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INDIVIDUAL DIFFERENCES IN RESILIENCE AND CARDIOVASCULAR REACTIVITY

A dissertation

Presented to

The College of Graduate and Professional Studies

Department of Psychology

Indiana State University

Terre Haute, Indiana

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Psychology

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by

Megan Barclay

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VITA

of

Megan Barclay

ACADEMIC BACKGROUND

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ABSTRACT

Childhood stress has been correlated with deleterious health outcomes and illnesses such as cardiovascular disease (Felitti et al., 1998; Su et al., 2014). The biopsychosocial model of health conceptualizes childhood development and identifies possible mechanisms of this relationship. The Adverse Childhood Experiences (ACEs) Study found a significant relationship between the number of ACEs and heart disease (Felitti et al., 1998). As the number one killer in the United States, cardiovascular disease (CVD) is frequently addressed in the research literature (Garbers et al., 2018), with evidence suggesting a correlation among cardiovascular reactivity (i.e., blood pressure), and CVD (Brindle et al., 2016; Hendrix & Hughes, 1997; Manuck, 1994). Research has shown that a specific adverse experience, bullying in childhood, is correlated with stronger autonomic nervous system response to stressful stimuli (Newman, 2014). The literature has also examined possible protective qualities such as resilience (Davydov, Stewart, Ritchie, & Chaudieu, 2010). The goal of the present study was to examine the relationship between social evaluative threat and cardiovascular reactivity during a social stress test, as well as the potential moderating role of resilience and adverse childhood experiences, such as bullying. The hypotheses were partially supported in that those exposed to any form of social evaluative threat experienced greater increases in systolic blood pressure (SBP) compared to a control group. While no moderating effects were found for resilience or other adverse experiences, history of bullying had a significant negative correlation with SBP. A thorough overview of possible

mechanisms of action are reviewed and directions for future research are provided in the context of the results.

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CHAPTER 1

INTRODUCTION

The long-term sequelae of exposure to trauma and adverse circumstances during childhood are of interest for a variety of reasons including the rising prevalence of chronic illnesses and the growing need to engage in prevention efforts. Childhood stress caused by disrupted family relationships has been correlated with illnesses such as cardiovascular disease (Felitti et al., 1998; Su et al., 2014), and research is now turning toward the identification of possible mechanisms of the relationship. The biopsychosocial model of health and disease has become an important framework in which to conceptualize a child's development and predict his or her future health outcomes.

The Adverse Childhood Experiences (ACEs) Study, which began in 1995, proposed that stressful or traumatic childhood incidents may influence child psychophysiological pathways contributing to risk for a variety of behavioral, social, and health problems (Brown et al., 2009). The original ACE Study included a survey of nearly 10,000 adults who were asked to indicate whether or not they had experienced various childhood stressors. The stressors were grouped into seven categories: psychological, physical, or sexual abuse, violence against their mother, and living with household members who were substance abusers, mentally ill or suicidal, or ever imprisoned. Results of this study revealed a significant relationship between exposure to adverse

experiences and multiple risk factors for several leading causes of death (i.e., cardiovascular health issues) later in life (Felitti et al., 1998).

Considering negative health outcomes, research has shown that deleterious health behaviors such as smoking, drinking, and physical inactivity are correlated with health outcomes such as heart disease as well as an overall lack of physical and mental wellness (Matthews, 2005). The results reviewed by Matthews have been replicated by numerous studies (Brown et al., 2009; Springer, Sheridan, Kuo, & Carnes, 2007), some of which will be discussed in the following review. Given the association between these risky behaviors and health problems, research is needed to uncover early predictors of these health behaviors.

Many of the respondents in the original ACE recalled multiple adverse experiences in childhood. For example, 25.6% were exposed to substance abuse in the household, 22% experienced sexual abuse, 18.8% lived with a family member who was mentally ill or had attempted suicide, 12.5% lived in a home where their mother or stepmother was abused, 11% experienced psychological abuse, and 10.8% endured physical abuse (Felitti et al., 1998). A total of 52.1% of the respondents reported experiencing some form of childhood adversity; a quarter of the participants experienced more than two categories of adverse events, and 6.2% indicated that they had been exposed to four or more categories of adverse experiences. Results of this study indicated that as the number of ACEs increases, the prevalence and risk of smoking, severe obesity, physical inactivity, substance abuse, risky sexual behavior, depressed mood, and suicide attempts increase as well. There was also a significant relationship between the number of adverse childhood experiences and the following diseases in adulthood: ischemic heart disease, cancer, chronic bronchitis or emphysema, hepatitis or jaundice, skeletal fractures, or poor self-

rated overall health (Felitti et al., 1998). The relationship between ACEs and health outcomes in adulthood appears to be partially mediated by the poor health behaviors described above.

As the number one killer in the United States, cardiovascular disease (CVD) is frequently addressed in the research literature (Garbers et al., 2018), and this research is establishing biopsychosocial risk and resilience factors with the goal of reducing morbidity and mortality. Behavioral contributors to CVD include smoking, poor diet, inactivity, and non-compliance with healthcare recommendations (Mozaffarian et al., 2016). Social factors such as loneliness have also been correlated with CVD (Thurston & Kubzansky, 2009). From a biological perspective, heightened sympathetic nervous system activity likely plays an important role in explaining how adverse childhood experiences may ultimately lead to CVD in adulthood. Sympathetic nervous system activity, in particular, has been associated with stress and mental illness (Chen & Matthews, 2001; Matthews, 2005). There is growing evidence to suggest a correlation among cardiovascular reactivity (i.e., heightened heart rate and blood pressure), hypertension and CVD (Brindle et al., 2016; Hendrix & Hughes, 1997; Manuck, 1994).

Heightened sympathetic nervous system activity (i.e., “fight-or-flight”) has a clear evolutionary basis for the human body to react to threats in the environment. However, as time has progressed, individuals with significant life stress and histories of abuse may experience a heightened stress response (cardiovascular response) to non-threatening stimuli. For example, Chen and Matthews (2001) found that cognitive biases in appraisal of ambiguous stimuli partially mediate the relationship between low socioeconomic status and increased cardiovascular reactivity among children and adolescents. The stress-reactivity hypothesis, which involves the prediction that heightened cardiovascular reactivity to stressors contributes to CVD, helps explain these findings and it will be discussed in greater detail below.

As there are individual differences in cardiovascular reactivity, experiments are designed to ascertain which psychosocial factors predict reactions to experimentally-induced stress. One way that a social stressor can be applied in an experimental setting is social evaluation. Social self-preservation theory states that self-conscious emotions are experienced when the goal of maintaining a positive social self-image is threatened (Schulz, Kirschbaum, Prüßner, & Hellhammer, 1998). It is argued that shame and other self-conscious emotions are basic human emotions that are necessary for the survival of the human species. These self-conscious emotions motivate the "shamed" individual to engage in specific behaviors to reestablish and maintain his or her affiliation with the group. Studies are showing that this emotion leads to heightened cardiovascular responses and activates the hypothalamic-pituitary-adrenocortical (HPA) axis leading to elevated cortisol levels and increased cardiovascular reactivity (Smith & Jordan, 2015).

Social behavior consists of two primary motivations – agency (e.g., status) and communion (e.g., acceptance). Therefore, the social self may be threatened when competence or status is challenged, or in a situation when one's friendliness or acceptance is called into question (Dickerson, Gruenewald, & Kemeny, 2004). Individuals with higher and more prolonged cardiovascular reactivity to social evaluative threat presumably have an increased risk of negative health outcomes such as CVD. Individual differences in cardiovascular reactivity to social evaluative threat, therefore, may be an important individual difference variable to study in stress-reactivity experiments.

In addition to identifying risk factors for adult health problems, it is also crucial that research efforts focus on recognizing protective factors. A meta-analysis was conducted that examined factors often noted in the literature as attenuating the effects of adverse childhood

experiences. Family functioning (past and present), including structure, organization, cohesion, conflict management, and communication, have been found to moderate the effects of adverse experiences in childhood (Counts, Buffington, Chang-Rios, Rasmussen, & Preacher, 2010). Additional protective factors include concrete support during childhood such as food, money, or clothing, and parenting skills. Counts et al. (2010) also found that emotional support provided protection against negative health outcomes. The authors defined emotional support as "the individual's perception that empathy, caring, reassurance, or understanding will be provided by social network members if needed" (Counts et al., 2010, p. 763). It was found that individuals who believed their environments to be emotionally supportive in childhood tended to experience fewer negative effects of maladaptive childhood experiences. This appears to be due to the opportunity for the child to express their emotions to a support system (Counts et al., 2010).

Another focus in the literature on adverse childhood experiences is the protective quality of individual resilience. Resilience has been defined as reduced vulnerability, the ability to adapt to adversity, or ability to cope (Davydov, Stewart, Ritchie, & Chaudieu, 2010). One prominent scale, The Connor-Davidson Resilience Scale, operationalizes resilience as a person's ability to view stress as a challenge or opportunity, commitment, control, engaging the support of others, goal-oriented, self-efficacy, having past successes, sense of humor, action-oriented, patient, tolerant of negative affect, adaptability to chance, optimism, and faith (Connor & Davidson, 2003). By this definition, individuals high in resilience tend to cope better with life stressors.

The current study seeks to examine the relationship between adverse childhood events, protective factors, and cardiovascular reactivity to social evaluative threat. In this experiment "social evaluative threat" consists of threats to one's status or acceptance. Although previous studies have examined the relationship between social experiences and response to evaluative

threat, these studies have not considered specific type of evaluative threat (i.e., status versus acceptance). The current study was designed to independently manipulate threats to status and acceptance in order to better identify differences in cardiovascular reactivity in response to each type of evaluative threat. Additionally, the moderating effects of resilience, bullying, and other adverse health experiences will be examined. The following review of the literature will provide information as to how each factor can be linked to health behaviors and outcomes, with a focus on cardiovascular health in particular. In line with recent research, it is hypothesized that individuals with more self-reported exposure to bullying and adverse experiences will have greater cardiovascular reactions to stress associated with social evaluation. It is further hypothesized that cardiovascular reactivity will be attenuated by resilience. In the present study, cardiovascular parameters will be measured through continued monitoring of blood pressure and heart rate.

CHAPTER 2

LITERATURE REVIEW

Overview of Individual Differences and Health

Biological and medical innovations have allowed people to live longer. However, many individuals will experience long periods of coping with chronic illnesses. The importance of prevention has come to the fore, and a great deal of research focuses on psychosocial factors that contribute to health and disease. The current body of prevention-focused research has expanded our knowledge of psychosocial factors that influence our perception of the world, and how these factors instigate physiological and behavioral reactions that ultimately influence health outcomes (Sherbourne, Hays, & Wells, 1995). A portion of this research has been conducted on childhood experiences, focusing on both short-term and long-term consequences of negative childhood events (Roberts, English, Thompson, & White, 2018). The following review will start with a description of a major chronic illness – cardiovascular disease – and then discuss negative childhood experiences, short and long-term consequences, and the mechanisms that may help explain the associations between these experiences and consequences.

Cardiovascular Disease (CVD)

Cardiovascular disease is the most common cause of death and disability around the world (Burg & Oyama, 2015; Farquhar et al., 1990). Cardiovascular disease, also referred to as

CVD or heart disease, includes multiple medical conditions such as coronary heart disease, myocardial infarctions (heart attacks), strokes, and peripheral artery disease. These conditions are typically seen in individuals over the age of 60, but unfortunately, these conditions are occurring more frequently among younger individuals. As factors related to CVD such as hypertension, elevated cholesterol, cigarette use, obesity, and sedentary lifestyle become more common in younger individuals, the incidence rates of cardiovascular events in these individuals increase as well (Farquhar et al., 1990; Nader, 2008).

The development of cardiovascular disease begins in the arteries, which send blood from the heart to other areas of the body. The beginning stages of disease occur when these arteries become hardened due to damage caused by atherosclerosis. Atherosclerosis refers to the buildup of plaque in the arteries and damage to the blood vessels (Burg & Oyama, 2015). Hypertension, or prolonged elevated levels of blood pressure, is a known risk factor for atherosclerosis and CVD (Lim et al., 2012).

In middle age, men have a higher risk for developing CVD than women, and that risk is higher still for African American males (Mozaffarian et al., 2016). While there are some biological and genetic traits that increase an individual's risk of developing CVD, there are numerous psychological and social factors involved as well. When discussing CVD, it is important to view the disorder from a biopsychosocial perspective and to consider treatment options that address biological, social, and psychological factors.

One of the most influential psychosocial factors on cardiac health is life stress; many individuals who experience heart problems report high levels of acute or chronic stress. This stress can influence physiology in a way that leads to or exacerbates health problems. Thayer, Yamamoto, and Brosschot (2010) noted that autonomic imbalance, otherwise described as a

hyperactive sympathetic nervous system and a hypoactive parasympathetic nervous system, is correlated with many medical conditions (e.g., immune deficiencies, inflammation, CVD, diabetes, osteoporosis, arthritis, Alzheimer's disease, and periodontal disease). When the sympathetic nervous system is chronically activated, blood flow and force increases, as does the risk of hypertension. This study along with others has found that over time, the strain of stress on the heart and entire cardiovascular system, as well as increased demand of cardiovascular energy, can lead to premature aging and diseases (Thayer et al., 2010).

The human body is designed to react to danger in one of two ways- fight or flight. That is, either physically protect oneself from danger or flee quickly. While the "fight or flight" response clearly served an adaptive purpose in our evolutionary history, we now face chronic minor or major stressors (e.g., daily hassles, adverse life events) that for some people can lead to hyperactive sympathetic nervous system responses. In layperson's language, the person is in a prolonged state of the "fight or flight" responses (Sapolsky, 2004). Years of research have shown that remaining in this state for an extended period of time can have detrimental effects on the heart (Thayer et al., 2010).

This prolonged "fight or flight" response leads to an allostatic load on the body in an attempt to preserve homeostasis. As previously mentioned, however, this response is often no longer evolutionarily necessary; in fact, this has become maladaptive. Stress and the associated sympathetic nervous system response lead to a multitude of physiological reactions including increased heart rate, respiration, and neurochemical responses, and decreased or constricted blood vessels and, digestive and immune system functioning. After some time, the body's parasympathetic nervous system will activate and all of these processes are reversed to return the body to a homeostatic state. Individuals under extreme amounts of stress, however, may

experience the autonomic imbalance mentioned earlier. This means that their autonomic nervous system is unable to regulate the body's processes as well as it should, producing possibly devastating effects, particularly on the heart (Thayer et al., 2010).

In addition to the physiological effects of stress, those experiencing chronic stress tend to gravitate toward deleterious health behaviors, such as poor diet, less exercise, and increase in use of nicotine and/or alcohol. In combination with the physiological effects, these health behaviors can increase an individual's risk of developing CVD. Certain personality traits have also been found to increase the likelihood of an individual's stress leading to CVD. Some of these traits or characteristics include hostility, competitiveness, pessimism, and depression (Pänkäläinen, Kerola, Kampman, Kauppi, & Hintikka, 2016; Rosengren et al., 2004; Rozanski, Blumenthal, & Kaplan, 1999).

Another psychosocial risk factor that can be implicated in the development of CVD is socioeconomic status. Research has found that low socioeconomic status is a significant predictor of increased risk of CVD as well as a significant contributor to poor prognosis (Mackenbach et al., 1999). Multiple studies have found that low socioeconomic status is not only associated with higher risk of CVD, but also with increased levels of risk-taking behavior and other psychosocial risk factors (Kaplan & Keil, 1993; Rozanski et al., 1999). Financial status and access to healthy food and good medical care have a direct effect on an individual's psychological and physiological well-being. In order to treat an individual's physical ailment, their psychological state and the social aspects of their lives must be taken into consideration (Kaplan & Keil, 1993).

Adverse Childhood Events and Their Association with Health Outcomes

In the 1990s, a landmark study concerning adult health outcomes and childhood experiences was conducted by Felitti and colleagues (1998). This study considered a range of adverse childhood life experiences including physical abuse, substance use, and criminal activity in the home. The Adverse Childhood Experiences (ACE) Study was a collaborative endeavor between the Centers for Disease Control (CDC) and Kaiser Permanente, a healthcare company based in California. The purpose of the study was to investigate the relationship between childhood experiences and medical and public health concerns in adulthood. It was becoming apparent, and it is continually suggested, that the leading causes of death in the United States (i.e. heart disease) are related to lifestyle factors and other health behaviors (e.g. smoking, drinking alcohol) (Felitti et al., 1998).

The Felitti et al. (1998) study considered 10 risk factors shown in previous research to contribute to morbidity and mortality in the United States including smoking, severe obesity, physical inactivity, depressed mood, suicide attempts, alcoholism, drug abuse, parental drug abuse, high lifetime number of sexual partners (>50), and a history of having a sexually transmitted disease. Additionally, participants were asked about adverse childhood experiences (i.e., experiences determined through prior research to be traumatic). Participants provided information about risk factors as well as their medical history, (i.e., history of heart disease, heart attacks, cancer, stroke, chronic bronchitis, COPD, diabetes, hepatitis or jaundice, any skeletal fractures). Participants were also asked to self-rate their current physical health.

Results of the Felitti et al. (1998) study revealed that over 50% of the participants reported past exposure to adverse childhood experiences. The most prevalent negative childhood experience was substance abuse in the household at 25.6%. Of the 8,056 respondents, 52%

experienced one or more adverse event, whereas 6.2% of participants reported experiencing four or more events. Those individuals who experienced more than four negative events were found to engage in a greater number of negative health behaviors. For example, they were 12.2 times more likely to attempt suicide, 10.3 times more likely to use injectable illicit drugs, 7.4 times more likely to become alcoholics, and 2.5 times more likely to contract a sexually transmitted disease. In addition to negative health behaviors, adverse childhood experiences were found to increase the individual's odds of developing a chronic disease. This included but was not limited to diabetes, cardiovascular disease, chronic bronchitis, emphysema, and skeletal fractures. Finally, as the number of negative experiences increased, individuals rated themselves as having poorer health (Felitti et al., 1998).

There is some concern regarding the nature of self-reported health as opposed to objectively collected data (e.g., health records). The Felitti et al. (1998) study asked participants to rate their physical health as "excellent, very good, good, fair, or poor." Concerns regarding the ability of participants to understand what the researchers meant by "poor" or "very good" have surfaced, as well as the question of accuracy of self-reported health status (i.e., in relation to others, compared to their health five years prior) (Idler & Benyamini, 1997; Schwarz, 1999). Past research by Idler and Angel (1990) has demonstrated that self-reported health status is significantly associated with the risk of death. Idler and Angel (1990) found that self-reported health predicted the risk of mortality even after controlling for other health and risk factors. They found that older individuals, those of African American descent, smokers, alcoholics, unmarried, and unemployed individuals were less likely to give positive assessments of their health. These groups were also found to have a higher mortality rate. There were significant relationships

between self-rated health, lack of access to medical care, decreased ability to pay for medical care, and future health outcomes.

Felitti and colleagues (1998) found that the number of adverse childhood experiences was positively correlated with the development of health conditions such as heart disease, cancer, chronic bronchitis, emphysema, hepatitis, jaundice, and skeletal fractures. In a follow-up study, they found that the leading causes of death among participants (90%) were caused by diseases of the circulatory system (heart disease and stroke), malignant neoplasms (cancer), diseases of the nervous system and sensory organs, diseases of the respiratory system, or diseases of the digestive system. Of note, on average, participants with six or more ACE's died 20 years earlier than those without ACE's (Brown et al., 2009).

Physical and sexual abuse. Childhood maltreatment has been found to contribute to psychiatric diagnoses such as depression, anxiety, eating disorders, PTSD, and medical disorders, including chronic pain syndromes, headaches, chronic fatigue syndrome, and irritable bowel syndrome (Arnow, 2004). Springer et al. (2007) conducted a study exploring the relationship between childhood physical abuse and poor health outcomes in adulthood. They focused on physical abuse as it is more common than sexual abuse and is more likely to occur to both males and females. Of note, respondents with a history of abuse were more likely to have fathers with less education and lower occupational achievement than participants that did not report childhood abuse. Participants who reported childhood abuse had more siblings, were more likely to grow up with problem drinkers, and reported parents with marital problems that would occasionally lead to violence. Individuals who reported abuse in childhood also reported deleterious health outcomes in all areas examined (illness, physical symptoms, anxiety, anger, and depression), nearly 40 years after the abuse had occurred (Springer et al., 2007).

Beitchman, Zucker, Hood, daCosta, and Akman (1991; 1992) conducted a literature review of the short-term and long-term effects of negative childhood events, such as physical and sexual abuse, on children of many ages and throughout adulthood. In their original study of preschoolers, Beitchman et al. (1991; 1992) examined short-term effects of different types of childhood trauma. They found that preschoolers who had experienced sexual abuse were more likely to display some form of abnormal sexual behavior (i.e., sex play with dolls, requesting sexual stimulation, etc.) compared to peers that did not experience abuse. Additionally, children who had experienced both sexual and physical abuse were more passive and withdrawn during periods of free play, suggesting a possible internalizing disorder diagnosis. These children tended to act out behaviorally, contributing to problems at school, as well as decreased self-esteem (Beitchman et al., 1991).

Beitchman et al. (1991) reported that 73% of those who had experienced sexual abuse or sexually suggestive aggression were in special education classes. In an earlier study by Egeland, Sroufe, and Erickson (1983), the researchers found that children who experienced abuse performed in the below average range on measures of general intelligence and demonstrated poorer school performance compared to children who had not experienced abuse. Children exposed to abuse were more likely to be socially or emotionally underdeveloped, which are both measures of adaptive functioning used to assist in diagnosing an individual with an intellectual disability or cognitive delay. The authors argued that growing up in poverty limits educational opportunities, placing these individuals at risk of exposure to a limited education with less than adequate resources (Egeland et al., 1983). Additionally, children exposed to abuse were found to be more distractible in class which the authors anticipated would contribute to impairment in learning and academic performance (Egeland et al., 1983).

Beitchman et al. (1992) provided additional information regarding factors that moderate the relationship between childhood sexual abuse and long-term outcomes. They found younger age when first exposed to trauma was associated with greater lasting effects of trauma. It was also discovered that older children and adolescents were more likely than younger children to experience invasive or penetrative sexual abuse. Although research (Beitchman, Zucker, Hood, & daCosta, 1992) has shown that abuse starting at a young age is likely to lead to the strongest negative effects of trauma, additional studies have demonstrated that invasive abuse (e.g., penetrative abuse), most commonly experienced by older children, is more traumatizing compared to non-penetrative abuse. Therefore, it is difficult to pinpoint with certainty which age is likely to produce the most lasting negative effects of childhood trauma (Beitchman et al., 1992).

Other psychosocial factors and health outcomes. The original ACE study (Felitti et al., 1998) identified a number of childhood experiences that have adverse consequences. Several psychosocial factors experienced in childhood have been found to be associated with deleterious health outcomes in adulthood including socioeconomic status, family dysfunction (e.g., divorce), and experience of being bullied. Bullying, in particular, has come to the attention of researchers recently given its prevalence and harmful effects.

*Socioeconomic status***.** Many studies have identified a correlation between early life socioeconomic disadvantage and adverse mental and physical health outcomes (Cohen, Janicki-Deverts, Chen, & Matthews, 2010; Doom, Mason, Suglia, & Clark, 2017; Kittleson, 2006). Individuals living in poverty or low-income housing during childhood are exposed to numerous risk factors such as overcrowding, family conflict, food insecurity, and less responsive parenting. It has been suggested that factors such as lack of perceived control, optimism, or self-esteem can

strengthen the relationship between socioeconomic status and adverse health outcomes (Bridger & Daly, 2017).

One factor that has been found to attenuate the relationship between childhood socioeconomic status and health outcomes is intelligence or cognitive ability. Intelligence includes abilities such as reasoning, memory, processing speed, and spatial ability, all of which can assist an individual in adapting effectively to their environment. Research has shown that childhood cognitive ability provides protective effects. For example, adolescents exposed to great amounts of family adversity, who also have higher cognitive ability, have been shown to exhibit fewer externalizing problems, such as substance abuse, as compared to adolescents with lower cognitive ability (Bridger & Daly, 2017). In a British cohort of over 11,000 people followed throughout their lifespan, Bridger and Daly (2017) found that greater social disadvantage as a child was significantly related to high levels of psychological distress as well as low self-rated health for individuals low in cognitive ability. Further examination found that individuals with lower intelligence who also had high levels of social disadvantage were at a greater risk for mortality, whereas individuals with higher cognitive ability did not have the same increased risk of mortality. It was suggested that higher cognitive ability improved resilience to the stress associated with lower socioeconomic status. It was proposed by the authors that higher cognitive ability might facilitate successful adaptation to adversity by enabling people to respond fast, flexibly, and strategically to environmental challenges and demands, particularly in situations where there are limited resources.

*Family problems***.** Studies have demonstrated that individuals exposed to trauma in childhood are more likely to come from single-parent homes or families with high levels of marital conflict. Beitchman et al. (1992) found that general discord within the home is a

predictor of childhood neglect or abuse. Individual members of these households (i.e., single-parent homes, marital conflict) were more likely to suffer from psychiatric issues such as depression, substance abuse, suicidal ideation, and psychopathologies associated with interpersonal violence (Beitchman et al., 1992). Research has also examined the correlation between maternal substance abuse and child experiences and outcomes. Lombard et al., (2017) found maternal substance abuse was correlated with high levels of aggression in children as well as parental neglect. Children of parents struggling with addiction were found to be more likely to engage in negative health behaviors during childhood and were also more likely to report internalizing and externalizing problems later in life (Lombard et al., 2017).

It has been proposed that parental conflict as well as divorce could affect children's long-term overall health by threatening their emotional security. The research of Fabricius and Luecken (2007) focused on children's contact with non-custodial parents and their overall health outcomes as adults. Children who experience parental divorce, as well as parental conflict, may perceive that their parents may no longer be able to care for them. A child's experience of insecurity in regard to parental love and support can lead to emotional dysregulation and stress-related health problems later on in life, including high blood pressure, enuresis, depression, and changes in heart rate (Fabricius & Luecken, 2007; Torres, Evans, Pathak, & Vancil, 2001). In fact, multiple sequential studies conducted by Torres and colleagues (2001) found that children whose parents divorced before they were 21 years old were likely to have a shorter lifespan of approximately four years (Torres et al., 2001).

In order to better assess the impact of parental divorce and relevant factors, Fabricius and Luecken (2007) asked the following questions to numerous college students. The students were asked to describe their living arrangements with their parents following their divorce, how many

days they spent with their fathers during the school year and during vacation, the amount of conflict between their parents before they separated, and overall, how they feel about the divorce between their parents. The students' overall perception of their parent's divorce was found to be a significant predictor of health vulnerability in adulthood (Fabricius & Luecken, 2007).

Fabricius and Luecken (2007) found that increased regularity, but not frequency, of contact with fathers was correlated with higher self-esteem in boys and girls when parent conflict was low, but lower self-esteem when parental conflict was high. Additionally, the more time children lived with their fathers after their parents' divorce, the better their long-term relationships were with their fathers. Furthermore, as would be expected, the more conflict the children experienced between their parents, the poorer their relationships were with their fathers. Additionally, increased experience of parental conflict was also found to be correlated with feelings of distress about their parents' divorce when participants were young adults. This effect was found to hold true regardless of the amount of time children spent living with their fathers after the divorce. Finally, poorer self-reported physical health as adults was correlated with negative father-child relationships post-divorce, as well as increased distress related to their parents' divorce (Fabricius & Luecken, 2007).

Disruptions in an individual's early caregiving environment can establish lifelong dysregulations in the physiological stress response, fostering pathophysiology in the mind and body of a child, which can contribute to hypertension, heart disease, infectious diseases, and other illnesses (Fabricius & Luecken, 2007). According to Fabricius and Luecken (2007), a review of the literature has found that in some cases, frequent contact with non-custodial fathers improved academic achievement, psychological adjustment, self-esteem, and social competence in children of divorced parents (Amato, 1993;. Healy, Malley, & Stewart, 1990). In contrast,

Amato and Gilbraith (1999) suggest no association between parental contact and well-being, whereas one study proposed that contact with fathers is actually detrimental to the well-being of children (Laumann-Billings & Emery, 2000). This issue is not only important to psychologists but lawmakers and child service workers as well. It is important for these professionals to be apprised of the research regarding whether increased amounts of visitation or shared residential custody can be beneficial to children when there is high parent conflict.

While parental divorce can be difficult on a child, death of a parent can be much more traumatizing. It has been reported that 3.4% of children under the age of 18 have experienced the death of a parent (Stroebe, Schut, & Stroebe, 2017). This is an important area of research as grief can last months to years with significant variance between individuals and cross-culturally. Grief has been defined as the primary emotional reaction to bereavement, incorporating diverse psychological and physical reactions. Research has indicated bereavement in childhood to be a risk factor for the development of information-processing biases, altered sibling relationships, and stress hormone irregularities (Stroebe et al., 2017).

The experience of parental death in childhood has also been associated with the development of depression in adulthood. Children who experience the death of a parent are at greater risk for developing moderate to severe psychopathological disturbance, lower educational attainment, obesity, suicidal behavior, an increased sense of vulnerability, and marital distress in adulthood (Luecken, 2000). Children whose parents commit suicide are especially vulnerable to these difficulties in adulthood. Environmental as well as personal factors can influence an individual's susceptibility to these negative outcomes following the loss of a parent. Studies have shown traits such as a hostile personality, a depressed psychological state, and low levels of

social support can increase vulnerability to the health-damaging effects of other stressors, particularly parental death (Brent, Melhem, Donohoe, & Walker, 2009).

Depression has been linked to increased risk of developing cardiovascular disease (Empana et al., 2006). Research has found that individuals with major depression experience significantly higher mortality rates following a myocardial infarction compared to non-depressed patients (Luecken, 2000; Stroebe et al., 2017). Finally, studies have shown that the effects of these risk factors can be influenced by factors in the home, including parent care. Research has demonstrated that family environment is the most important moderator of adult health outcomes following parental loss in childhood. Continuity of care by the remaining parent, siblings, or other caregivers in their lives can have a significant effect on how the child grieves the loss of their parent, as well as their long-term health outcomes (Luecken, 2000).

*Bullying***.** An additional adverse childhood experience that occurs in 10-33% of children and adolescents is chronic bullying (Matthews, Jennings, Lee, & Pardini, 2017). It has been suggested that the variation in prevalence rates is due to differences in methods of sampling as well as study population. Bullying can be defined as a systematic abuse of power and refers to repeated aggression toward another individual that is intentional. This form of aggression can either be direct, such as physical aggression or name-calling, or relational in that the intent is to damage relationships through spreading rumors (Wolke, Copeland, Angold, & Costello, 2013). Recent studies have demonstrated the detrimental effects of bullying in childhood and adolescence, such as mental health symptoms in childhood, as well as psychological problems and heart disease risk in adulthood (Takizawa, Danese, Maughan, & Arseneault, 2015; Arseneault, 2018).

Research has found that boys and girls tend to engage in different types of bullying behavior (Boulton & Smith, 1994). Boulton and Smith (1994) found that boys are more likely to be involved in physical bullying compared to girls, both as the bully and the victim. Male victims of bullying tend to score lower on self-perceived athletic competence than male bullies and male children who were not involved in long-term bullying either as the bully or the victim. Female victims of bullying were more likely than females who were not involved in bullying to perceive low amounts of social acceptance. Both male and female victims scored lower on a global assessment of their self-worth than male and female children who were uninvolved in bullying (Boulton & Smith, 1994).

There is evidence for a dose-response relationship between those who are chronically bullied by peers over multiple years, compared to those bullied only at one point in time, and an increased risk for adverse outcomes such as psychiatric problems (Wolke et al., 2013). Interestingly, individuals rated as both bullies and victims in the study by Wolke et al. (2013) were found to have the worst health outcomes overall, compared to their peers who were rated as bullies of victims. Those who were rated by 50% or more of their peers as both “bullies” as well as victims themselves were at an increased risk of being diagnosed with a serious illness or psychiatric disorder, smoking, and slow illness recovery in adulthood. Individuals who were either victims or bullies in childhood were at a heightened risk of developing psychiatric problems and smoking. Those who were rated as bullies only were at an elevated risk of engaging in risky or illegal behaviors such as drinking, using illicit drugs, and risky sexual behaviors in adulthood. Interestingly, no increased risk of engaging in these risky behaviors was found for victims (Wolke et al., 2013).

Mechanisms

The literature on adverse childhood experiences has clearly demonstrated a relationship between ACE's and negative outcomes in adulthood, including physical outcomes. These findings beg the question of *how* adverse childhood experiences are linked to diseases and mortality in adulthood (Felitti et al., 1998). Proposed mechanisms include health behaviors and physiological factors such as cardiovascular reactivity.

Negative health behaviors. Research suggests that individuals facing trauma in childhood and adolescence may turn to mechanisms such as excessive alcohol consumption, overeating, drug abuse, or sexually risky behavior in order to cope with family and household dysfunction (Felitti et al., 1998; Wolke et al., 2013). Negative childhood experiences may elicit anxiety, depression, or anger, which may be associated with behaviors such as smoking, or alcohol and drug use as a way of dealing with symptoms. According to the negative affect model of tobacco use disorder, the introduction to and maintenance of tobacco use is partially determined by the experience of negative affective states. Factors associated with nicotine dependence include difficulty enduring emotional distress, affect regulation deficits, and expectations that cigarette smoking also reduce these aversive states (Carmody, 1992).

The Coronary Artery Risk Development in Young Adults (CARDIA) (Budoff et al., 2006) was a longitudinal study conducted from 1985 to 2010. Carroll et al. (2017) examined the results of this study and looked, in particular, for the effects of and interactions between depression and smoking on heart outcomes-specifically cardiovascular health. They found that coronary artery calcification was more prevalent in individuals with both high depression and high rates of smoking. However, individuals who were found to have depressive symptoms who did not smoke heavily did not have significantly higher rates of coronary artery calcification.

Finally, individuals who smoked heavily were at an increased risk of coronary artery calcification regardless of their amount of depressive symptoms (Carroll et al., 2017).

In addition to nicotine use, prescription drug and illicit drug use and abuse have a high correlation with adverse events in childhood. A 2008 study by Anda et al. (2008) found that rates of prescription medication consumption increased as ACE Scores increased in a large study of HMO patients. This trend was particularly noticeable in younger participants, whose rates of prescription filling were 60% higher in those with ACE Scores of five or more. A second study involving 3,333 women between the ages of 18 and 64 found a significant relationship between prescription usage and a history of physical or sexual abuse in childhood (Bonomi et al., 2008).

Illicit drug use has been identified as a leading contributing factor to health outcomes, such as sexually transmitted diseases, human immunodeficiency virus, viral hepatitis, and numerous social problems among adolescents and adults. Dube and colleagues (2003) examined the relationship between illicit drug use and 10 categories of adverse childhood experiences in 8,613 adults. Participants completed a survey about childhood abuse, neglect, and household dysfunction, illicit drug use, as well as other health-related issues. The researchers found that participant ACE scores were significantly correlated with being introduced to drugs, drug problems, drug addictions, and parental drug use. Those who had experienced greater than five ACE's were 7-10 times more likely to report illicit drug problems compared to individuals reporting no ACE's. In this study, four birth cohorts were examined dating back to 1900, and there was a strong positive correlation between ACE score and lifetime drug use for each cohort. The persistent correlation between ACE score and drug use for four successive birth cohorts suggests that the effects of adverse childhood experiences are not bound by societal changes such as availability of drugs, or social attitudes toward drugs (Dube et al., 2003). Finally, Bellis and

colleagues (2017) found that individuals reporting four or more ACE's, especially those with a lack of social support, were more likely to be heavy alcohol drinkers.

Another area of concern pertaining to risky behavior is overeating and sedentary lifestyles that may lead to obesity. Individuals who have been exposed to adverse childhood experiences may have abnormal brain processes (e.g., alterations in nervous, immune, and endocrine system functioning) that influence one's weight (Danese et al., 2009). Alterations in these areas, in conjunction with other possible lifestyle changes, may lead to an associated weight problem known as the "metabolic syndrome." Metabolic syndrome is a cluster of abnormalities, which tend to simultaneously occur within the same typically unhealthy individual. These abnormalities include obesity, dyslipidemia, glucose intolerance, hypertension, high blood pressure, excess weight around the midsection, and poor cardiorespiratory fitness. Vascular lesions and hormonal imbalances are associated with these abnormalities, and ultimately, predict psychological and cardiovascular health outcomes. Evidence has shown that the clustering of metabolic risk markers in young adulthood is associated with an increased risk of developing cardiovascular disease, diabetes, or dementia later in life (Danese et al., 2009).

There are other physical changes that occur in obese individuals. Obesity has been shown to increase total blood volume as well as cardiac output, increasing the overall cardiac workload and putting excess stress on the individual's heart (Lavie, Milani, & Ventura, 2009). As weight gain is also associated with increased arterial pressure, this increase in cardiac output can cause the individual to become hypertensive, meaning that their blood pressure can become suddenly very elevated. An important ramification related to obesity can be identified in the left ventricular chamber of the heart. Obese individuals may be vulnerable to left ventricular hypertrophy, or wall thickening in this area of the heart (Lavie et al., 2009).

Physiological processes. Another mechanism explaining the link between stressful life experiences and health involves physiology. Therefore, in addition to the indirect pathways (e.g., health behaviors) described above, examining the physiological changes associated with the short and long-term impact of early exposure to stress allows researchers to identify direct pathways of these relationships (Hamilton, Newman, Delville, & Delville, 2008). Physiological changes can be monitored through the examination of cardiovascular reactivity, HPA axis reactivity, and alterations in brain biology over time or throughout the course of a single study.

*Cardiovascular reactivity***.** For several decades, research has demonstrated the mediating effects of cardiovascular reactivity on life stress and health outcomes (Carroll et al., 2011; Tuomisto, 1997). Cardiovascular reactivity is often measured as the difference in blood pressure, or heart rate, between a measurement taken during a task and that individual's measurements at baseline (Brindle et al., 2016; Kamarck, Jennings, & Manuck, 1992; Matthews, Woodall, & Allen, 1993). Substantial life stress has been found to increase an individual's blood pressure in response to stressful stimuli, with this reaction happening quicker over time. Eventually, the individual's heart rate and blood pressure are easily raised by non-threatening stimuli that are perceived as anxiety-provoking, leading to increased risk of hypertension (Brindle et al., 2016; Matthews et al., 1993). A meta-analysis of 41 articles by Chida and Steptoe (2010) found that increased stress reactivity and slower recovery post-stress were associated with increased cardiovascular risk due to elevated blood pressure, hypertension, left ventricular mass, atherosclerosis, and additional cardiac events. Prolonged mental stress has been linked to increased blood pressure and heart rate, contributing to increased cardiovascular reactivity (Carroll et al., 2011; Matthews et al., 1993). This reactivity can serve as a mediator between life stress and negative health outcomes, cardiovascular health in particular (Brindle et al., 2016).

As described above, individuals who experience elevated cardiovascular and cortisol reactivity in response to stress are more likely to have internalizing symptoms such as low self-esteem and depression (Obradović, 2012). A more nuanced way of looking at patterns of reactivity is to consider individual differences in ANS reactivity. For example, a study by Holterman, Murray-Close, and Bresland (2016) suggests that certain life stressors such as social exclusion or bullying are associated with depressive symptoms in individuals with reactivity patterns that reflect coactivation (i.e., increased sympathetic and parasympathetic reactivity) *and* coinhibition (i.e., blunted sympathetic and parasympathetic reactivity). Generally, studies of ANS reactivity have focused on the deleterious effects of excessive reactivity, but the aforementioned study proposes that blunted ANS reactivity may play a role, too. Gump and Matthews (1999) contend that this blunting of cardiovascular reactivity may be due to habituation to levels of chronic stress over time. Whereas individuals who coactivate in times of stress may become hypervigilant and unable to regulate their emotions, those who co-inhibit their responses may be able to attend to the stressful stimuli without utilizing their coping skills (Holterman et al., 2016).

The Hypothalamic Pituitary Adrenal (HPA) axis. Previous research has correlated social stress, such as that induced by bullying, with altered cardiovascular reactions and disruptions in the hypothalamic-pituitary-adrenal (HPA) axis (Hamilton et al., 2008). Being bullied may alter an individual's physiological responses to stress and change cognitive responses to threatening and non-threatening situations (e.g., hypervigilance, perceived hostility in social interactions; Wolke et al., 2013). In addition to changes in the HPA axis, bullying has been linked to heart beat alterations, increased heart rate, altered basal levels of cortisol, and decreased levels of self-esteem (Boulton & Smith, 1994). In particular, interpersonal stressors seem to lead to heightened

cortisol responses in participants (Hamilton et al., 2008). In a study examining perceived social isolation, individuals who reported more feelings of loneliness also were recorded as having higher blood pressure and higher cortisol levels beginning in the morning (Cacioppo & Hawkley, 2009). Chronic bullying has been found to have an effect on an individual's cardiovascular response when they are experiencing simulated social exclusion (Newman, 2014).

Altered activity in the HPA axis as well as altered cortisol responses may increase the risk for developing mental health problems and increase susceptibility to illness by interfering with immune responses. Bellis et al., (2017) suggested that ACE's could lower an individual's stress tolerance and consequentially predispose them to antisocial behavior such as violence or general interpersonal difficulties. ACE's may also play a role in HPA axis functioning with subsequent deleterious consequences on the immune system. In general, poor social circumstances in childhood or early adolescence may result in low self-esteem, feelings of lack of control over home and work environments, and consequently long-term stress.

*Irregularities in brain biology***.** A number of neuropsychological research studies have focused on the long-term influence of adverse experiences during early development (Bendall et al., 2008; De Bellis et al., 2009; Gould et al., 2012). It has been proposed that ACE's can alter early brain development, and can even compromise the role of the pre-frontal cortex in functions such as impulse control (Bellis et al., 2017). A considerable amount of research has been conducted in order to better understand the relationship between ACE's and neurodevelopmental mechanisms and outcomes (Hart &Rubia, 2012; McLaughlin et al., 2012; Schilling, Aseltine, & Gore, 2008; Sheridan & McLaughlin, 2014). Sheridan and McLaughlin (2014) suggest a conceptual framework for understanding the neurodevelopmental effects of ACE's based on individual experiences of deprivation and threat. First, deprivation is defined as the absence of

species or age-expectant environmental inputs, specifically a lack of expected cognitive or social feedback. Psychological research has long-since purported that an early environment devoid of enrichment would yield a neural structure less capable of dealing with complex environments (Hart & Rubia, 2012). Sheridan and McLaughlin (2014) suggest that environments low in cognitive stimulations can lead to fewer synaptic connections and decreased functioning on tasks that depend on the affected brain areas, such as complex cognitive tasks. Studies of children exposed to deprived environments have observed decreased thickness in cortical areas of the brain and prefrontal cortex functioning, leading to overall cognitive function decline (Linver, Brooks-Gunn, & Kohen, 2002; Noble, et al., 2012)

Sheridan and McLaughlin (2014) propose that early threat exposure is associated with changes in neural circuitry, altering the functioning of the hippocampus, amygdala, and ventromedial prefrontal cortex. This alteration in hippocampal functioning has been associated with poor functioning on learning and memory tasks (Sheridan & McLaughlin, 2014). The hippocampus has been identified as the "most obvious" target of the damaging effects of childhood maltreatment and neglect. This brain area is saturated with glucocorticoid receptors, and is vulnerable to the effects of excessive levels of glucocorticoids such as cortisol, the hormone released during times of stress. Additionally, it has been demonstrated that overexposure to glucocorticoids could lead to dendritic atrophy in the hippocampus (Teicher & Samson, 2016). Finally, adults with histories of maltreatment during childhood tend to have smaller hippocampi compared to individuals who did not experience such maltreatment. Teicher and Samson (2016) cited a study of 357 individuals, in which severe childhood maltreatment was associated with decreased hippocampus size in males, and greater effects of trauma exposure on hippocampus volume were found in males compared to females (Everaerd et al., 2012). The

authors suggest that females may be more resilient in response to childhood maltreatment as compared to males due to a protective factor associated with the production of estrogen and recommend additional research in this area (Teicher & Samson, 2016).

Additional alterations have been identified in the amygdala, the arousal center of the brain. Stress hormone stimulation associated with perceived environmental stressors has been correlated with dendritic arborization in the amygdala, leading to increased volume (Teicher & Samson, 2016). Finally, the cerebellum has been implicated in the brain altering effects of childhood maltreatment and neglect. The cerebellum has the highest density of glucocorticoid receptors, which as discussed pertaining to the hippocampus, can further the effects of the stress hormone cortisol on the brain. Teicher and Samson (2016) conclude with a statement proclaiming that the neurological pathways and regions of the brain involved in regulating emotional and physical response to threatening stimuli tend to overlap with regions found to differ structurally in maltreated individuals. This includes the hippocampus and amygdala, as well as the thalamus, visual cortex, anterior cingulate cortex, and ventromedial prefrontal cortex (Teicher & Samson, 2016).

Protective Factors

In addition to risk factors, equally important is the identification of protective factors that can help prevent negative health outcomes. Often, protective factors are the inverse of the risk factors mentioned above (i.e., high versus low socioeconomic status, intact versus broken families) (Walker et al., 2011). Perceived social support and resilience are two of the most studied protective factors against negative health outcomes. Given the increased focus on prevention, it is prudent to examine protective factors so that early intervention may be provided.

Perceived social support. Schaefer, Coyne, and Lazarus (1981) discuss years of research in the introduction to their study that has demonstrated a correlation between perceived social support and how a person responds to stressful stimuli. In addition, perceived support has been related to an individual's ability to cope with stress. Previous research has found significant inverse associations between perceived social support and cholesterol levels and symptoms of depression (Schaefer, Coyne, & Lazarus, 1981). Bowen et al. (2014) also suggest that stable and consistent perceived support may be a significant coping resource, serving as a buffer between life's daily stresses and their effect on systolic and diastolic blood pressure.

Robinson and colleagues (2017) identified two forms of social support: structural and functional. Structural support refers to the extent to which individuals are involved in social networks, whereas functional support describes actual or perceived socially supportive interactions with others. The researchers describe the social support reactivity hypothesis, which proposes that supportive individuals can "exert" their effects on health by attenuating the perceiving individual's physiological response to stress. When individuals feel threatened, they are likely to affiliate with those who are facing or have faced similar threats. Robinson et al. (2017) found that active support from others, specifically those facing a similar threat, had an effect on participant health outcome, particularly their ability to heal after a stress-inducing procedure. Feelings of closeness with another participant during the previously mentioned task were found to decrease self-reported stress and lessen autonomic system arousal (Robinson et al., 2017). It is possible that perceived support from family members could activate this same mechanism, as members of the same family may be viewed as experiencing the same events, positive or negative.

Resilience. Bellis and colleagues (2017) define resilience as an individual's ability to convert theoretically harmful stress into manageable stress and consequently reduce the harmful physiological and psychological impacts of such stressors. Research has focused on identifying potential factors that increase individual resilience, given that resilience has been found to have protective effects on at risk populations (Watson, Clark, & Tellegen, 1988). It is believed that in childhood, having a relationship with a trusted adult such as a parent, teacher, or coach is the strongest component of resilience development (Shonkoff et al., 2015). Having this trusted adult's support as a child has been found to be one factor that promotes resilience and consequently can mitigate the impact of childhood adversity on health outcomes. Additionally, not only can adult-child relationships help develop resilience, they may also be able to prevent some adverse childhood experiences from happening in the first place (Bellis et al., 2017).

In a British cohort, resilience has been correlated with cognitive abilities that protect against developing negative health behaviors or experiencing negative health outcomes. This study also examined the effects of early treatment in childhood to help protect the child against the long-term effects of negative childhood experiences. For example, a child who experiences a notable stressor, such as parental divorce, may receive therapy services in childhood which then serve as a buffer against further stressors and other adverse experiences later in life (Bridger & Daly, 2017).

Notably, it has been suggested that mild to moderate levels of adverse experiences in childhood may help the child to adapt to higher levels of stress. Although there are many studies that focus on the consequences of adverse childhood experiences, some level of adversity in childhood can be helpful in increasing the child's coping skills which can improve ability to cope with stress as an adult (Bridger & Daly, 2017). This notion may contribute to the research behind

stress inoculation training (SIT), which assists clients with anxiety to prepare for stressful situations in which they may have to face their fears (Foa et al., 1999; Meichenbaum & Deffenbacher, 1988). The goals of SIT include the application of coping skills, such as cognitive restructuring and reframing, planning for resources and escape routes, decreasing overgeneralization and negative self-talk, as well as other cognitive-behavioral therapy skills. The clients are educated about stress and bodily responses to stressful experiences, and through SIT, they are taught to predict what can happen in these situations so that they may decrease the severity of any negative reaction they may experience (Foa et al., 1999; Meichenbaum & Deffenbacher, 1988).

The Need for a Theoretical Perspective to Guide Research

Many of the previously mentioned negative influences on overall health include a social/interpersonal aspect. Divorce, death of a loved one, bullying, trauma, poor relationships with family members, and growing up near crime or in a low socioeconomic area all involve a social milieu. A great deal of research has been conducted in order to identify the correlation between social experiences and overall health, with a focus on heart health (Kuper, Marmot, & Hemingway, 2002; Sparrenberger et al., 2009). Numerous studies have been conducted in search of the mechanisms behind these correlations, and a handful of theories appear to explain how these mediating variables create their effect (Bowen et al., 2014; Robinson et al., 2017). For example, research has shown that positive social processes or interactions (i.e. social support) tend to reduce the physiological stress response, whereas negative social processes (i.e. social isolation, perceived rejection) tend to heighten that same response. If experienced repeatedly, over a long period of time, prolonged physiological responses of this type could contribute to the development of a variety of health issues (Chida & Steptoe, 2010).

The interpersonal perspective and its application to psychosocial risk factors. Stress processes such as cardiovascular reactivity can be examined experimentally, but there is a need to choose stressors that are theoretically informed. Unfortunately, a number of past experimental studies used non-social stressors (e.g., cold pressor task) that are not commonly experienced by people, and hence, lack ecological validity (Grant, Hobkirk, Persons, Hwang, & Danoff-Burg, 2013). Social stressors, on the other hand, are particularly salient for humans and are commonly experienced. A recent study, in fact, suggests that social stressors are a central aspect of human life and neuroendocrine and cardiovascular responses to experimentally-induced social stress are greater than non-social stressors (Woody, Hooker, Zoccola, & Dickerson, 2018). Of note, this finding was not due to cognitive load (i.e., these tasks are simply more difficult).

The interpersonal perspective of clinical, social, and personality psychology suggests that an individual's social behavior is marked by varying degrees of dominance (e.g., control versus submission) and affiliation (e.g,. warmth versus hostility). These dimensions are orthogonal to one another; together, they make up the Interpersonal Circumplex (Locke, 2000). A person's social behavior, then, can be described in terms of his or her degree of dominance and affiliation (i.e.,, interpersonal style). These dimensions of social behavior – dominance and affiliation – correspond to the social motives of agency (i.e., status) and communion (i.e., acceptance), respectively.

One interpersonal theory in particular, social self-preservation theory (Gruenewald, Kemeny, Aziz, & Fahey, 2004), purports that self-conscious emotions, such as shame, are experienced when the goal of maintaining a positive social self-image is threatened. Situations which threaten the "social self", an individual's social value or standing, elicit increased feelings of low social worth (e.g., shame) and low social self-esteem, and increased physiological reactivity. Gruenewald and colleagues (2004), examined cognitive, emotional, and physiological

responses to a laboratory stressor task in the presence or absence of social evaluative threat. The researchers found that participants in the social evaluation condition displayed stronger increases in psychophysiological reactivity, and they concluded that threat to the social self is able to elicit psychological and physiological responses that are relevant to health and disease (Gruenewald et al., 2004). Individual differences in cardiovascular reactivity to social evaluative threat, therefore, may be an important individual difference variable to study in stress-reactivity experiments (Dickerson, Gruenewald, & Kemeny, 2004).

Building on the research of Gruenewald and colleagues, Smith and Jordan (2015) independently manipulated the dimensions of social evaluative threat (i.e., status and acceptance) and found strong evidence of psychophysiological reactivity to both forms of threat. This experiment was an important first step in examining individual differences in cardiovascular reactivity to social evaluative threat because it looked at the two types of social motives separately. Past studies have tended to conflate the two (Gruenewald et al., 2004). Smith and Jordan (2015) found that when threatening an individual's status (i.e., an agentic threat), there was a significant increase in feelings of shame, and when threatening an individual's acceptance or likeability (i.e., a communion threat), the individual's anxiety increased substantially. Both dimensions of social evaluation in this study also led to increases in blood pressure and heart rate (Smith & Jordan, 2015).

Current Research Study

The above literature review suggests that many adverse childhood experiences are associated with deleterious health outcomes. Furthermore, there are protective factors such as resilience that may be associated with salubrious health outcomes. Questions remain, however, about the physiological mechanisms explaining these relationships The purpose of the current study is to examine the relationship between individual differences (e.g., adverse childhood experiences, resilience) and current cardiovascular reactivity. Specifically, the proposed study will consider whether or not these individual difference variables moderate the relationship between social evaluative threat and cardiovascular reactivity. Similar to Smith and Jordan (2015), the present study will utilize a social stressor that separately threatens status (i.e., agency) and acceptance (i.e., communion). The individual difference variables will be assessed via questionnaires that address adverse childhood experiences, exposure to bullying, and resilience.

The experimental design consists of four conditions. The independent variable was social evaluative threat. The first condition had a social evaluative threat in which the participant was evaluated on how likeable, interesting, and friendly he/she is (i.e., communion threat). The second condition had a social evaluative threat in which the participant was evaluated on how competent, intelligent, and skilled he/she is (i.e., agentic threat). The third condition had a combination of conditions one and two. In other words, the participant was evaluated on both likeability *and* competence (i.e., both communion and agency). Finally, the fourth condition was the control condition. Participants engaged in the exact same tasks but there was no social evaluative threat involved. Dependent variables were cardiovascular reactivity as measured by systolic and diastolic blood pressure. These measurements were taken before the task (baseline) and during the task in order to calculate a change score for systolic and diastolic blood pressure.

For the present study, the researcher hypothesized that:

1) Participants exposed to agentic social evaluative threat will display greater cardiovascular reactivity compared to participants who are not exposed to agentic social evaluative threat.
2) Participants exposed to communion social evaluative threat will display greater cardiovascular reactivity compared to participants who are not exposed to communion social evaluative threat.
3) Participants exposed to combined agentic and communion social evaluative threat will display greater cardiovascular reactivity compared to participants who are not exposed to social evaluative threat (control condition).
4) The effects of social evaluative threat on cardiovascular reactivity will be moderated by adverse childhood experiences, bullying, and resilience.
    a. Participants with higher resilience as assessed by the Connor-Davidson Resilience Scale (see Appendix A) will have less cardiovascular reactivity in response to social evaluative threat compared to participants lower in resilience.
    b. Participants exposed to a greater number of adverse childhood experiences as assessed by the Health Experiences Questionnaire (see Appendix B) will have greater cardiovascular reactivity in response to social evaluative threat compared to participants with less exposure to adverse childhood experiences.
    c. Participants reporting more exposure to bullying as assessed by the Experiences with Bullying Scale (see Appendix C) will have greater cardiovascular reactivity in response to social evaluative threat compared to participants with less exposure to bullying.

CHAPTER 3

METHOD

Participants

This study employed a sample of 104 undergraduate students enrolled in classes through the Psychology Department at a large Midwestern University. Students were required to be at least 18 years old to participate in the study. Participants in the study ranged between 18 and 45 years of age ($M = 19.67$, $SD = 3.70$). Of the participants, 63% identified as female and 34% identified as male. Of the students who participated, 43% were White/Caucasian, 34% were Black/African American, 15% were Hispanic/Latino(a), 5% were Asian/Asian American, 1% identified as American Indian or Alaskan Native, and 2% of participants did not disclose their race/ethnicity or identified with another population. Of the participants, 69% were first-year college students, 22% were in their second year, 4% in their third, 3% in their fourth, and 2% were beyond four years of undergraduate education. Participants were asked about their family composition during childhood. Regarding their household circumstances, 63% of students were raised by both parents in the same home, 31% were primarily raised by their mother following their parents divorce, and 6% were raised by their fathers following parental divorce.

Students were recruited on a voluntary basis through use of the SONA online system to sign up for the study. Participants were required to have abstained from caffeine and nicotine for at least two hours prior to participating in the experiment, and were asked when they last consumed these substances prior to beginning the experiment. Participants taking medications known to impact cardiovascular activity, such as beta-blockers, were excluded from the study.

Measures

Physiological Measures

Blood pressure. A Dinamap Model 100 was used to measure systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate. The Dinamap uses the occillometric method to calculate blood pressure. The assessments of blood pressure was obtained using a properly sized occluding cuff positioned on the upper non-dominant arm of the participant according to the manufacturer's specifications. Mean SBP, DBP, and heart rate for each epoch (i.e., baseline, tasks, recovery) were averaged across 90-second intervals to increase the reliability of the assessments (Kamarck et al., 1992).

Questionnaire Measures

The following questionnaires were completed through Qualtrics Survey System.

Connor-Davidson Resilience Scale-25 (CD-RISC-25). The Connor-Davidson Resilience Scale is a 25-question survey with short phrases followed by boxes designed to assess individual resilience (See Appendix A). Participants are directed to select a box from zero to four, zero being "not at all" and four being "true nearly all the time", that best suits their response to each of the 25 phrases (Connor & Davidson, 2003). The number of check marks per column will then be multiplied by the numerical score assigned to that column (e.g., the participant selected 10/25 phrases as being 3's, the total for that column is 30). The total for each column

(zero, one, two, three, and four) is summed and a total score out of 100 is given, with a higher score indicating greater resilience. (Connor & Davidson, 2003). The total score on the CD-RISC-25 will be used as a measure of resilience. Reliability and validity have been assessed and suggest good internal consistency ($\alpha = 0.89$), consistent with the current sample ($\alpha = 0.88$). Additionally, high level of test-retest reliability (0.87), and convergent validity are suggested by positive correlation with the Kobasa hardiness measure ($r = 0.83$, $p < .0001$) (Connor & Davidson, 2003).

Health Experiences Questionnaire (HES). The Health Experiences Questionnaire is a 28-item list of statements about childhood experiences, including sickness, abuse, familial discord, or parent psychopathology (See Appendix B). The participant is asked to answer "yes"(1) or "no"(0) whether each of the events occurred before they were 17-years-old. There are no psychometric statistics available (Noyes et al., 2002). The total score on the HEC will be used as a measure of adverse child experiences.

Experiences with Bullying Questionnaire (EBQ). The Experiences with Bullying Questionnaire is a set of seven questions asking about participants' experiences with repeated, intentional aggression (bullying) in the past (See Appendix C for scoring procedure). The participants are asked if they were a victim of bullying in high school, junior high/middle school, or college, and if the bullying did not occur at all, occurred occasionally, or occurred frequently. Additionally, the participant is asked if they were a victim of bullying during that time period, and whether the bullying was primarily physical in nature (e.g., physical harm or threats of harm), social (e.g., social exclusion, embarrassment), or both. Finally, the participants are asked if since coming to college they had been bullied by students, faculty, both, or neither. Internal consistency for this measure has been reported to be around .70 with the value for the current

sample being lower (α = 0.51) (Hamilton, Newman, Delville, & Delville, 2008; Newman, Holden, & Delville, 2005).

Procedure

Temporal Sequence

Participants arrived at the laboratory for their scheduled 120-minute experiment with random assignment to condition. A timeline of the study is presented in Figure 1.

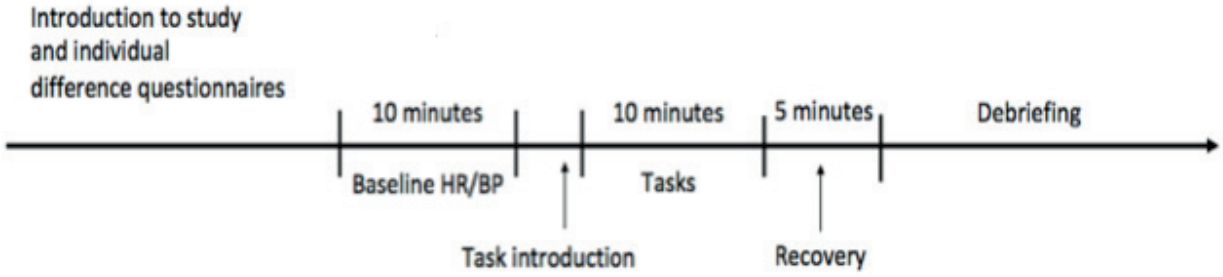

Figure 1. Temporal sequence of measurements and tasks

Participants were introduced to the study and signed the informed consent. They then completed a demographic information questionnaire (Appendix D) followed by measures of adverse health experiences, resilience, and experiences with bullying.

Baseline. A 10-minute baseline for physiological measures was assessed during a minimally engaging task in which the participants were asked to rate a set of pictures regarding the pleasantness of the photo. Audio instructions guided the participants through the task. The participants had one minute to look at two pictures of pleasant scenery and selected the photo they preferred. Audio instructions informed the participants when to turn to the next pair of

pictures, and this process was repeated until the tenth pair had been rated. Blood pressure was collected at 10 seconds, 300 seconds, 390 seconds, 480 seconds, and 570 seconds.

Experimental tasks. Evaluative threat conditions were manipulated in the same manner as in prior studies in other laboratories (T.W. Smith et al., 1997). Participants were exposed to one of four conditions all of which required participation in a role played interaction. In the communion threat condition, participants were told that raters will judge how likeable, interesting, and friendly they were. In the agency threat condition, participants were told that raters will judge how intelligent, competent, and skilled they were. In the combined condition, the participants were told that raters will judge them *both* on how likeable and intelligent they were. In the control condition, the participants were told that they need to respond to the tasks but their responses will not be evaluated in any way. Additionally, raters were not present in the control condition.

Through audio instructions, the task was then given to the participants in which they talked about a role playing interaction with a pre-recorded hostile passenger in a car accident. For each speaking task, blood pressure was assessed 10 seconds after the participant began speaking. The task involved two parts in which the participant responded for 90 seconds. For example, the participant heard the following audio instruction and was also given a hard copy to follow along:

> For this task, we would like you participate in a role played interaction. The interaction revolves around a car accident. Both you and the person you will interact with were **the passengers**, **NOT** the drivers of the cars involved in the accident. First, let me describe to you the events leading up to the interaction. You've been out for the day with your younger brother doing some shopping. He has had his license for 2 years and he is a good driver. He loves his old red Toyota. Your brother is an honor student, gets good grades, and is responsible. You stop at one shopping center that is pretty crowded. He drives slowly in the parking lot looking for a space to park. As he passes a gray van, it **abruptly** backs up and hits your brother's car on the right side. Specifically, the gray van strikes the side of your brother's car near the right front tire. It was clear that the driver **never**

> **looked**. The passenger in the gray van is a young man and the driver is an older woman. When the older woman gets out, she looks confused about what just happened. The young man gets out and **inappropriately blames you and your younger brother**. You will now listen to the passenger of the other car speak for a few seconds. You're going to hear his point of view of what happened. Then we would like you to role play and respond to him for 90 seconds. You can go over your own point of view about what happened and respond to his inappropriate blaming of you and your younger brother. You will then stop and the other driver will respond. After his second response, we will ask you to respond for another 90 seconds. Now imagine that this accident has just happened and the passenger of the other car steps out and addresses you. Again, you will hear his point of view, and afterwards, we will ask you to respond.

The hostile passenger audio was played, and then the participant responded. After speaking for 90 seconds, the participant heard a follow-up pre-recorded interaction with the hostile passenger and then the participant responded a second time for 90 seconds.

Two "raters" were seated across from the participant in the threat conditions to make ratings on a clipboard as the participant talked. For each experimental condition the "raters" consisted of one male and one female individual between the ages of 20 to 30 of varying ethnic/cultural backgrounds. Throughout the task, the interaction between the raters and the participant was minimal, with the raters maintaining professional demeanor and limiting emotional reaction to the participant's response, responding only with prompts encouraging the participant to try their best or continue speaking. They made their first rating 10 seconds into the speaking task and their second rating at the end of the 90-second interval. In total, the experimental task took approximately 10 minutes to complete. During the recovery stage the participants were left alone in the room for a period of five minutes. Throughout this time their blood pressure was measured four times, however, this data was not analyzed for the current study. At the conclusion of the experiment one of the raters explained the purpose of the experiment to the participant along with debriefing.

CHAPTER 4

RESULTS

Statistical Analyses

Physiological responses were analyzed as task - baseline change scores in 2 (high vs. low agency threat) X 2 (high vs. low communion threat) factorial ANOVAs. The main effects of agency threat and communion threat tested the primary hypotheses that these stressors would evoke heightened cardiovascular responses. Effect sizes are reported as partial η^2 for main effects and interactions, and as Cohen's *d* for main effects and mean comparisons. Analyses revealed no departures from homogeneity of variance, but some minor departures from normality for changes in systolic blood pressure. Because analyses of transformed outcomes produced the same pattern of results, analyses of untransformed variables are reported below. Controlling race, ethnicity, and gender through analysis of covariance (ANCOVA) did not alter any of the effects of social evaluative threat on cardiovascular reactivity reported below.

Descriptive Analyses

Table 1 presents the mean, standard deviation, range, and internal consistency for the primary research variables. The mean for resilience (*M* = 71.6) in the current sample was similar to means found in samples of the general population as well as a group of Iranian college students with previously published means of 80.40 (*SD* = 12.8) and 70.53 (*SD* = 15.7),

respectively (Connor & Davidson, 2003; Haddadi & Besharat, 2010). For comparison, the reported frequency of bullying in this sample was 4.01, which is similar to that found in a study comparing both LGBT and heterosexual adults with scores ranging from 4-5 across groups (Puckett, 2012). Comparison data could not be located for the total adverse health experiences score at this time. For the present study, parents divorcing, having a family member who was seriously ill, or the death of a close friend or family member were the most commonly reported adverse health experiences.

Primary Analyses

The data was screened for missing data before completion of statistical analyses. There were 10 participants who had missing data, with no participants missing more than one data point per questionnaire. For the resilience scale, the participant's item mean score for that measure was substituted for the missing response(s) on that measure. The frequency totals of bullying and adverse health experiences in childhood were calculated from the sum of the completed items.

Correlation analyses were conducted among the primary research variables. Table 2 presents these correlations. Resilience was not correlated with either adverse health experiences or bullying. However, the total adverse health experiences score was positively correlated with bullying ($r = .28$, $p < .01$), indicating that a higher number of self-reported adverse health experiences was correlated with a higher number of self-reported experiences with bullying.

Baseline Equivalence of Groups

In a 2 (high vs. low agency threat) X 2 (high vs. low communion threat) X 2 (gender) ANOVA of baseline measures, men had higher SBP than did women (114.14 mmHg vs. 108.41 mmHg, *SE*s = 1.90, 1.45), $F(1,96) = 5.73$, $p < .05$, $\eta^2 = .06$, $d = .58$. No other effects were

significant. Control of gender and race/ethnicity did not alter the results of analyses reported below.

Effects of Agency and Communion Threats

Systolic Blood Pressure

High agency threat participants displayed greater overall SBP change than those in low agency threat conditions (26.44 mmHg vs. 20.45 mmHg, *SE*s = 1.86, 2.00), $F(1,100) = 4.10$, $p < .05$, $\eta^2 = .04$, $d = .67$. High communion threat participants displayed greater SBP change than those in low communion threat conditions (27.51 mmHg vs. 19.61 mmHg, *SE*s = 2.16, 1.66), $F(1,100) = 8.01$, $p < .01$, $\eta^2 = .07$, $d = .83$. The agency threat X communion threat interaction was not significant, $F(1,100) = 2.66$, $p = .11$. As presented in Figure 2, follow-up mean comparisons indicated that SBP change was greater in the agency threat condition compared to the control condition, $t(3.11) =$, $p < .01$, $d = .83$, the communion threat condition compared to the control condition, $t(3.16) =$, $p < .01$, $d = .84$, and the combined threat condition compared to the control condition, $t(4.09) =$, $p < .001$, $d = 1.09$. Mean comparisons between the threat conditions were not significant.

Diastolic Blood Pressure

High agency threat participants displayed greater overall DBP change than those in low agency threat conditions (16.89 mmHg vs. 12.85 mmHg, *SE*s = 1.17, 1.32), $F(1,100) = 4.71$, $p < .05$, $\eta^2 = .05$, $d = .45$. High communion threat participants did not display greater DBP change than those in low communion threat conditions (16.22 mmHg vs. 13.51 mmHg, *SE*s = 1.23, 1.30), $F(1,100) = 1.92$, $p = .17$, $\eta^2 = .02$. The agency threat X communion threat interaction was not significant, $F(1,100) = .13$, $p = .72$, and given that it did not approach significance, follow-up mean comparisons were not conducted.

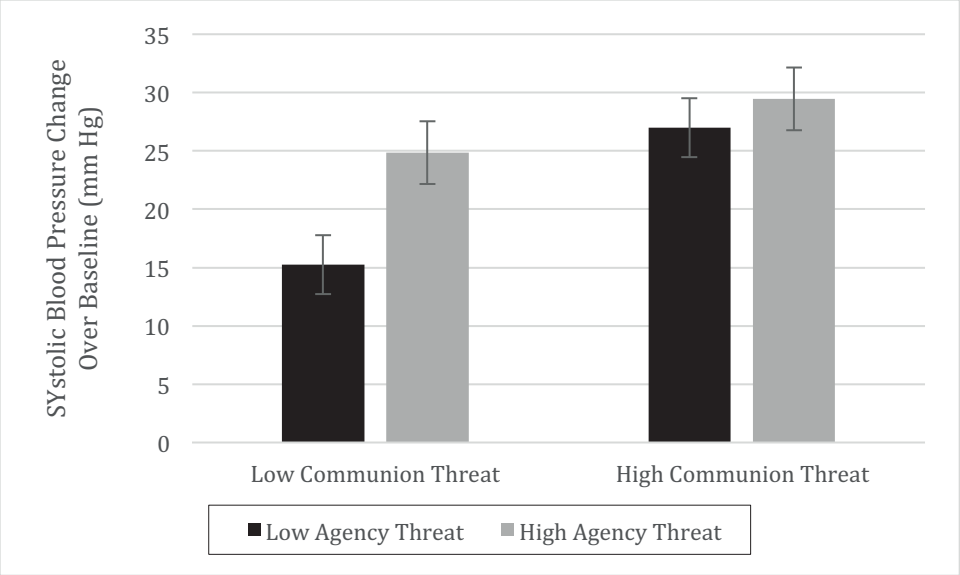

Figure 2. Mean comparisons of SBP change over baseline among the four conditions.

Effects of Resilience, Adverse Health Experiences, and Exposure to Bullying

Resilience

Hierarchical regression analyses with the rationale of the order of each step coming from previous research (see Smith and Jordan, 2015) were used to test: 1) the associations between resilience and cardiovascular reactivity, and 2) the moderating effect of resilience on social evaluative threat. Contrary to hypothesis 4a resilience was not associated with either systolic blood pressure reactivity (F (7, 96) = 2.63, $p < .05$; $R^2 = .16$) or diastolic blood pressure reactivity (F (7, 96) = 1.04, $p = .41$; $R^2 = .07$) (see Table 3 and 4). None of the tests of the moderating effect of resilience on stress were significant.

Adverse Health Experiences

Hierarchical regression analyses were used to test: 1) the associations between adverse health experiences and cardiovascular reactivity, and 2) the moderating effect of adverse health experiences on social evaluative threat. Contrary to hypothesis 4b exposure to adverse health

experiences in childhood was not associated with either systolic blood pressure reactivity (F (7, 96) = 2.43, $p < .05$; $R^2 = .15$) or diastolic blood pressure reactivity (F (7, 96) = 1.25, $p = .29$; $R^2 = .08$) (see Table 5 and 6). None of the tests of the moderating effect of adverse health experiences on stress were significant.

Bullying

Hierarchical regression analyses were used to test: 1) the associations between bullying and cardiovascular reactivity, and 2) the moderating effect of bullying on social evaluative threat (see Table 6 and 7). Without the interaction terms, bullying was not associated with systolic blood pressure ($t = -1.55$, $p = .125$). As shown in model 5 (see Table 7), exposure to bullying was associated with systolic blood pressure reactivity when the interaction terms were entered into the regression analyses (F (7, 96) = 4.10, $p < .01$; $R^2 = .23$). This finding suggests that bullying is a significant predictor of systolic blood pressure reactivity conditional on the inclusion of its interaction with social evaluative threat (i.e. communion). Of note, the direction of the association was opposite of what was predicted. In the full model, bullying was negatively associated with systolic blood pressure reactivity ($t = -2.25$, $p < .05$), and the interaction between communion threat and bullying was significant ($t = -2.34$, $p < .05$).

To specifically examine and visually depict this interactive effect, the PROCESS macro for SPSS was used with communion threat entered as the independent variable, systolic blood pressure reactivity entered as the dependent variable, and bullying entered as the moderator. Bullying approached significance in its prediction of systolic blood pressure reactivity (t = -1.91, p = .059) and the interaction of communion threat and bullying significantly predicted systolic blood pressure reactivity (t = -2.00, p < .05). As shown in Figure 3, for participants receiving the communion threat, the individuals reporting little to no past exposure to bullying had the largest

SBP reactivity. For participants who did not receive the communion threat, past exposure to bullying did not influence SBP reactivity. Findings for DBP reactivity were in the same direction as SBP (F (7, 96) = 2.60, $p < .05$; $R^2 = .16$), but were ultimately not significant (see Table 8).

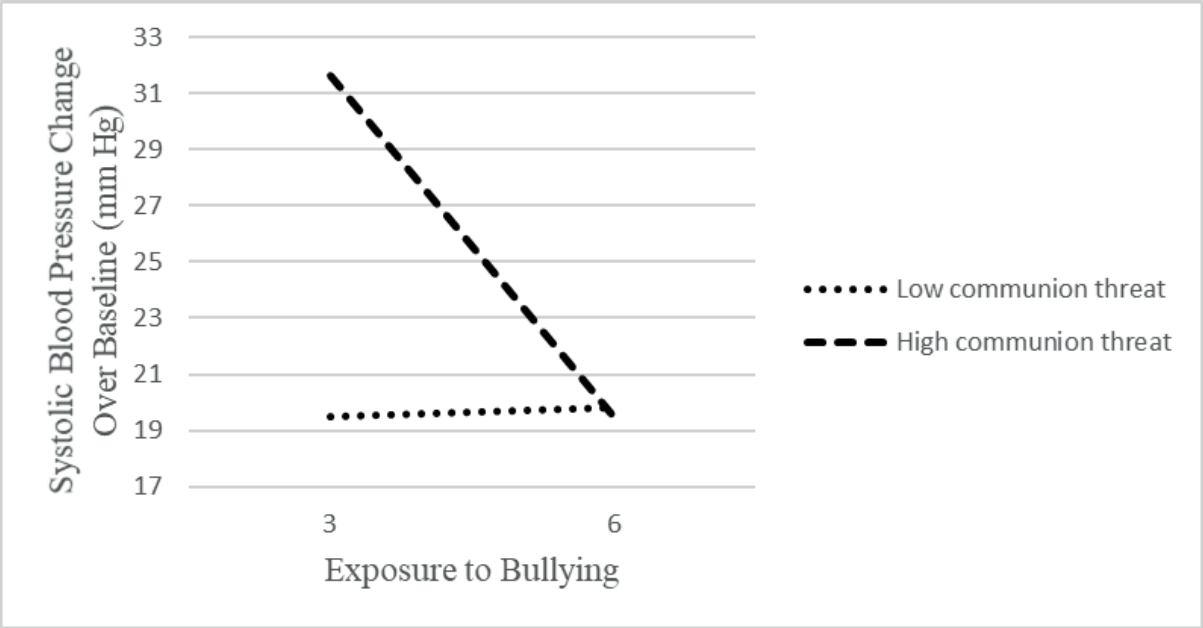

Figure 3. The relationship between bullying and SBP change based on low versus high communion threat.

CHAPTER 5

DISCUSSION

Individuals have two broad social motives (i.e., agency and communion) that coincide with goals of status and acceptance. According to social self preservation theory, when faced with social evaluative threat, our bodies respond with predictable physiological changes. There are likely individual differences in these physiological changes in response to social evaluative threat. The present study used a 2 X 2 factorial design in which social evaluative threat was the independent variable and physiological change (i.e., blood pressure) was the dependent variable.

For the primary research variables (adverse health experiences, bullying, and resilience), they were generally uncorrelated. The exception was the significant, positive correlation between adverse health experiences in childhood and exposure to bullying, indicating that increased self-reported past adverse health experiences was associated with increased self-reported experiences with bullying. Resilience was not significantly correlated with bullying or number of adverse health experiences in childhood. The correlation between adverse health experiences and bullying may in part be due to similarly assessed content (i.e., exposure to physical and social aggression), and hence, this positive association is to be expected.

Aside from men having higher SBP during baseline in comparison to women, no other differences in the baseline groups were found. Control of gender and race/ethnicity did not alter

the results of analyses; hence, in the present study, social evaluative threat appeared to influence the physiology of all participants similarly. For SBP reactivity (i.e., task value minus baseline value), both threats to acceptance and status resulted in significant change. Therefore, the predicted independent effects of these two dimensions of social evaluative threat on SBP reactivity was confirmed. The combined threat, though in the expected direction, was not significant (p = .11). As previously reported by Smith and Jordan (2015), with larger cell size (i.e., more participants), it is likely that the combined threat would become significant.

For DBP reactivity (i.e., task value minus baseline value), the status stressor resulted in significant change but the acceptance stressor did not (p = .17). Therefore, the predicted independent effect of one of the two dimensions of social evaluative threat on DBP reactivity was confirmed. The combined threat was not significant. The lack of fully consistent findings for DBP reactivity does have parallels in the research literature (Arthur, Katkin, & Mezzacappa, 2004) and may reflect greater sensitivity of SBP to social evaluative threat or may be a function of less variability in DBP reactivity. Additionally, SBP may be more crucially related to physiological reactivity to threat, compared to DBP. Systolic blood pressure is a measure of blood leaving the heart to assist the numerous mechanisms in the body during the "fight or flight" response, whereas DBP is measured as blood returns to the heart, which may leave this measure less reactive to evaluative threat.

Overall, the results of the present study generally supported hypotheses 1 through 3. The conclusions that can be drawn from these results are similar to those of prior studies by Gruenewald and colleagues (2004) and Smith and Jordan (2015). The consistency across studies suggest a significant link between social evaluative threat and alterations in physiological responses. The results presented in the current study add to the existing literature regarding the

impact of social evaluative threat on cardiovascular reactivity, particularly as measured by systolic blood pressure.

An additional aim of the present study was to investigate the moderating effect of individual difference variables that have previously been shown to be associated with cardiovascular disease. The physiological impact of the threat conditions was hypothesized to be moderated by individual differences in self-reported resilience and adverse childhood experiences such as bullying. Scores on the Health Experiences Scale were also not found to moderate the relationship between social evaluative threat and blood pressure reactivity. While exposure to significant life stressors does have deleterious health correlates, it is possible that blood pressure reactivity is not the predominant mechanism mediating this relationship. Other physiological correlates such as cortisol or C-reactive protein may better explain this relationship between life stressors and health outcomes through their impact on inflammatory processes or other psychosocial outcomes such as well-being. Additionally, no significant effects were found for resilience as a moderating variable. Similarly, it is possible that while resilience may attenuate the relationship between life stress and negative health outcomes, the predominant mechanism mediating this relationship may not be blood pressure. Other physiological or psychosocial correlates such as certain health behaviors may be more operative here.

One particular adverse childhood experience, bullying, as measured by the Experiences with Bullying Questionnaire, was found to significantly moderate aspects of the relationship between social evaluative threat and SBP reactivity. However, the moderating effect was in the opposite direction than what was predicted. This moderating effect was found for the acceptance threat condition, suggesting that individuals self-reporting limited to no past exposure to bullying had the highest SBP reactivity. For individuals self-reporting a greater amount of past exposure

to bullying, their SBP reactivity did not differ whether they were exposed to the acceptance threat or not.

While much of the research in this area would suggest that those who have experienced a history of chronic bullying might have greater cardiovascular reactivity to such a threat, there is also literature to support the contrary. Though studies have shown HPA axis dysregulation and stronger autonomic system response in bullied children, this disruption in cardiovascular reactivity is short-lived for those with histories of long-standing, chronic bullying (Hamilton et al., 2008; Newman, 2014). In multiple studies participants have been found to experience acute stress reactions to a single stressor task as evidenced by increases in heart rate and cortisol levels compared to baseline. However, research has suggested that those with a chronic history of bullying demonstrate a phenomenon termed "blunting" in which both their sympathetic and parasympathetic nervous systems decrease in activity and they do not react to the stressful stimuli to the degree one might expect. Regarding SBP in particular, a study by Hamilton et al. (2008) found that when under acute stress, such as giving a presentation, males with a history of chronic bullying demonstrated blunted blood pressure responses compared to non-bullied men.

A study by Newman (2014) found that the ANS blunting is singularly related to the sympathetic nervous system, as no differences were observed in parasympathetic nervous system activity. It should be noted, however, that the current study as well as those discussed in the preceding paragraph examined reactivity following a single stressor, which is potentially different than what chronic stress exposure might look like outside experimental settings. While the research regarding the blunting of the sympathetic nervous system of bullied children is beginning to demonstrate the impact this has on their cardiovascular health, it is important to

note that more research is needed to determine the impact of present-day chronic stressors for these individuals.

As previously mentioned, a moderate level of adversity in childhood may help improve an individual's ability to cope with stress as an adult (Bridger & Daly, 2017). This information may help to inform and guide certain exposure-based treatments such as stress inoculation training (SIT), which is conceptually similar to the idea of blunting. For those with anxiety, the goal of this training is to decrease the severity of any negative reaction the individual may experience (Foa et al., 1999; Meichenbaum & Deffenbacher, 1988).

The current study has multiple strengths including its experimental design. Researchers working in the area of cardiovascular reactivity have utilized standard methodologies such as the Trier Social Stress Test (TSST) that are useful manipulations for true experiments examining physiological responses. The present study used a modified version of the TSST (see Smith & Jordan, 2015). Another strength of the current study involves the procedure that uses a 10 minute baseline period. Some studies (e.g., Newman, 2014) have used much shorter baseline periods (e.g., two-minute baseline task) to gather pre-task physiological data. The current study is consistent with past suggestions (Jennings et al., 1992) that argue for a baseline period of 10-minutes or longer when conducting a study of physiological changes in order to gather ideal cardiovascular parameters before introducing the social stressor.

The current study is not without limitations. When examining the role of stress on health, there is sometimes an over-reliance on acute stressors to elicit stress responses. While this procedure yields excellent experimental control, it may lack ecological validity (i.e., does an experimentally-induced acute stressor approximate the chronic stress one might face in real life?). Other methodological concerns include the reliance upon a convenience sample of

undergraduate students from a public Midwestern university. While this sample is not ideal for generalizability purposes to the entire population, this study population was specifically chosen for the life experiences typically faced by someone at this stage of life (e.g., exposure to negative interpersonal exchanges). Due to the limited external validity of the current study, caution is warranted when extrapolating the current results beyond the undergraduate college student population. Utilizing more diverse samples that would improve generalizability is needed.

Another limitation of the current study is the reliance on self-reported data for the individual difference questionnaires. As with any self-report measure, the data represented are going to be the individual's perceptions of the variable being measured, such as bullying, which may differ from an objective account. On the one hand, an individual may wish to present themselves more favorably when rating their resilience or number of adverse health experiences. On the other hand, there is a risk of some participants unknowingly portraying themselves in a more negative light due to biases or cognitive distortions they may hold about themselves. Therefore, informant ratings may be needed in certain situations. Regarding bullying in particular, however, research has found that self-reported victimization tends to produce respectable test-retest reliability as well as correlation with peer perception of victimization status, indicating that it may be a sufficient measure for the purposes of the current research (Newman, 2014).

While the current study only calculated changes in reactivity during an initial stressor task compared to baseline, the significant increase in SBP (and to a lesser extent, DBP) compared to control participants may have implications for long-term health effects. Health-related research has identified repeated exposure to life stressors as predictive of increases in blood pressure over time. Individuals who have a history of reacting to multiple threatening

incidents may eventually develop faster physiological reactions (Brindle et al., 2016; Matthews et al., 1993). In the context of experimentally-inducted acute stress, these faster physiological reactions do not necessarily mean that the reactions themselves are larger in comparison to others (i.e., greater reactivity). In fact, "blunting" might occur in which the reaction is fast, but the elevation of reactivity is actually less than what one would expect. The current study sheds some light on a trend in current research suggesting a blunting effect, particularly regarding blood pressure, when the stressor is in some way associated with bullying or social ostracization (Gump & Matthews, 1999; Hamilton et al., 2008; Newman, 2014).

As it relates to the current study, it can then be supported that although many individuals may react quicker to a perceived stressor, if faced with a lifetime of chronic bullying or similar challenges, their alterations in blood pressure may actually be smaller compared to those who have not faced such hardships. As children and adolescents, it is likely that those who were chronically victimized learned to be hypervigilant and aware of their surroundings. However, once an actual stressor was faced, their sympathetic nervous system was blunted in response and exaggerated physiological changes were not witnessed in comparison to those without such a history.

An additional explanation for the results found in the present study can be supported by motivational intensity theory, which assumes that the amount of energy expended by an individual is dependent on the information provided regarding a task, including the difficulty of the task or the perceived reward associated with successful completion of such task (Richter, Gendolla, & Wright, 2016). Motivation to engage in a task has been broken into two groups, either fixed or unfixed difficulty, indicating the participant's knowledge of the cognitive ability or skill required to complete the task. Previous research has suggested that differences in

cardiovascular reactivity may exist when individuals are placed into either category, and then also when either are offered what they perceive to be an incentive or not. Richter and Gendolla (2006) found that in an unfixed task of unknown situation difficulty, SBP reactivity was significantly higher in groups with a perceived incentive to engage, whereas in groups with a fixed task difficulty (ex: needing to obtain a certain score to "pass" an exam), SBP reactivity was low across groups. This indicates that one of two possible explanations regarding bullied participants may be true when utilizing this theoretical model. The participants in the current study may not have identified the fixed performance standard was given to them, in which case, the incentive of avoiding social threat was insignificant. The participants also may have been unable to set their own performance standard, and therefore did not feel the incentive of avoiding social evaluative threat was motivating. It is possible that children who have been chronically bullied are often faced with an unfixed task, such as popularity, where there are no defined markers of success but rather a continuum on which they are judged. As previously mentioned, when the incentive to engage is no longer present, SBP reactivity is low, as there is no desire to maintain popularity and therefore no need to expend energy. For those with a history of chronic bullying they may no longer desire popularity or maintenance with the "in-group", producing the lower SBP reactivity described by Richter and Gendolla (2006).

While these results are in no way promoting exposure to bullying as a means of cardiovascular disease prevention, this may be a welcome relief for those concerned about the longstanding health effects of chronic stress. In the literature review it was noted that mild to moderate levels of adverse experiences in childhood may help someone adapt to higher levels of stress. In other words, some level of adversity in childhood can be helpful in improving a person's coping skills to manage life's difficulties. Physicians and researchers are working to

identify ways to lower blood pressure to improve health outcomes (Gosmanova et al., 2016), and perhaps one way to do so is by "inoculating" individuals to the effects of stress. The present study's finding of a moderating effect of bullying on SBP reactivity may be helpful in identifying other psychophysiological mechanisms – some of which can be modified through stress inoculation training, for example – that can be a target of prevention efforts. However, it should be noted that although the cardiovascular benefits to blunting may be present, no research was found examining the long-term mental health impacts of blunting associated with chronic bullying.

Considerations for continued research may include examination of and comparison between trials of the current study. In other words, the methodology could involve repeated exposures to the same stressor to examine patterns of habituation, as evidenced by a decrease in blood pressure change between measurements taken following the initial introduction of the stressor, return to baseline, reintroduction, and then back to baseline. Previous research has shown habituation to be predictive of numerous health-related outcomes, specifically decreased cardiovascular risk (Peters & McEwen, 2015), and this information could be combined with the knowledge collected regarding social evaluative threat and individual difference variables as potential moderators.

An additional area for continued study would be examining the impact of age as a moderating variable for the effect of social evaluative threat on SBP. While prior studies have examined gender and found no main effects for this variable as a moderator (Smith and Jordan, 2015), limited research is available regarding the influence of age a moderator. The present study relies on a convenience sample of undergraduate students, and while this sample was chosen for their likelihood of experiencing social evaluative threat in social, academic, and work

environments, this phenomenon is not limited to this age group. With many non-traditional learners going back to college after their children have left home, and many children finding jobs at younger ages, individuals are likely to face social stressors in environments that they may not have found themselves in 30, even 10 years ago. Due to the progressive nature of cardiovascular disease, as well as the importance placed on preventative medicine, it would be beneficial to study the impact of social stress across the lifespan and how individual differences in each group serve to moderate this relationship.

The primary goal of the present study was to examine the relationship between social evaluative threat and cardiovascular reactivity, as well as the potential moderating role of individual differences such as resilience and adverse childhood experiences, including bullying. As it relates to physiological reactivity, this study has supported previous literature regarding the impact of social threat, specifically when examining an undergraduate population. Social self-preservation theory would suggest that these results are indicative of the participant's desire to maintain social value or standing (Gruenewald et al., 2004). Results suggest that this motivation to maintain social standing may interact with an individual's history of exposure to bullying. Motivational intensity theory, in conjunction with the findings of Newman (2014), suggest that when an individual has experienced a significant amount of stress associated with bullying in their lifetime, their cardiovascular reactivity can be blunted in reaction to stress. One possible explanation for this is that these individuals no longer view the threat as "motivating," or requiring energy expenditure, as they have habituated to this level of cardiovascular reactivity. The knowledge gained through continued study in this area could help to guide treatment as well as education regarding cardiovascular health, preventative medicine, and behavioral medicine. By examining the implications of individual differences as moderating variables in

cardiovascular health, there is an opportunity for the biopsychosocial model to inform care and prevent disease.

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Table 1

Descriptive Statistics for Resilience, Adverse Health Experiences, and Bullying Across Conditions

	Resilience[a]	Adverse Health Experiences[b]	Bullying[c]
M	71.6	4.86	4.01
SD	12.10	3.70	1.30
Range	56.00	17.00	6.00
Internal Consistency	0.88		

[a]Scores range from 0-100 with higher scores indicating greater resilience. [b]Scores range from 0-28 with higher scores indicating greater number of adverse experiences. [c]Scores range from 2-6 with higher scores indicating greater number of experiences with bullying.

Table 2

Correlations Among Primary Research Variables

Variable	Resilience	Adverse Health Experiences	Bullying
Resilience	-		
Adverse Health Experiences	.55	-	
Bullying	.93	.01	-

Table 3

Hierarchical Regression Results for the Moderating Effect of Resilience on Social Evaluative Threat and Systolic Blood Pressure Change

Model	Variable	Unstandardized B	Standard Error	Coefficients β	*t*	*p*
1	(Constant)	23.66	1.33		17.85	.00
	agency	2.78	1.33	0.20	2.10	.04
	communion	3.80	1.33	0.27	2.86	.01
2	(Constant)	23.77	1.32		18.06	.00
	agency	2.67	1.32	0.19	2.03	.05
	communion	3.73	1.32	0.26	2.83	.01
	agencyXcommunion	-2.15	1.32	-0.15	-1.63	.11
3	(Constant)	23.81	1.32		18.07	.00
	agency	2.75	1.32	0.19	2.08	.04
	communion	3.62	1.32	0.26	2.73	.01
	agencyXcommunion	-2.16	1.32	-0.15	-1.64	.10
	Resilience	0.11	0.11	0.09	0.96	.34
4	(Constant)	23.84	1.34		17.79	.00
	agency	2.76	1.33	0.20	2.07	.04
	communion	3.61	1.34	0.26	2.70	.01
	agencyXcommunion	-2.20	1.34	-0.16	-1.64	.10
	Resilience	0.11	0.11	0.09	.96	.34
	AgencyXresilience	0.03	0.11	0.03	0.28	.78
	CommunionXresilience	-0.01	0.11	-0.00	-0.04	.97
5	(Constant)	23.89	1.34		17.86	.00
	agency	2.93	1.34	0.21	2.19	.03
	communion	3.48	1.34	0.25	2.60	.01
	agencyXcommunion	-2.27	1.34	-0.16	-1.70	.09
	Resilience	0.13	0.11	0.11	1.15	.25
	AgencyXresilience	0.04	0.11	0.04	0.37	.71
	CommunionXresilience	-0.02	0.11	-0.01	-0.14	.89
	AgencyXcommunionXresilience	-0.14	0.11	-0.12	-1.22	.22

Table 4

Hierarchical Regression Results for the Moderating Effect of Resilience on Social Evaluative Threat and Diastolic Blood Pressure

Model	Variable	Unstandardized B	Standard Error	Coefficients β	*t*	*p*
1	(Constant)	14.94	.89		16.85	.00
	agency	1.95	.89	.21	2.20	.03
	communion	1.25	.89	.14	1.41	.16
2	(Constant)	14.96	.90		16.77	.00
	agency	1.94	.89	.21	2.17	.03
	communion	1.24	.89	.13	1.39	.17
	agencyXcommunion	-.33	.89	-.04	-.37	.72
3	(Constant)	14.96	.90		16.68	.00
	agency	1.94	.90	.21	2.16	.03
	communion	1.23	.90	.13	1.37	.18
	agencyXcommunion	-.33	.90	-.04	-.37	.72
	Resilience	.01	.08	.01	.11	.92
4	(Constant)	14.99	.91		16.43	.00
	agency	1.95	.91	.21	2.15	.03
	communion	1.22	.91	.13	1.34	.18
	agencyXcommunion	-.35	.91	-.04	-.39	.70
	Resilience	.01	.08	.01	.13	.90
	AgencyXresilience	.01	.08	.02	.19	.85
	CommunionXresilience	-.01	.08	-.02	-.19	.85
5	(Constant)	15.00	.92		16.37	.00
	agency	1.99	.92	.22	2.18	.03
	communion	1.18	.92	.13	1.29	.20
	agencyXcommunion	-.37	.92	-.04	-.41	.68
	Resilience	.02	.08	.02	.20	.84
	AgencyXresilience	.02	.08	.02	.22	.83
	CommunionXresilience	-.02	.08	-.02	-.22	.82
	AgencyXcommunionXresilience	-.04	.08	-.05	-.48	.63

Table 5

Hierarchical Regression Results for the Moderating Effect of Adverse Health Experiences on Social Evaluative Threat and Systolic Blood Pressure Change

Model	Variable	Unstandardized B	Standard Error	Coefficients β	*t*	*p*
1	(Constant)	23.66	1.33		17.85	.00
	agency	2.78	1.33	.20	2.10	.04
	communion	3.80	1.33	.27	2.86	.01
2	(Constant)	23.77	1.32		18.06	.00
	agency	2.67	1.32	.19	2.03	.05
	communion	3.73	1.32	.26	2.83	.01
	agencyXcommunion	-2.15	1.32	-.15	-1.63	.11
3	(Constant)	23.77	1.32		17.97	.00
	agency	2.67	1.33	.19	2.01	.05
	communion	3.73	1.32	.26	2.82	.01
	agencyXcommunion	-2.15	1.32	-.15	-1.62	.11
	HealthExperiences (HES)	.00	.36	.00	.01	.99
4	(Constant)	23.71	1.34		17.76	.00
	agency	2.65	1.33	.19	1.99	.05
	communion	3.71	1.33	.26	2.78	.01
	agencyXcommunion	-2.21	1.34	-.16	-1.66	.10
	HealthExperiences (HES)	.015	.37	.00	.04	.97
	AgencyXHES	-.20	.38	-.05	-.52	.60
	CommunionXHES	-.26	.37	-.07	-.69	.49
5	(Constant)	23.70	1.34		17.71	.00
	agency	2.61	1.34	.18	1.95	.05
	communion	3.65	1.34	.26	2.73	.01
	agencyXcommunion	-2.23	1.34	-.16	-1.66	.10
	HealthExperiences (HES)	-.06	.38	-.01	-.15	.89
	AgencyXHES	-.19	.38	-.05	-.51	.61
	CommunionXHES	-.22	.38	-.06	-.59	.56
	AgencyXcommunionXHES	-.30	.38	-.08	-.79	.43

Table 6

Hierarchical Regression Results for the Moderating Effect of Adverse Health Experiences on Social Evaluative Threat and Diastolic Blood Pressure Change

	Variable	Unstandardized B	Standard Error	Coefficients β	*t*	*p*
Model						
1	(Constant)	14.94	.89		16.85	.00
	agency	1.95	.89	.21	2.20	.03
	communion	1.25	.89	.14	1.41	.16
2	(Constant)	14.96	.89		16.77	.00
	agency	1.94	.89	.21	2.17	.03
	communion	1.24	.89	.13	1.39	.17
	agencyXcommunion	-.33	.89	-.04	-.37	.72
3	(Constant)	14.94	.89		16.74	.00
	agency	1.90	.89	.21	2.12	.04
	communion	1.21	.89	.13	1.36	.18
	agencyXcommunion	-.33	.89	-.04	-.37	.71
	HealthExperiences (HES)	-.22	.24	-.09	-.89	.38
4	(Constant)	14.97	.90		16.58	.00
	agency	1.90	.90	.21	2.11	.04
	communion	1.22	.90	.13	1.36	.18
	agencyXcommunion	-.31	.90	-.03	-.34	.74
	HealthExperiences (HES)	-.22	.25	-.09	-.89	.38
	AgencyXHES	.07	.25	.03	.27	.79
	CommunionXHES	.11	.25	.04	.42	.67
5	(Constant)	14.97	.91		16.55	.00
	agency	1.93	.91	.21	2.14	.04
	communion	1.26	.91	.14	1.40	.17
	agencyXcommunion	-.30	.91	-.03	-.33	.74
	HealthExperiences (HES)	-.17	.26	-.07	-.67	.50
	AgencyXHES	.07	.26	.03	.26	.80
	CommunionXHES	.08	.26	.03	.32	.75
	AgencyXcommunionXHES	.21	.26	.08	.81	.42

Table 7

Hierarchical Regression Results for the Moderating Effect of Bullying on Social Evaluative Threat and Systolic Blood Pressure Change

	Variable	Unstandardized B	Standard Error	Coefficients β	*t*	*p*
Model						
1	(Constant)	23.66	1.33		17.85	.00
	agency	2.78	1.33	.20	2.10	.04
	communion	3.80	1.33	.27	2.86	.01
2	(Constant)	23.77	1.32		18.06	.00
	agency	2.67	1.32	.19	2.03	.05
	communion	3.73	1.32	.26	2.83	.01
	agencyXcommunion	-2.15	1.32	-.15	-1.63	.11
3	(Constant)	23.84	1.31		18.2	.00
	agency	2.71	1.31	.19	2.08	.04
	communion	3.74	1.31	.26	2.86	.01
	agencyXcommunion	-2.10	1.31	-.15	-1.61	.11
	Bullying	-1.55	1.01	-.14	-1.55	.13
4	(Constant)	23.84	1.28		18.58	.00
	agency	2.75	1.28	.19	2.14	.04
	communion	3.79	1.28	.27	2.96	.00
	agencyXcommunion	-2.03	1.28	-.14	-1.58	.12
	Bullying	-2.11	1.01	-.19	-2.09	.04
	AgencyXbullying	1.28	.99	.12	1.30	.20
	CommunionXbullying	-2.18	1.00	-.20	-2.16	.03
5	(Constant)	23.78	1.27		18.70	.00
	agency	2.73	1.27	.19	2.14	.04
	communion	3.74	1.27	.26	2.94	.00
	agencyXcommunion	-2.09	1.27	-.15	-1.64	.10
	Bullying	-2.26	1.01	-.21	-2.25	.03
	AgencyXbullying	1.66	1.01	.15	1.64	.10
	CommunionXbullying	-2.36	1.01	-.22	-2.34	.02
	AgencyXcommunionXbullying	1.66	1.01	.15	1.65	.10

Table 8

Hierarchical Regression Results for the Moderating Effect of Bullying on Social Evaluative Threat and Diastolic Blood Pressure Change

	Variable	Unstandardized B	Standard Error	Coefficients β	*t*	*p*
Model						
1	(Constant)	14.94	.89		16.85	.00
	agency	1.95	.89	.21	2.20	.03
	communion	1.25	.89	.14	1.41	.16
2	(Constant)	14.96	.90		16.77	.00
	agency	1.94	.89	.21	2.17	.03
	communion	1.24	.89	.13	1.39	.17
	agencyXcommunion	-.33	.89	-.04	-.37	.72
3	(Constant)	14.99	.89		16.82	.00
	agency	1.96	.89	.21	2.20	.03
	communion	1.24	.89	.14	1.40	.17
	agencyXcommunion	-.30	.89	-.03	-.34	.74
	Bullying	-.77	.68	-.11	-1.12	.26
4	(Constant)	14.99	.87		17.26	.00
	agency	1.98	.87	.22	2.28	.03
	communion	1.28	.87	.14	1.48	.14
	agencyXcommunion	-.25	.87	-.03	-.29	.78
	Bullying	-1.19	.69	-.17	-1.73	.09
	AgencyXbullying	.94	.67	.13	1.40	.16
	CommunionXbullying	-1.64	.68	-.23	-2.39	.02
5	(Constant)	14.96	.87		17.29	.00
	agency	1.97	.87	.21	2.28	.03
	communion	1.25	.87	.14	1.45	.15
	agencyXcommunion	-.28	.87	-.03	-.33	.75
	Bullying	-1.27	.69	-.18	-1.85	.07
	AgencyXbullying	1.15	.69	.16	1.67	.10
	CommunionXbullying	-1.73	.69	-.24	-2.53	.01
	AgencyXcommunionXbullying	.92	.69	.13	1.34	.18

Appendix A

Connor-Davidson Resilience Scale 25 (CD-RISC-25)

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.

1. I am able to adapt when changes occur.
2. I have at least one close and secure relationship that helps me when I am stressed.
3. When there are no clear solutions to my problems, sometimes fate or God can help.
4. I can deal with whatever comes my way.
5. Past successes give me confidence in dealing with new challenges and difficulties.
6. I try to see the humorous side of things when I am faced with problems.
7. Having to cope with stress can make me stronger.
8. I tend to bounce back after illness, injury, or other hardships.
9. Good or bad, I believe that most things happen for a reason.
10. I give my best effort no matter what the outcome may be.
11. I believe I can achieve my goals, even if there are obstacles.
12. Even when things look hopeless, I don't give up.
13. During times of stress/crisis, I know where to turn for help.
14. Under pressure, I stay focused and think clearly.
15. I prefer to take the lead in solving problems rather than letting others make all the decisions.
16. I am not easily discouraged by failure.
17. I think of myself as a strong person when dealing with life's challenges and difficulties.
18. I can make unpopular or difficult decisions that affect other people, if it is necessary.
19. I am able to handle unpleasant or painful feelings like sadness, fear, and anger.
20. In dealing with life's problems, sometimes you have to act on a hunch without knowing why.
21. I have a strong sense of purpose in life.
22. I feel in control of my life.
23. I like challenges.
24. I work to attain my goals no matter what roadblocks I encounter along the way.
25. I take pride in my achievements.

Answer choices for every statement:
not true at all (0)
rarely true (1)
sometimes true (2)
often true (3)
true nearly all the time (4)

Source:

Connor, K.M. & Davidson, J.R.T. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale. *Depression and Anxiety, 18*(2), 76-82.

Appendix B

HES Questionnaire

Please indicate with a "yes" (1) or "no" (0) whether each of the following events occurred for you prior to age 17.

1. Sick a lot as child
2. Chronic illness or disability
3. Became seriously ill
4. Poor health in childhood
5. Was seriously injured
6. Victim of violence
7. Extremely ill or injured
8. Physically abused
9. Sexually abused
10. Traumatic sexual experience
11. Parent seriously ill
12. Parent chronically ill
13. Parent hazardous occupation
14. Parent died or was killed
15. Parent alcohol/drug problem
16. Parents separated/divorced
17. Parental separation or divorce
18. Parent excessively worried about illness
19. Parental over-concern
20. Illness in a parent
21. Family member seriously ill
22. Family member chronically ill
23. Family member in hazardous occupation
24. Family member alcohol/drug problem
25. Close friend seriously ill
26. Close friend died or was killed
27. Death of close friend or family member
28. Other major upheaval

Source:

Noyes, R., Stuart, S., Langbehn, D.R., Happel, R.L., Longley, S.L., & Yagla, S.J. (2002). Childhood antecedents of hypochondriasis. *Psychosomatics: Journal of Consultation and Liaison Psychiatry, 43*(4), 282-289.

Appendix C

EBQ (Experiences with Bullying Questionnaire)

The questions on this page all deal with your past and present experiences with bullying. Bullying is typically defined as repeated, intentional aggression directed against a less powerful target. Bullying is separate from friendly teasing, because the intent is to cause physical or emotional harm. It is also different from fighting, because the target is often chosen for an inability to defend him- or herself. Please keep this definition in mind as you answer the following questions, using the scales provided. You are free to skip any questions that make you uncomfortable.

1. How often were you a victim of bullying during high school?

○ Not at all ○ Occasionally ○ Frequently

2. IF you were a victim of bullying during high school, was the bullying primarily physical (e.g., physical harm or threats of harm), social (e.g., exclusion, embarrassment), or both?

○ Physical ○ Social ○ Both ○ N/A

3. How often were you a victim of bullying during junior high / middle school?

○ Not at all ○ Occasionally ○ Frequently

4. IF you were a victim of bullying during junior high / middle school, was the bullying primarily physical (e.g., physical harm or threats of harm), social (e.g., exclusion, embarrassment), or both?

○ Physical ○ Social ○ Both ○ N/A

5. How often have you been a victim of bullying since coming to college?

○ Not at all ○ Occasionally ○ Frequently

6. IF you have been a victim of bullying since coming to college, has the bullying been primarily physical (e.g., physical harm or threats of harm), social (e.g., exclusion, embarrassment), or both?

○ Physical ○ Social ○ Both ○ N/A

7. If you have been bullied since coming to college, has it been primarily by students, faculty, or both?

○ Students ○ Faculty ○ Both Equally ○ Not applicable

SCORING NOTES: Calculate a "bullying score" by adding up the frequency on the two frequency items (high school and before high school—college is too low-frequency), to get a scale ranging from 2-6.

Source:

Hamilton, L.D., Newman, M.L., Delville, C.L., & Delville, Y. (2008). Physiological stress response of young adults exposed to bullying during adolescence. *Physiology & Behavior, 95*(5), 617-624.

Appendix D

Demographics Page

1. Subject ID _____

2. Today's Date: _____

3. Gender: Male Female Transgender

4. Which race/ethnicity do you identify with:

African American/Black
Non-Hispanic White
White Hispanic / Latino American
Asian
Pacific Islander
Persian
Arab
American Indian or Alaska Native
Other

5. How would you classify yourself in terms of religious faith or spirituality?

Atheist
Buddhist
Hindu
Jehovah's Witness
Jew
LDS (i.e., Mormon)
Muslim
New Age
Traditional African religion
Lutheran
Roman Catholic
Episcopalian
Methodist
Presbyterian
Christian
Baptist
Pentecostal
Adventist
Taoist
Unitarian
Baha'i
Other (please specify) _____