hardened state. This belief has been challenged over the years with research in brain trauma patients (Krishna et al., 2017) and resilience (Karatoreos & Mcewen, 2013). There are now indications that with the help of treatment and environmental factors there may be a way to return the brain to a more plastic state in order to facilitate resilience after childhood trauma (Karatoreos & Mcewen, 2013).

Policies and Practice

A great deal of research has been devoted over the years to understanding the mechanisms of resilience for those that have been exposed to childhood trauma. The logical next step is how to use that information to implement policies and resources in the community. There are several ways researchers have looked at implementing the resilience research (Hendrick & Young, 2013) that include prevention, intervention (Chandler et al., 2015) education (Wood-Jaeger et al., 2018), health resources (Steverman & Shern, 2017) and community access (Davidson et al., 2019). Although it may not always seem like a huge leap between research outcomes and program implementation there can be some obstacles including re-designing current programs, converting theory

into actionable projects, and financial hurtles (Hendrick & Young, 2013; Steverman & Shern, 2017). Although there are studies that indicate that youth intervention programs are effective at promoting resilience (Chandler et al., 2015), community programs are important in promoting parental resilience (Woods-Yaeger et al., 2018), and screenings and early detection in healthcare settings are critical to intervention and referral (Colvin, et al., 2016; Marie-Mitchell et al., 2016) the primary hurdle that prevents effective program initiation is that of lack of financial means and program coordination (Steverman & Shern, 2017). In 2017 the United States spent 3.5 Trillion dollars on health care expenses, yet only 3% of that went to public health and preventative programs (CMS, 2018). When it comes to public health programs there is not only the issue of limited funding, but also disagreement as to who's budgeted the funding is coming from when multiple organizations or communities are involved (Steverman & Shern, 2017). Research and data are an important part of understanding how to solve problems, but implementation is whole other problem that needs to be solved with additional program evaluation and pilot programs to demonstrate the success and cost effectiveness of preventative and intervention programs.

Researchers in many studies have looked at the efficacy of pediatric screenings into the risk factors of ACEs during routine childhood exams (Bright et al., 2015; Colvin et al., 2016; Kerker et al., 2016; Purewal et al., 2016) and even parental ACEs screenings (Szilagy et al., 2016) to help guide families to preventative care and resources needed to prevent the cycle of ACEs. This is one such area where the research exists, but the implementation of widespread programs has not occurred due to limitations in organization, funding, and resources.

Other Areas of Resilience Research

Although resilience theory and research have a tendency to focus on the resilience of children who have experience trauma or maltreatment such as ACEs, there are other areas of research that may shed some light on the overall development and impact of resilience in both children and adults. Researchers have studied how resilience relates to areas such as education (Wilson et al., 2019; Zarotti et al., 2020), the military (Cramm et al., 2018; Van Voorhees et al., 2018), natural disasters (Ota et al., 2019), loss (Coa et al., 2020), and personality traits such as the Big 5 (Ercan, 2017; Sârbescu & Boncu, 2018).

The transition to post-secondary education can be a tumultuous one at best and the mental health of these students has become a topic of study. Wilson et al. (2019) looked at the effects of resilience and personality of first year college students on GPA and found that there was an effect for personality but not specifically for resilience unless combined with other factors. Zarotti et al. (2020) looked at the effects of cognitive reprisal and resilience on university students and found that mindfulness plays a significant mediating role in the relationship between cognitive reprisal and resilience leading the research to conclude that mindfulness training would be beneficial to university students.

Trauma or adversity can occur both in childhood and in adulthood and may stem from a multitude of sources. Military personnel and veterans, victims on natural disasters, and those that have suffered significant loss such as the loss of a child are a few examples of these sources.

In a longitudinal study Van Voorhees et al. (2018) looked at the violence that stems from veterans and how social support can influence resilient coping. The

researchers found that participants that had reduced levels of social support had increases in violence (Van Voorhees et al., 2018). Ota et al. (2019) looked at survivors of the Great East Japan Earthquake and the relationship between resilience and brain network. The researchers found a negative relationship between resilience and the right anterior cingulate cortex indicating there may be a biological relationship between trauma and resilience (Ota et al., 2019). Loss is another event that may influence the mental health outcome of a person. Cao, Yang and Wang (2020) investigated how resilience is influenced by social support of those that have experienced the loss of an only child in China. Cao, Yang and Wang (2020) found that resilience was supported by social and familial support as a protective factor on mental health.

The personality types have been used in many research related fields, and resilience is no exception. The five-factor model of personality (FFM) or the "big five" are five dimensions of personality as they relate to extroversion, agreeableness, contentiousness, neuroticism, and openness (McCrae & John, 1992). The alternative five factor model (AFFM) was developed by Zuckerman in 1994 and consist of impulsive sensation seeking, neuroticism-anxiety, aggression-hostility, sociability, and activity (Schmitz, 2004). Ercan (2017) looked at the relationship between the FFM and resilience and found that neuroticism, conscientiousness, and extroversion where predictors of resilience which aligned with other similar studies of these variables. Sârbescu and Boncu (2018) looked at the alternative five factor model and compared it to the original five factor model as it relates to resilience. The researchers found that resilience was related to both low neuroticism-anxiety and low aggression-hostility, high sociability and

high activity, and with average impulsive sensation seeking (Sârbescu & Boncu, 2018), these results show similarities to the results from the FFM with some minor variations.

Motherhood

The ACEs questionnaire consists of ten questions that assesses childhood adversities which are believed to have an effect on overall wellbeing throughout the lifespan (Felitti et al., 1998). Five of the questions are directly related to events specific to parental conduct, three other questions are directly related to members of the household and only two are related to general family or other adults (Felitti et al., 1998). With what seems like a very clear link between parental conduct, family life and advise events, there is strikingly little research into ACEs and parenting and even less that focuses on mothers alone. ACEs in mothers has been linked to negative parenting behaviors (Borja et al., 2019; Kolomeyer et al., 2016) which had also been related to increased behavior problems in children (Howard et al., 2001). The research on motherhood tends to focus on mediating factors such as reflective functioning where the parent is able to self-reflect on their own emotional state (Kolomeyer et al., 2016) and resilience (Borja et al., 2019; Sexton et al., 2015). One meta-analysis and follow up study conducted by Khan and Renk (2019) looked at the relationship between ACEs and depression as they relate to parenting in mothers and the outcomes in children. According to the analysis there are significant relationships between the mother's childhood adversities, depression, mother-child bonding, and the child's internalizing and externalizing of problems. Young (2018) specifically looked at research on the transition into parenthood as it relates to resilience theory. In this analysis of literature there were 29 resilience factors that related to the effective transition into parenthood, however some of the primary concepts were similar

to those that have already been discussed such as optimism, self-esteem, and social, community and familial support (Young, 2018). Although there has not been a great deal of research on resilience as it relates to motherhood, there are several different ways the research can be framed. First there is the view of how resilience is a factor in parental stressors such as single parenting (Chasson & Taubman, 2020) and then on the other hand there is research that looks at how past adversities and resilience impact current parenting (Panisch et al., 2020). Several researchers have focused on breaking the cycle of ACEs from parent to child (Wiig et al., 2017; Woods-Jaeger et al., 2018) with the underlying theme that community support and programs are key to the success of this goal.

The Gap in the Research

Although many of these factors have been studied individually and in conjunction with one another the combination of adverse childhood events, health-related outcomes, resilience and motherhood have not been studies as combined factors. This study intends to fill that gap in the research to improve our understanding of the role motherhood plays in health-related outcomes due to adverse childhood events in relationship to resilience.

Summary and Conclusions

ACEs have been linked to all forms of health-related outcomes that include behavioral, mental health issues, major medical problems, ADHD, and overall well-being. The overall theme of these studies supports the conclusion that with an increase of ACEs comes a decrease in overall health. Another overall theme is that early detection and intervention of ACEs related cases is crucial to preventing long term problems.

Resilience research has a similar theme to that of ACEs in that prevention and intervention are critical components. Although there are some factors that are believed to be genetically supportive of resilience, it is a general theme of resilience research that outside support is needed to build resilience and that it can be learned with the appropriate tools. One of the hurtles that needs to be overcome is the financial restraints of building and maintain programs to build resilience and overcome the damage that can be caused by ACEs.

Although it is clear that ACEs has an effect on parenting and plays a role in the cycle of ACEs, there has been little research done in this area. Mothers play a significant role in the upbringing of children, yet there is little known about how ACE effect motherhood and what role becoming a parent has on resilience. The present study will look at the differences between mothers and nonmothers as they relate to ACEs and resilience and overall health-related outcomes. This may shed some light on impacts of motherhood or specific areas that may need attention to facilitate resilience for mothers who are impacted by ACEs.

Chapter 3: Research Method

Introduction

The purpose of this research design quantitative study was to examine the relationship between ACEs and measures of health-related outcomes among mothers and nonmothers, while moderating for a measure of resilience. This chapter will detail the participants, materials, research design, and procedure. This will include the strategy for recruitment and data acquisition, instrumentation, and statistical analysis, while acknowledging factors related to ethical concerns, reliability and validity. Research questions and hypotheses will be restated, and finally a summary will conclude the chapter.

Research Design and Rationale

The independent variables for this study were ACEs, motherhood, and a measure of resilience. The dependent variable of health-related outcomes will be a weighted linear composite (latent variable) of health status and health-harming behaviors.

The study was a quantitative, research design that utilized a convenience sample of internet survey participants who met several criteria for inclusion. The primary sampling group consisted of mothers and nonmothers, over the age of 18. A 3-way multi-variate analysis of variance (MANOVA) was used to examine the relationship between ACEs and health-related outcomes among mothers and nonmothers, while moderating for the effects of resilience.

Data were collected using an internet sampling strategy developed on SurveyMonkey and distributed on the Prolific platforms. Internet sampling strategies are a cost effective and time efficient method of data collection that has become an accepted

psychological tool for research. Although there are advantages and disadvantages to internet survey, as in all research methods, the access to large participant pools and convenience to participants and researchers alike, along with the proved reliability, have made internet research an effective and accepted tool within the field of psychology (Buhrmester et al., 2011; Gosling et al., 2004).

Methodology

Population

The target population for this study is women, 18-years of age and over, categorized as a mother or nonmother. Participants in the 'mother' group have had at least one child for whom they consistently have been the primary caretaker (at least 50% legal custody). The nonmother group include women, 18-years of age or older who have never had children, nor had legal custody, through foster care, adoption or marriage.

Two convenience sample groups were used from a participant pool of Prolific subscribers. The participants were selected if they meet the criteria of being female and 18 years of age and over. One group of participants was selected if they have children and have qualified with the prescreening questions, while the second group of participants had no children and qualified based on the prescreening questions.

The first sample group had inclusion criteria that includes being female, 18 years of age or over, and have either given birth or had legal obligation for a child from birth to current age and maintained 50% or greater custody of the child throughout. The criteria for the second sample group was being female 18 years of age and over who have never given birth, nor had legal custody, through foster care, adoption or marriage.

G-Power 3.1 was used to calculate a minimum sample size of 99 for a MANOVA with interactions that has two dependent variables and three independent variables. This sample size was based on a medium effect size of .0625 (Pillais V), alpha of .05, and power of .80. A sample of 205 women were used for the study.

Procedures For Recruitment, Participation, and Data Collection

Participants were recruited and screened through an on-line crowdsourcing internet marketplace that facilitates survey collection, the company is called Prolific. Prolific has prescreened participants who can be selected using age and gender. A primary survey was conducted to prescreening participants for maternal qualifications for the survey. Once maternal qualifications were determined for both the mother and nonmother groups participants were invited back for the full survey using an anonymous user ID provided by Prolific. Demographic information that was collected once determined eligible for the study included age, race, income, education, state of residence, marital status, and number of children.

Informed consent was provided electronically prior to participation in the survey. Participants were provided with information regarding the study, how to obtain additional information, how to contact me, the researcher, information regarding voluntary participation, and additionally a crisis helpline was provided if the participant felt they needed support after the study was concluded. Because participation was anonymous, participants used a check box to either accept or reject that they have read and understand the informed consent. Participants that accept moved on to the survey.

Once the survey was complete, participants were presented with debriefing information which provided information reading the focus of the study and references

and contact information if participants wanted to request additional information. The debriefing information also included helpline data and contact sheets. The participants were then directed to the appropriate page for payment receipt which is provided by the site being used.

Instrumentation

The Connor-Davison Resilience Scale was developed by Kathryn Connor and Jonathan Davidson in 2003. This scale is commonly used to determine greater and lesser resilience in particular with those that have experienced childhood trauma (Lamond et al., 2008). On July 7, 2018 a user agreement was signed along with a $30 fee and permission was granted for the use of this scale during this project (see Appendix C for agreement and permissions). The Connor-Davidson Resilience Scale was used by Sexton et al. (2015), with an internal reliability of .92, in their study that looked at postpartum mothers who experienced childhood maltreatment, using resilience as a moderator in the outcomes of depression, post-traumatic stress, parenting, and family functioning. Lamond et al. (2008) used the Connor-Davidson Resilience Scale on an older female population with an internal consistency of .92. Connor and Davison (2003) tested the original scale in a study of 828 participants divided into 6 groups determined by mental health status. The overall internal consistency of the scale had a Cronbach's α of .89, the test re-test reliability of 24 participants has an intraclass correlation coefficient of .87, and the convergent validity was determined by correlation to Kobasa hardiness measure, Perceived Stress Scale, Sheehan Stress Vulnerability Scale, Sheehan Disability Scale, and Sheehan Social Support Scale with significant correlations (Connor & Davidson, 2003). The 10-item scale used in this study was validated by Campbell-Sills and Stein (2007).

The original ACEs study was conducted by Felitti et al. (1998) and the questionnaire used in the landmark study is available for public use on the Centers for Disease Control (CDC) website (Violence Prevention, 2016) which include the female health history and health appraisal (including health risk behavior) questionnaires. The female health history questionnaire includes ACEs questions used in the original study; however, a short version of the ACEs questionnaire is available at https://acestoohigh.com/got-your-ace-score. For the current study, a modified version of the female health history and female health appraisal questionnaires will be used (see appendix D and E) to include only questions surrounding specific health and health harming topics and to shorten the length of the overall questionnaire.

Operationalization

Motherhood: A female over the age of 18 who has had one or more children that have been in and remain in their legal care at least 50% of the time since birth. Motherhood will be measured as either birth or adoption from birth of a child that remains in mothers care through legal adult age or current age if still a minor.

Resilience: Resilience is the ability to overcome the negative effects of adversities experienced to lead a productive and fulfilling life (Howard et al., 1999). Resilience is measured on the Connor-Davidson scale based on a 25-item scale or an abridged 10-item scale (Connor & Davidson, 2003). The resilience scale measures things such as ability to adapt, outlook on life, and coping skills on a 5-point scale from 0-4 with 0 being not true at all to and 4 being true nearly all the time. The 25-item scale is scored as a total score that ranges from 0-100 and the 10-item scale is a total score that ranges from 0-40. Higher overall scores are equated with higher resilience and lower overall scores are

equated with lower resilience. An example item on the scale is “I am able to adapt when changes occur” (Connor & Davidson, 2003).

Adverse Childhood Experiences (ACEs): An event that takes place in a person’s life prior to the age of 18 and falls within the seven categories of abuse and household dysfunction. These categories include phycological abuse, physical abuse, sexual abuse, substance abuse, mental illness, violence towards mother, and criminal behavior (Felitti et al, 1998). The ACEs short form is made up of 10 yes or no questions and the total score of yes answers is the ACEs score, this score can range from 0-10. Questions can be divided in to two categories of abuse and household dysfunction and then further divided into the seven categories of ACEs. An example question is “Were your parents ever divorced” (Felitti et al, 1998).

Health Status: Health status is measured by diseases or conditions that are on the top of the mortality ratings in the United States and consist of heart disease, cancer, stroke, emphysema (COPD), chronic bronchitis, hepatitis, diabetes, and skeletal fractures (Felitti et al., 1998). The original women’s health appraisal questionnaire used to assess health status in the ACEs study was 104 questions, for the purpose of this study the appraisal will be shortened to 15 yes or no questions to assess major health issues (Felitti et al, 1998; Khrapatina & Berman, 2017).

Health Harming Behaviors: Habits or behaviors that result in negative health effects or health risks. These factors include sedentary lifestyle, obesity, smoking, drug use, alcoholism, excessive sexual partners in a lifetime that exceed 50, history of sexually transmitted disease, depression, and suicide attempts (Felitti et al., 1998). In the original ACEs study health risk behaviors were evaluated in the health history questionnaire along

with demographics and ACEs questions, the female questionnaire contained 68 primary questions with sub questions totaling 142 questions (Felitti et al, 1998). For the purpose of this study the questionnaire will be shortened to 15 yes or no questions relating to health harming behaviors (Felitti et al, 1998; Khrapatina & Berman, 2017).

Data Analysis Plan

IBM SPSS Statistics version 27 was used for data processing and analyses. Excel spreadsheets were also used to sort, organize and filter data.

Research Question 1 (RQ1): What is the relationship between ACEs and negative health-related outcomes in women?

$H_0$1: ACEs are unrelated to negative health-related outcomes in women.

H_a1: Higher scores on the ACE will be related to higher negative health-related outcome scores in women.

Research Question 2 (RQ2): How is resilience related to negative health-related outcomes in women?

$H_0$2: Resilience is unrelated to negative health-related outcomes in women.

H_a2: Higher measures of resilience will be related to lower negative health-related outcome scores in women.

Research Question 3 (RQ3): How does resilience influence the relationship between ACEs and negative health-related outcomes in women?

$H_0$3: The effects of ACE on negative health-related outcomes will not change in relation to resilience in women.

H_a3: The effects of ACE on negative health-related outcomes will be reduced by higher resilience in women.

Research Question 4 (RQ4): How does motherhood influence negative health-related outcomes?

$H_0$4: Mothers will not differ in their negative health-related outcomes.

H_a4: Mothers will show higher negative health-related outcome scores compared to nonmothers.

Research Question 5 (RQ5): How does motherhood influence negative health-related outcomes as a function of their ACEs?

$H_0$5: Mothers will not differ in their negative health-related outcomes in relation to ACEs.

H_a5: Mothers will show higher negative health-related outcome scores in relation to greater ACEs compared to nonmothers.

Research Question 6 (RQ6): How does motherhood influence negative health-related outcomes as a function of resilience?

$H_0$6: Mothers will not differ in their negative health-related outcomes in relation to resilience.

H_a6: Mothers will show lower negative health-related outcome scores in relation to greater resilience compared to nonmothers.

Research Question 7 (RQ7): How does motherhood influence negative health-related outcomes as a function of ACEs when moderated by resilience?

$H_0$7: Resilience will not moderate the relationship between ACEs and negative health-related outcomes in mothers or nonmothers.

H_a7: Resilience will moderate the relationship between ACEs and negative health-related outcomes in mothers, but not in nonmothers.

ACEs (independent variable) were treated as categorical with 3 levels (0-1, 2-3, and 4 or more ACEs). Resilience factor (moderating variable) were treated as categorical, either as dichotomous based on median split, or with 3 levels, depending on the frequency distribution. Motherhood (independent variable) is a single dichotomous categorical variable. The dependent variable of health-related outcomes will be a weighted linear composite (latent variable) of health status and health-harming behaviors, used in a three-way MANOVA. In the event that one of the multivariate main or interaction effects is statistically significant, post hoc tests will include univariate analyses of variance and multiple comparison tests. These tests will isolate specific main and simple effects. Demographic information was collected, and data was analyzed against health-related outcomes by conducting a series of one-way MANOVA's. If a demographic variable is significantly ($p < .05$) related to negative health-related outcomes, it will be used as a moderator variable in tests of experimental hypotheses.

The current study has two categorical independent variables, one categorical moderator variable, and two continuous dependent variables. The independent variables are motherhood (mothers versus nonmothers) and adverse childhood events (with three levels based in severity) (Mckelvey et al., 2018). The moderating variable was resilience (divided into either high and low or three groups depending on the frequency distribution) (Lutz et al., 2017). The two dependent variables were based on a composite score (health-related outcomes) obtained by summing responses from two separate health questionnaires (modified female health appraisal and modified female health harming behaviors) (Anda et al., 1999).

The relationships between motherhood and health-related outcomes, and ACEs and health-related outcomes can both be moderated by resilience, which would be revealed by the respective two-way integration term in a MANOVA. Likewise, the interaction effects of motherhood and ACEs on health-related outcomes may also be moderated by resilience, which would be reflected in the three-way interaction term. The advantage of using a MANOVA in this study is the ability to focus on three moderating effects of Resilience (Dubowitz et al, 2001; Kandel et al., 1988).

According to Barron and Kenny (1986) when using independent variables that are dichotomous the best analytical framework for testing the moderating effect is to use an interaction term in a 2 x 2 ANOVA. Using the Barron and Kenny model with the current variables the analysis would then be adjusted to a 3-way MANOVA. Similar studies that have conducted analyses on variables of ACEs and resilience have used ANOVA (Jackson, 1996; Kandel et al., 1988; Krishna et al, 2017; Mash & Johnson, 1983), ANCOVA (Borja et al., 2019), MANOVA (Dubowitz et al., 2001; Kandel et al., 1988; Liebenberg & Moore, 2016; Lotzin et al., 2018; Nowakowski-Sims, 2018), and MANCOVA (Kandel et al., 1988). ACEs have been analyzed in many different ways from all ten factors as individual variables (Felitti et al., 1998), to categorize ACEs into levels such as 0, 1, 2-3, ≥4 (Bellis et al., 2017). Similarly, the childhood trauma questionnaire (CTQ), which is similar to the ACEs scale, has been used categorically as none, mild, moderate, and sever ranging from 0-3 (Terock et al., 2019). Resilience scores have also been analyzed categorically using high and low based on a median split (Lutz et al., 2017).

Threats to Validity

One of issues with external validity with this study is the sampling method. The sample was collected via internet questionnaire which is a convenience sample of volunteers who fit the sampling criteria for the study. This limits the generalizability of the study and reduces the external validity. Another threat is self-selection bias, this is common when recruiting participants in a volunteer format.

Although it is difficult to avoid self-section bias in this type of research model collection of demographic information can be helpful in understanding the population that is being sampled and reporting the limitations and possible future research when discussing results.

A threat to internal validity is selection-by-maturation interaction. Individuals who have experienced resilience from the effects of the ACEs they encountered may be more likely to self-select to participate in this type of study than those who are experiencing more negative outcomes of ACEs. One way to overcome this threat is to use a larger population to attempt to overcome this selection issue.

The anonymity of internet research allows participants the freedom to answer questions honestly that they otherwise may not feel comfortable answering, if identified (Coomber, 1997). This method also allows researchers access to a greater audience without the added time constraints and expense and has been shown to produce high quality data (Buhrmester et al., 2011). In a comparison study of traditional and internet collection methods in psychology Gosling et al. (2004) reported that studies done via internet research held up to the scrutiny of in person research. Although there are obstacles and threats to validity in all methodologies the findings did not support the idea

that internet research is less reliable than other methodologies used in psychological research (Gosling et al., 2004).

Ethical Procedures

Institutional Review Board (IRB) approval was obtained through the Walden University IRB office prior to inception of research data collection (approval number 06-23-20-0444178). Once IRB permissions was granted data was collected anonymously through an internet survey forum (SurveyMonkey and Prolific) with the utilization of the available survey population provided by Prolific.

The questionnaires that were being completed contain some sensitive information and may bring about an emotional response from participants. This was addressed in the informed consent and the participants were provided appropriate phone numbers for women's help organizations and crisis lines both during the informed consent and upon debrief.

Data were collected anonymously through an internet survey collection site (Prolific). Collected data was maintained on encrypted and password protected files in Excel and SPSS on a password protected computer. Upon completion of the research the data was moved to an encrypted file on an eternal drive and stored in a combination lock safe and kept for a minimum of five years. One of the concerns with anonymous data collection is authenticity of the collected information. Screening questions was used to help evaluate the participants qualifications for the research. Another concern with data from a convenience sample based on an anonymous volunteer population can be self-selection bias. Although it is difficult to avoid self-section bias in this type of research model collection of demographic information can be helpful in understanding the

population that is being sampled and reporting the limitations and possible future research when discussing results. With the use of Prolific, the participants were provided a small incentive for their participation in the surveys, all compensation was provided directly from the data collection forum; I did not have any direct contact with participants.

Summary

Participants were recruited online to participate in an anonymous survey through SurveyMonkey for survey creation and Prolific for population and collection which has a large survey population available for researchers. After initial screening questions to determine eligibility participants completed an informed consent that included details regarding obtaining additional information on the completed study, study contact information and voluntary participation information. The participant that wished to continue checked a box that states they have read and understand the informed consent and were directed to the qualifying survey. The qualifying survey determined eligibility based on this studies definition of motherhood and nonmother. Participants that qualified were invited to participate in the full survey using an anonymous user ID via Prolific. The survey contains a series of four questionnaires, two that have 10 questions and two that have 15 questions along with 10 demographic questions for a total of 60 combined questions. All questions are either yes or no or Likert style questions. The survey should take around 10 minutes to complete. Sampling was conducted over a – day period and 205 participants completed the full survey.

A three-way MANOVA was used with three independent variables ACEs, resilience and motherhood as categorical variables. The dependent variable of health-

related outcomes was a weighted linear composite (latent variable) of health status and health-harming behaviors. In the event that one of the multivariate main or interaction effects is statistically significant, post hoc tests will include univariate analyses of variance and multiple comparison tests. These tests will isolate specific main and simple effects.

Chapter 4: Results

Introduction

The purpose of this quantitative study is to examine the effects of ACEs and motherhood on a weighted linear composite of health status and health harming behavior, while moderating for a measure of resilience. The research design and the statistical analysis will account for differences in health status and health harming behavior (health-related outcomes) that can be attributed to motherhood and ACE, moderating for resilience.

Research Question 1 (RQ1): What is the relationship between ACEs and negative health-related outcomes in women?

$H_0$1: ACEs are unrelated to negative health-related outcomes in women.

H_a1: Higher scores on the ACE will be related to higher negative health-related outcome scores in women.

Research Question 2 (RQ2): How is resilience related to negative health-related outcomes in women?

$H_0$2: Resilience is unrelated to negative health-related outcomes in women.

H_a2: Higher measures of resilience will be related to lower negative health-related outcome scores in women.

Research Question 3 (RQ3): How does resilience influence the relationship between ACEs and negative health-related outcomes in women?

$H_0$3: The effects of ACE on negative health-related outcomes will not change in relation to resilience in women.

H_a3: The effects of ACE on negative health-related outcomes will be reduced by higher resilience in women.

Research Question 4 (RQ4): How does motherhood influence negative health-related outcomes?

H_04: Mothers will not differ in their negative health-related outcomes.

H_a4: Mothers will show higher negative health-related outcome scores compared to nonmothers.

Research Question 5 (RQ5): How does motherhood influence negative health-related outcomes as a function of their ACEs?

H_05: Mothers will not differ in their negative health-related outcomes in relation to ACEs.

H_a5: Mothers will show higher negative health-related outcome scores in relation to greater ACEs compared to nonmothers.

Research Question 6 (RQ6): How does motherhood influence negative health-related outcomes as a function of resilience?

H_06: Mothers will not differ in their negative health-related outcomes in relation to resilience.

H_a6: Mothers will show lower negative health-related outcome scores in relation to greater resilience compared to nonmothers.

Research Question 7 (RQ7): How does motherhood influence negative health-related outcomes as a function of ACEs when moderated by resilience?

H_07: Resilience will not moderate the relationship between ACEs and negative health-related outcomes in mothers or nonmothers.

H_a7: Resilience will moderate the relationship between ACEs and negative health-related outcomes in mothers, but not in nonmothers.

This chapter will consist of both the data collection and analysis of this study. The chapter will begin with a detailed description of the data collection process and then include some of the initial descriptive statistics and how they relate to the general population. The next section will include more detailed descriptive statistics and results of the tests for assumptions. The final section will include the results of the statistical tests and analyses based on the research questions and hypotheses followed by a summary of this chapter.

Data Collection

Data were collected in two waves using SurveyMonkey for survey collection and Prolific for survey population. The two-step process was used due to a restriction on qualifying questions that Prolific has in place to guarantee quality and was approved through the IRB in a revised application and a variance from the description in Chapter 3. The first survey was used as a qualifying survey to verify custody of the participants that answered "Yes" to the motherhood question and verify nonparental status of participants that answered "No" to the motherhood question. The survey used skip logic and consisted of either "2" (if answer was "No" to the question of motherhood) or "3" (if "Yes" to question of motherhood to determine custody) questions. Of the 299 participants who filled out the qualifying survey 230 participants qualified and were invited to participate in the full survey. Survey invitations were submitted to participants by entering the individuals unique Prolific ID into the survey invitation field. A total of 205 completed surveys were received. Total data collection time for both surveys was 12 days.

Results

Descriptive Statistics

Study participants consisted of 205 women, all were age 18 and above. See Table 1 for a socioeconomic breakdown of the participants. One hundred and four women (50.7%) responded that they were mothers and 101 (49.3%) responded that they were not mothers. The race and ethnicity of the respondents varied: 131 (63.9%) were White, 26 (12.7%) were Black, 20 (9.8%) were Chinese, 7 (3.4%) were Vietnamese, 5 (2.4%) were Filipino, 3 (1.5%) were Asian Indian, 2 (1%) were Japanese, 2 (1%) were Korean, 1 (.5%) were Other Asian, 1 (.5%) were Pacific Islander, 7 (3.4%) identified as Other race, and 13 (6.4%) identified as Hispanic/Latino. According to the US Census Bureau (US Census, 2019) the US population is 76.3% White, 13.4% Black, 5.9% Asian, .2% Pacific Islander, 18.5% Hispanic/Latino. Based on the US census this sampling is consistent with the racial makeup of the US population, with a slightly higher representation of Asian and a lower representation of Hispanic/Latino.

The age makeup of the 205 women was: 29 (13.7%) were between the ages of 18-20, 81 (39.5%) were between the ages of 21-29, 50 (24.4%) were between the ages of 30-39, 20 (9.8%) were between the ages of 40-49, 17 (8.3%) were between the ages of 50-59, and 8 (3.8%) were 60 or older. Of the 205 women 73 (35.6%) were married, 31 (15.1%) were not married but lived with a partner, 12 (5.9%) were divorced, 84 (41%) were never married, 2 (1%) were separated, and 3 (1.5%) were widowed. Of the 205 women 63 (30.7%) reported being employed full time 1-35 hours per week, 54 (26.3%) reported being employed full-time over 35 hours per week, 45 (22%) reported not being employed but looking for work, 35 (17.1%) reported not being employed and not looking

for work, 5 (2.4%) reported being retired, and 3 (1.5%) reported being disabled and not able to work. Of the 205 women, 56 (27.3%) reported an annual income between $0-9,999, 18 (8.8%) reported an annual income between $10,000-19,9999, 27 (13.2%) reported an annual income between $20,000-29,999, 21 (10.2%) reported an annual income between $30,000-39,999, 15 (7.3%) reported an annual income between $40,000-49,999, 17 (8.3%) reported an annual income between $50,000-59,999, 12 (5.9%) reported an annual income between $60,000-69,999, 12 (5.9%) reported an annual income between $70,000-79,999, 6 (2.9%) reported an annual income between $80,000-89,999, 8 (3.9%) reported an annual income between $90,000-99,999, and 13 (6.3%) reported an annual income over $100,000. Of the 205 women, three (1.5%) reported less than a high school degree, 28 (13.7%) reported high school or equivalent, 54 (26.3%) reported some college, 19 (9.3%) reported an associate degree, 68 (33.2%) reported a bachelor's degree, and 33 (16.1%) reported a graduate degree.

Table 1

Socioeconomic Makeup of Participants

Demographic Variable	*N*	%
Age		
18-20	29	14.1
21-29	81	39.5
30-39	50	24.4
40-49	20	9.8
50-59	17	8.3
60+	8	3.9
Children		
No	104	50.7
Yes	101	49.3
Marital Status		
Married	73	35.6
Not married, but living with a partner	31	15.1
Widowed	3	1.5
Separated	2	1
Divorced	12	5.9
Never married	84	41
Employment		
Employed, working 1-35 hours per week	63	30.7
Employed, working full time (35 or more hours per week)	54	26.3
Not employed, looking for work	45	22
Not employed, NOT looking for work	35	17.1
Retired	5	2.4
Disabled, not able to work	3	1.5
Income		
Between $0 and 9,999	56	27.3
Between $10,000 and 19,999	18	8.8
Between $20,000 and $29,999	27	13.2
Between $30,000 and $39,999	21	10.2
Between $40,000 and $49,999	15	7.3
Between $50,000 and $59,999	17	8.3
Between $60,000 and $69,999	12	5.9
Between $70,000 and $79,999	12	5.9
Between 80,000 and $89,999	6	2.9
Between $90,000 and $99,999	8	3.9
Over $100,000	13	6.3
Education		
Less than high school degree	3	1.5
High school degree or equivalent (e.g., GED)	28	13.7
Some college but no degree	54	26.3
Associate degree	19	9.3
Bachelor degree	68	33.2
Graduate degree	33	16.1

Demographic Variable	*N*	%
Race		
White or Caucasian	131	63.9
Black or African American	26	12.7
Asin Indian	3	1.5
Chinese	20	9.8
Filipino	5	2.4
Japanese	2	1
Korean	2	1
Vietnamese	7	3.4
Other Asian	1	0.5
Other Pacific Islander	1	0.5
Some other race	7	3.4
Hispanic/Latino		
Yes, Mexican	6	2.9
Yes, Puerto Rican	3	1.5
Yes, Other	4	2
No	192	93.7

Note. N=205

Assumptions

Statistical assumptions were evaluated for MANCOVA related to the dependent variables (total health, total health harming, and total health composite) using IBM SPSS, Version 27. Multivariate outliers were evaluated using Kolmogorov-Smirnov and Shapiro-Wilk. These tests indicated that the dependent variables were not normally distributed (see Table 2). Despite the nonnormal distribution, the data did show homogeneity of variance. Levene's test showed homogeneity of variance in total health F (28, 101) = 0.28, p = 0.72, total health harming F (28, 86) = 0.68, p = 0.876, and total health composite F (28, 75) = 0.69, p = 0.859.

There are no univariate or multivariate outliers. SPSS was used to run a boxplot and Mahalanobis distance revealed no outliers. A scatterplot was conducted on SPSS and no visual outliers were observed. Box's M (89.13) was not significant, p (.004) > α (.001) – indicating that there are no significant differences between the covariance matrices. Therefore, the assumption is not violated.

Table 2

Tests of Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	*df*	Sig.	Statistic	*df*	Sig.
TOTAL ACEs	0.168	205	0.000	0.885	205	0.000
TOTAL Resilience	0.062	205	0.054	0.99-	205	0.162
TOTAL Health	0.194	205	0.000	0.883	205	0.000
TOTAL Health Harm	0.140	205	0.000	0.940	205	0.000
Health Composite	0.120	205	0.000	0.958	205	0.000

Analysis

As a result of preliminary correlational analyses relating demographic variables to negative health-related outcomes, it was found that age correlated significantly with both total health ($r = .335$, $p < .01$) and health harming ($r = .403$, $p < .01$). Therefore, age was used as a covariate in a three-way (ACEs, Resilience, and Motherhood) multivariate analysis of covariance (MANCOVA), with total health and health harming as the dependent variables. Results of the three-way MANCOVA are presented in Table 3.

Table 3

Multivariate Analysis of Covariance

Effect	Pillai's Trace	*F*	Hypothesis *df*	Error *df*	Sig.	Partial Eta
AGE	0.151	16.992	2	191	0.000	0.151
ACES	0.082	8.573	2	191	0.000	0.082
RESILIENCE	0.032	1.540	4	384	0.190	0.016
MOTHERHOOD	0.095	10.030	2	191	0.000	0.095
ACES *						
RESILIENCE	0.029	1.416	4	384	0.228	0.015
ACES *						
MOTHERHOOD	0.007	.664	2	191	0.516	0.007
RESILIENCE *						
MOTHERHOOD	0.024	1.164	4	384	0.326	0.012
ACES *						
RESILIENCE *						
MOTHERHOOD	0.070	3.472	4	384	0.008	0.035

Regarding Research Question 1, I hypothesized that higher ACE scores would be related to higher negative health-related outcomes in women. The results from the MANCOVA support this hypothesis (Pillai Trace = 0.151, F (2, 191) = 16.99, $p < 0.001$, partial $\eta 2 = 0.151$.) To further investigate the significant multivariate main effect of ACE, three-way univariate analyses of covariance (ANCOVA) were conducted for total health and health harming separately. As can be seen in Table 4, women with higher

ACE scores have significantly ($p < .001$) greater health harming mean scores (3.75) than do women with lower ACE scores (2.71).

For Research Question 2, I hypothesized that higher resilience in women would be related to lower negative health-related outcomes, which would be reflected in the main effect of resilience. The results from the MANCOVA did not support this hypothesis (Pillai Trace = 0.032, F (2, 191) = 1.54, p = 0.190, partial η2 = 0.16).

With Research Question 3, I hypothesized that the effect of ACEs on negative health-related outcomes in women would be reduced by higher resilience. The ACE group by resilience group interaction did not support this hypothesis (Pillai Trace = 0.029, F (4, 384) = 1.42, p = 0.228, partial η2 = 0.15).

Regarding Research Question 4, I hypothesized that mothers will have higher negative health-related outcomes than nonmothers. The results from the MANCOVA support this hypothesis (Pillai Trace = 0.095, F (2, 191) = 10.03, $p < 0.001$, partial η2 = 0.095). To further investigate the significant multivariate main effect of ACE, three-way ANCOVAs were conducted for total health and health harming separately. As can be seen in Table 4, women who were mothers have significantly ($p < .001$) greater health mean scores (2.51) than do women who were nonmothers (1.13).

For Research Question 5, I hypothesized that mothers will show greater negative health-related outcomes in relation to ACEs compared to nonmothers, which would be reflected by the ACE motherhood interaction. The results from the MANCOVA did not support this hypothesis (Pillai Trace = 0.007, F (2, 191) = .66, p = 0.516, partial η2 = 0.007).

With Research Question 6, I hypothesized that mothers will show lower negative health-related outcomes in relation to resilience compared to nonmothers, which would be reflected by the resilience by motherhood interaction. The results from the MANCOVA did not support this hypothesis (Pillai Trace = 0.024, F (4, 384) = 1.16, p = 0.326, partial η2 - 0.012).

Last, with Research Question 7, I hypothesized that resilience will moderate the relationship between ACEs and negative health-related outcomes in mothers, which would be revealed by the three-way interaction among motherhood, ACEs, and Resilience. The results from the MANCOVA support this hypothesis (Pillai Trace = 0.07, F (4, 384) = 3.47, p = 0.008, partial η2 - 0.035). As shown in table 4 the three-way interaction was only significant for total health (F (2, 192) = 5.27, p = 0.006, partial η2 = 0.052).

Table 4

Univariate ANCOVAs

Source	Dependent Variable	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
AGE	TOTAL Health	13.977	1	13.977	6.368	0.012	0.032
	TOTAL Health Harm	124.289	1	124.289	31.906	0.000	0.142
ACES	TOTAL Health	4.266	1	4.266	1.943	0.165	0.010
	TOTAL Health Harm	65.519	1	65.519	16.819	0.000	0.081
RESILIENCE	TOTAL Health	8.974	2	4.487	2.044	0.132	0.021
	TOTAL Health Harm	7.357	2	3.678	0.944	0.391	0.010
MOTHERHOOD	TOTAL Health	43.778	1	43.778	19.946	0.000	0.094
	TOTAL Health Harm	0.526	1	0.526	0.135	0.714	0.001
ACES * RESILIENCE	TOTAL Health	0.639	2	0.319	0.146	0.865	0.002
	TOTAL Health Harm	19.459	2	9.730	2.498	0.085	0.025
ACES * MOTHERHOOD	TOTAL Health	0.162	1	0.162	0.074	0.786	0.000
	TOTAL Health Harm	4.320	1	4.320	1.109	0.294	0.006
RESILIENCE * MOTHERHOOD	TOTAL Health	7.985	2	3.992	1.819	0.165	0.019
	TOTAL Health Harm	4.647	2	2.323	0.596	0.552	0.006
ACES * RESILIENCE * MOTHRHOOD	TOTAL Health	23.165	2	11.583	5.277	0.006	0.052
	TOTAL Health Harm	7.016	2	3.508	0.901	0.408	0.009

To further investigate the moderating effects of resilience on the relationship between ACEs and total harm for mothers versus nonmothers, univariate two-way ANCOVAs were conducted separately for each of three levels of resilience. As shown in table 5, the motherhood by ACEs interaction is statistically significant ($p < .05$) for only the lowest resilient group. A three-way interaction in this model is sensitive to changes in the ACEs by motherhood interaction as you go from one level of resiliency to another.

Table 5

Univariate ANCOVA Dependent Variable:TOTAL Health

Categorical resilience 3 groups	Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.
1	Model	237.149[a]	5	47.430	17.095	0.000
	ACES	0.264	1	0.264	0.095	0.759
	MOTHERHOOD	22.239	1	22.239	8.016	0.007
	AGE	3.704	1	3.704	1.335	0.254
	ACES * MOTHERHOOD	12.505	1	12.505	4.507	0.039
	Error	124.851	45	2.774		
	Total	362.000	50			
2	Model	428.800[b]	5	85.760	51.707	0.000
	ACES	2.760	1	2.760	1.664	0.200
	MOTHERHOOD	24.136	1	24.136	14.552	0.000
	AGE	9.215	1	9.215	5.556	0.020
	ACES * MOTHRHOOD	2.580	1	2.580	1.556	0.215
	Error	164.200	99	1.659		
	Total	593.000	104			
3	Model	180.083[c]	5	36.017	12.559	0.000
	ACES	3.345	1	3.345	1.167	0.286
	MOTHERHOOD	4.709	1	4.709	1.642	0.206
	AGE	1.502	1	1.502	0.524	0.473
	ACES * MOTHERHOOD	7.747	1	7.747	2.702	0.107
	Error	131.917	46	2.868		
	Total	312.000	51			

Between subjects means were evaluated for the triple interaction (see Table 6), the group of mothers that had ACEs and medium resilience had higher negative health scores than those with no ACEs by .73 points. The group of mothers that had ACEs and high resilience had higher negative health scores than those without ACEs by 1.4 points. All categories had a higher health score for mothers than nonmothers.

Table 6

Between Subjects Means: Variable Health

ACEs	Resilience	Children	Mean	*N*
No	Low	NO	0.1667	6
		YES	4.3333	3
		Total	1.5556	9
	Medium	NO	1.0000	22
		YES	2.1000	10
		Total	1.3438	32
	High	NO	1.0000	6
		YES	1.1667	12
		Total	1.1111	18
Yes	Low	NO	1.8276	29
		YES	2.5833	12
		Total	2.0488	41
	Medium	NO	0.9032	31
		YES	2.8293	41
		Total	2.0000	72
	High	NO	0.7000	10
		YES	2.5652	23
		Total	2.0000	33

Figures A, B, and C present the ACEs by motherhood interaction for each level of resiliency, respectively. Figure A with characteristically nonparallel lines reveals the statistically significant ($p < .05$) ACEs by motherhood interaction that is not present in figures B and C. For women in the lowest resiliency group, a simple effects test was

conducted comparing total health between women who reported ACSs and those who did not, for mothers and nonmothers. Among nonmothers, mean total health score for women reporting no ACEs (0.16) is significantly lower ($F(1,192) = 6.34$, $p < .013$) than for nonmothers reporting ACEs (1.83). In contrast, among mothers, mean total health score did not change in relation to ACEs.

Figure 1

Interaction Low Resilience

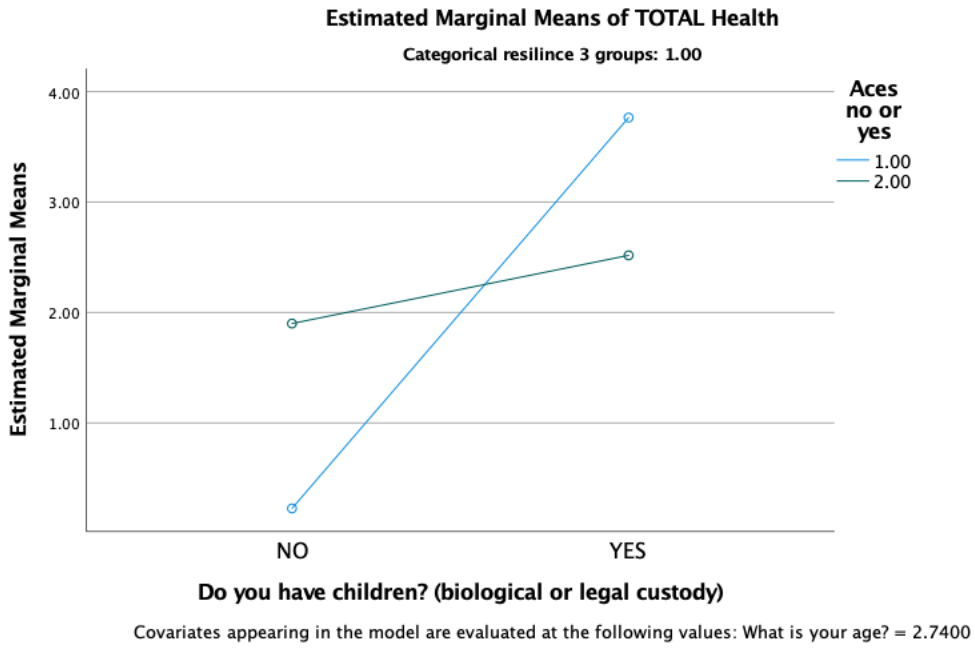


Figure 2

Interaction Medium Resilience

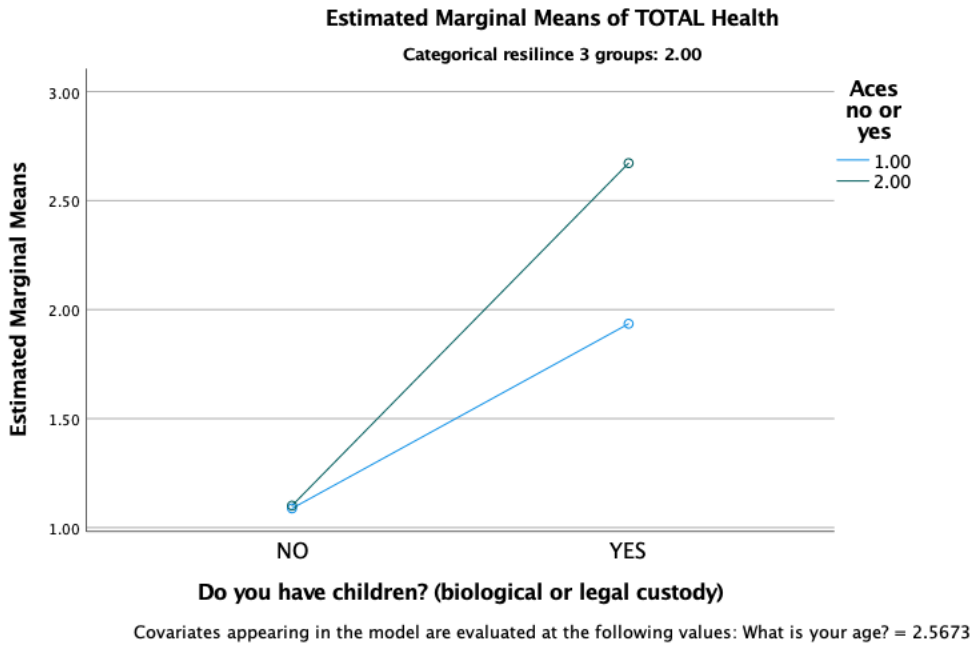
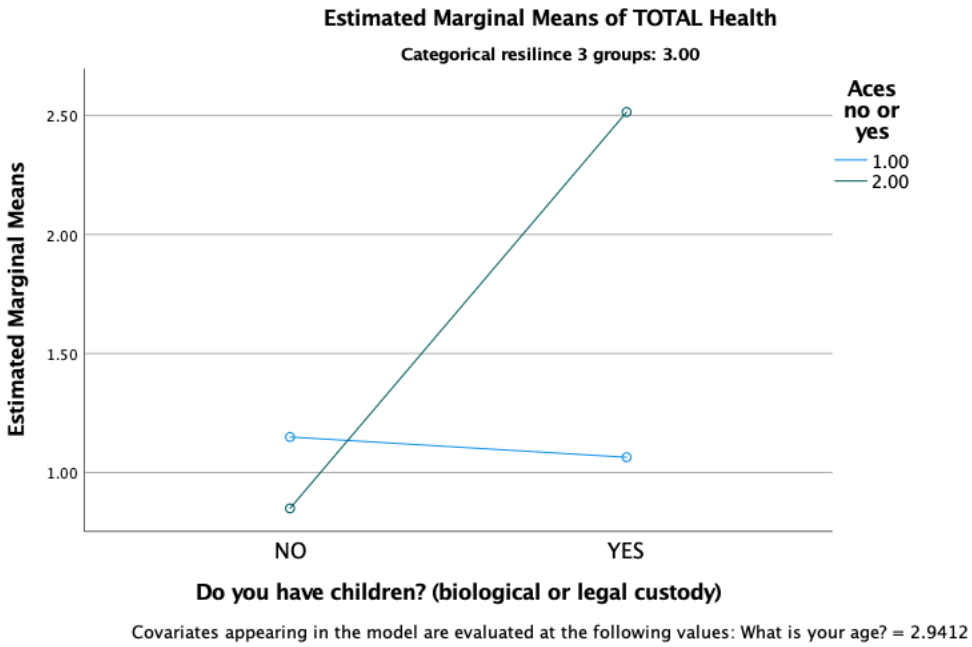


Figure 3

Interaction High Resilience



Summary

In this study, I hypothesized that differences in health-related outcomes would be found between mothers and nonmothers as they relate to ACEs and moderated by resilience. There was a positive relationship between age and negative health-related outcomes in that older participants reported more negative outcomes than younger participants. In addition, there were significant differences in negative health-related outcomes in relation to ACEs and motherhood. There was also a significant finding in the triple interaction between motherhood and ACEs when moderated by resilience. There were no significant differences in negative health-related outcomes and resilience, ACEs moderated by resilience, motherhood based on ACEs, or motherhood moderated by

resilience. In Chapter 5 additional interpretations of these findings will be discussed along with implications and possible future investigations.

Chapter 5: Discussion

Introduction

The purpose of this quantitative study was to examine the effects of ACEs and motherhood on a weighted linear composite of health status and health harming behavior, while moderating for a measure of resilience. There were 205 women who were surveyed using an online survey platform. The women were asked questions regarding their status as mothers, and general demographics such as age, race, education, income, and marital status. They also answered questions regarding health and health harming behaviors based on the original ACEs survey and 10 questions from the ACEs short form, also based on the original ACEs study (Felitti et al., 1998). Participants were also asked about resilience using the 10 question Connor-Davidson Resilience Scale short version (Connor & Davidson, 2003). During the process of correlational analysis between demographic variables and health-related outcomes, it was discovered that age was statistically significantly related to both health-related outcome variables. Consequently, age was used as a covariate in a MANCOVA analysis. All seven research questions were analyzed using the results of the MANCOVA analysis.

Statistical significance was found, as it related to negative health-related outcomes, for the variables of age, ACEs, motherhood, and the interaction of ACEs, resilience, and motherhood. Further investigation into these findings was conducted. Univariate ANCOVAs were performed on each health-related outcome variable that was found to be statistically significantly ($p < .05$) related to ACEs, motherhood, or the three-way interaction. Age was found to be statistically significantly related to both health and health harming variables. Although the multivariate effect of ACEs was statistically

significant ($p < .001$), results of the univariate ANCOVA revealed that only health harming behaviors differed significantly in relation to ACEs. Similarly, the multivariate effect of motherhood on health-related outcomes was statistically significant, but further univariate ANCOVA analysis revealed that only total health differences could be accounted for by motherhood. Again, the multivariate triple interaction among ACE, motherhood and resilience was statistically significant ($p = .008$), but only total health differed in relation to unique combinations of the three independent variables. Interpretation of these findings, implications, limitations, social change implications, and recommendations will be further discussed in the chapter.

Interpretation of Findings

Statistical assumptions for a MANCOVA were evaluated using Kolmogorov-Smirnov. Although there was not a normal distribution, Levene's test showed homogeneity of variance. SPSS was used to compute Mahalanobis distances, and no significant ($p < .05$) outliers were revealed. The results of the MANCOVA and the between subjects means will be further discussed in this chapter.

Hypotheses were tested using a three-way (ACEs, resilience, and motherhood) MANCOVA, with age as the covariate. As hypothesized, statistically significant levels of variation in negative health-related outcomes were explained by ACEs, motherhood, and age. In addition, a statistically significant three-way interaction was found. When multivariate statistically significant levels were determined, additional univariate analyses were conducted to contrast means. Differences in mean health harming scores in part can be explained by women's level of ACE. Women with higher ACE in general reported higher health harming scores than did women with lower ACE scores, in

addition mothers were found to have significantly higher mean scores for total health than that of nonmothers.

The final statistically significant explanation of total health differences could be attributed to the three-way interaction between motherhood, ACEs, and resilience. Mean scores for the interaction between were compared and revealed statistically significant interaction between ACEs and motherhood ($p < .05$). For women in the lowest resiliency group, a simple effects test was conducted comparing total health between mothers and nonmothers, for both ACE groups. Among nonmothers, mean total health score for women reporting no ACEs (0.16) was significantly lower than for nonmothers reporting ACEs (1.83). In contrast, among mothers, mean total health score did not change in relation to ACEs.

Discussion

Felitti et al.'s (1998) original work related to ACEs linked seven categories of ACEs to negative health-related outcomes. While ACEs have been linked to both negative health (Felitti et al, 1998) and health-harming behaviors (Brown & Shillington, 2017; Felitti et al., 1998; Khrapatina & Berman, 2017), the outcomes of this study only had statistical significance for ACEs when related to health-harming behaviors. However, ACEs, when combined with motherhood, were linked to negative health outcomes. Both of these findings are consistent with Felitti's (1998) findings with the addition of the motherhood variable.

Some of the literature has focused on parental stress and resilience (Chasson & Taubman, 2020) or adversity and resilience in parenting (Panisch et al., 2020), but there is little research on motherhood as it relates to ACEs and resilience. The current study did

not find statistical significance in the relationship between resilience and motherhood or ACEs and motherhood as they related to negative health-related outcomes. However, there was a statistically significant relationship between motherhood and negative health-related outcomes and a statistically significate relationship in the interaction of Motherhood, ACEs, and Resilience and negative-health-related outcomes. The findings also show that age is a statistically significant factor in the interaction of these variables. Kolomeyer et al. (2016) looked at the relationship between ACEs and negative parenting, and Sexton (2015) looked at the relationship between mothers, trauma, resilience and psychopathology. One of the gaps that was filled by this study was the relationship that motherhood plays in the negative health outcomes regardless of other factors. In the current study mothers had a higher negative health outcome in all categories of ACEs and resilience when compared to nonmothers.

One of the interesting finding of this study that varied from other studies was that the effects on health seemed to be more related to the variables of ACEs and Motherhood. The factor of resilience only seemed to factor when interacting with the other variables and did not have statistically significant effects when not in combination with the other variables. Unlike the Kolomeyer et al. (2016) study that found resilience to have a significant effect on negative parenting behaviors, and Sexton et al. (2015) that found resilience to have a buffering effect on psychopathology, the current study found that resilience only had a significant effect when in combination with the other variables (ACEs and motherhood).

Limitations of the Study

Although the sample had a range of demographic variability, there was a limitation in the sample size. Some of the individual categories (such as low ACE, low resilience) had a small n that may have limited the usefulness and generalizability of the data. The group that contained low ACE, low resilience had an n of 3 which could have skewed the results for this category based on the limited participants in this category. This limited the studies generalizability to the overall population. Another possible limitation is the response bias of the participants. Response bias could affect how the respondents answer questions by either swaying them to answer in what they believe to be a socially acceptable manner, or what they believe the researcher is looking for. The questionnaires are well established and tested tools, but response bias is always a possibility and could be addresses in a future study. The convenience sample was also a limitation of the study that could be addressed in subsequent research.

Recommendations

It is recommended that future research expand the variables and sample size to further investigate the findings of this study. The current research found that age was a statistically significant variable in the interaction withing these findings and one recommendation would be to further investigate these findings, such as looking into the age in which the woman became a mother and how that may interact with the ACEs and health effect. Age of ACE occurrence may also be a variable that could be included in future research. Additional demographic variables could also be added to the interaction such as education, income, and marital status variables. Utilizing the full version of the

resilience and ACEs scales along with more specific demographic information (instead of ranges) may also yield additional information.

Another recommended area of investigation for future research would be to isolate which health and health harming outcome variables specifically effect mothers as they relate to ACEs. Also, a more in depth look at which resilience factors impact mothers and how these factors specifically mediate the health outcomes in mothers along with age.

Past research has had a focus on parenthood as a population when looking at ACEs, resilience, parenting, and health outcomes (Hughes et al., 2017; Kolomeyer et al., 2016; Sexton, 2015), the current research indicates that motherhood should be a population focus of its own. Although there are many areas of research suggested in this section, one implication of the current research is that additional research could be conducted with a variety of variables on the population of mothers.

Implications

The implications of this research are on several levels: individual, family, and social/policy. On the individual level understanding the relationship of ACEs and resilience on negative health-related outcomes as they specifically relate to mothers could help mothers understand their own individual situation and how they are being impacted by their own experiences. The implication to mothers is relevant due to the statistical relationship between mothers and child rearing responsibilities (Grall, 2016; Working Mothers Issue Brief, 2016). This leads to how the research can be utilized in families and social/policy implications. With greater understanding of the relationship surrounding ACEs, Resilience, Motherhood, and the resulting negative health-related outcomes, better

programs can be designed to help families that need support. The implications of the relationship between motherhood and negative health outcomes could translate into programs that are implemented in both maternal care and after birth education programs. This research presented an understanding that motherhood itself and particularly when combined with ACEs has an impact on health outcomes. Helping a new mother understand how both past events, such as ACEs, and current events, such as becoming a mother, could change her health situation. This information could help new mothers make better decisions surrounding their health.

Conclusion

Motherhood is a life changing experience and each woman who enters into this experience brings with her a history of their own childhood experiences and their own adaptions (Karatoreos & Mcewen, 2013; Luthar, 2015) that may or may not lead to resilience. All of these experiences combined could lead to a negative health-related outcome (Felitti et al., 1998). Understanding how these factors interact is an important step to understanding how to both deal with the negative outcomes and even prevent them from happening at all. Although additional research is needed to hone in on the specific aspects of each variable that are involved in the relationship between motherhood, ACEs, resilience, and negative health-related outcomes, it is a first step into understand these relationships.

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Appendix A: ACEs Survey Instrument

ACEs Survey Instrument
ACEs Short Form

Adverse Childhood Experience (ACE) Questionnaire

Finding your ACE Score

While you were growing up, during your first 18 years of life:

1. Did a parent or other adult in the household **often** ...
   Swear at you, insult you, put you down, or humiliate you?
   or
   Act in a way that made you afraid that you might be physically hurt?
   Yes No If yes enter 1

_____

2. Did a parent or other adult in the household **often** ...
   Push, grab, slap, or throw something at you?
   or
   Ever hit you so hard that you had marks or were injured?
   Yes No If yes enter 1

_____

3. Did an adult or person at least 5 years older than you **ever**...
   Touch or fondle you or have you touch their body in a sexual way?
   or
   Try to or actually have oral, anal, or vaginal sex with you?
   Yes No If yes enter 1

_____

4. Did you **often** feel that ...
   No one in your family loved you or thought you were important or special?
   or
   Your family didn't look out for each other, feel close to each other, or support each other?
   Yes No If yes enter 1

_____

5. Did you **often** feel that ...
   You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?
   or
   Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?

Yes No If yes enter 1

_____

6. Were your parents **ever** separated or divorced?

Yes No If yes enter 1

_____

7. Was your mother or stepmother:

Often pushed, grabbed, slapped, or had something thrown at her?

Or

Sometimes or often kicked, bitten, hit with a fist, or hit with something hard?

or

Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?

Yes No If yes enter 1

_____

8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?

Yes No If yes enter 1

_____

9. Was a household member depressed or mentally ill or did a household member attempt suicide?

Yes No If yes enter 1

_____

10. Did a household member go to prison?

Yes No If yes enter 1

_____

Now add up your "Yes" answers:_____This is your ACE Score

Appendix B: Resilience Questionnaire

Resilience Questionnaire

Connor-Davidson Resilience Scale 10

(questions 1, 4, 6, 7, 8, 11, 14, 16, 17, and 19 from the original scale)

For each item, please mark an "x" in the box below that best indicates how much you agree with the following statements as they apply to you over the last month. If a particular situation has not occurred recently, answer according to how you think you would have felt.

	not true at all (0)	rarely true (1)	sometimes true (2)	often true (3)	true nearly all the time (4)
1. I am able to adapt when changes occur.	☐	☐	☐	☐	☐
2. I can deal with whatever comes my way.	☐	☐	☐	☐	☐
3. I try to see the humorous side of things when I am faced with problems.	☐	☐	☐	☐	☐
4. Having to cope with stress can make me stronger.	☐	☐	☐	☐	☐
5. I tend to bounce back after illness, injury, or other hardships.	☐	☐	☐	☐	☐
6. I believe I can achieve my goals, even if there are obstacles.	☐	☐	☐	☐	☐
7. Under pressure, I stay focused and think clearly.	☐	☐	☐	☐	☐
8. I am not easily discouraged by failure.	☐	☐	☐	☐	☐
9. I think of myself as a strong person when dealing with life's challenges and difficulties.	☐	☐	☐	☐	☐
10. I am able to handle unpleasant or painful feelings like sadness, fear, and anger.	☐	☐	☐	☐	☐

Appendix C: Agreement and Permissions for use of the Connor-Davidson Resilience Scale

Agreement and Permissions for use of the Connor-Davidson Resilience Scale

Dear Katherine:
Thank you for your interest in the Connor-Davidson Resilience Scale (CD-RISC). We are pleased to grant permission for use of the CD-RISC in the project you have described under the following terms of agreement:

1. You agree (i) not to use the CD-RISC for any commercial purpose unless permission has been granted, or (ii) in research or other work performed for a third party, or (iii) provide the scale to a third party without permission. If other colleagues or off-site collaborators are involved with your project, their use of the scale is restricted to the project described, and the signatory of this agreement is responsible for ensuring that all other parties adhere to the terms of this agreement.

2. You may use the CD-RISC in written form, by telephone, or in secure electronic format whereby the scale is protected from unauthorized distribution or the possibility of modification. **In all presentations of the CD-RISC, including electronic versions, the full copyright and terms of use statement must appear with the scale. The scale should not appear in any form where it is accessible to the public and should be removed from electronic and other sites once the project has been completed.**

3. Further information on the CD-RISC can be found at the www.cd-risc.com website. The scale's content may not be modified, although in some circumstances the formatting may be adapted with permission of either Dr. Connor or Dr. Davidson. If you wish to create a non-English language translation or culturally modified version of the CD-RISC, please let us know and we will provide details of the standard procedures.

4. Three forms of the scale exist: the original 25 item version and two shorter versions of 10 and 2 items respectively. When using the CD-RISC 25, CD-RISC 10 or CD-RISC 2, whether in English or other language, please include the full copyright statement and use restrictions as it appears on the scale.

5. A student-rate fee of $ 30 US is payable to Jonathan Davidson at 325 Carolina Meadows Villa, Chapel Hill, NC 27517, USA, either by PayPal (www.paypal.com, account mail@cd-risc.com), cheque, bank wire transfer (in US $$), international money order or Western Union**.**

6. Complete and return this form via email to mail@cd-risc.com.

7. In any publication or report resulting from use of the CD-RISC, you do not publish or partially reproduce items from the CD-RISC without first securing permission from the authors.

If you agree to the terms of this agreement, please email a signed copy to the above email address. Upon receipt of the signed agreement and of payment, we will email a copy of the scale.

For questions regarding use of the CD-RISC, please contact Jonathan Davidson at mail@cd-risc.com. We wish you well in pursuing your goals.

Sincerely yours,

Jonathan R. T. Davidson, M.D.
Kathryn M. Connor, M.D.

Agreed to by:

_____ _____
Signature (printed) Date

_____
Title

_____
Organization

From: **Jonathan Davidson, M.D.** jonathan.davidson@duke.edu
Subject: Re: Request Form from: Katherine Walker-Schneider/Dr Monny Sklov

Date: July 7, 2018 at 2:09 PM
To: Katherine Walker-Schneider katherine.walker-schneider@waldenu.edu

Thank you Katherine:

I have pleasure to enclose the scale and manual. Please let me know if I can be of further assistance.

With good wishes for a successful research project, Jonathan Davidson

Appendix D: Modified Female Health Appraisal Questionaire

Modified Female Health Appraisal Questionnaire

***Do you have*:**

Chronic bronchitis or emphysema	1=yes 0=no

Have you ever:

Had lung Cancer	1=yes 0=no

Have you ever been told you have:

High blood pressure	1=yes 0=no
A heart attach (coronary)	1=yes 0=no
An ulcer	1=yes 0=no

Are you troubled by:

Frequent Headaches	1=yes 0=no
Frequent back pain	1=yes 0=no

Have you ever:

Had a stroke or "small stroke"	1=yes 0=no
Broken any bones	1=yes 0=no

Have you had, or do you have:

Any problems with your urinary tract (kidney, bladder)	1=yes 0=no
A noticeable lump in your breast	1=yes 0=no

Have you ever been treated for or told you had:

Any venereal disease	1=yes 0=no
Diabetes	1=yes 0=no
Thyroid disease	1=yes 0=no
Cancer	1=yes 0=no

Total score Out of 15

Appendix E: Modified Female Health Harming Behaviors

Modified Female Health Harming Behaviors

1.	Have you had more than 50 sexual partners in your lifetime? 0=no	1=yes
2.	Have you ever contracted or been treated for a venereal disease (Sexually Transmitted Disease)? 0=no	1=yes
3.	Have you smoked at least 100 cigarettes in your entire life? 0=no	1=yes
4.	Do you smoke cigarettes now? 0=no	1=yes
5.	During the past month, have you had any beer, wine, wine Coolers, cocktails or liquor? 0=no	1=yes
6.	Have you ever had problems with your use of alcohol? 0=no	1=yes
7.	Have you ever considered yourself to be an alcoholic? 0=no	1=yes
8.	Have you ever used street drugs? 0=no	1=yes
9.	Have you ever had a problem with street drugs? 0=no	1=yes
10.	Have you ever considered yourself to be addicted to street drugs? 0=no	1=yes
11.	Have you ever been under the care of a psychologist, psychiatrist, or therapist? 0=no	1=yes
12.	Have you ever attempted suicide? 0=no	1=yes
13.	Do you exercise? 0=no	1=yes

14.	Have you ever considered yourself overweight? 0=no	1=yes
15.	Are you overweight now? 0=no	1=yes

Total Score ____ Out of 15