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A Cross-Cultural Comparison of the Cognitive and Mental Health Repercussions of Childhood Adversity in Adulthood

Sara Grace Comella
University of North Florida, n01414537@unf.edu

A CROSS-CULTURAL COMPARISON OF THE COGNITIVE AND MENTAL HEALTH REPERCUSSIONS OF CHILDHOOD ADVERSITY IN ADULTHOOD

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Sara Grace Comella

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The Thesis of Sara Comella is approved:

_____	_____
Dr. Tracy Alloway, Committee Chair	Date
_____	_____
Dr. Dawn Witherspoon, Second Reader	Date
_____	_____
Dr. Lori Lange, Department Chair	Date

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Abstract

The majority of individuals in the United States experience at least one type of traumatic during childhood (“Understanding Child Trauma”, 2017). Individuals with childhood adversity have an increased incidence of depression, anxiety, and alcohol abuse during adulthood (Rehan et al., 2017). However, the consequences of early adversity are not limited to mental health and extend to areas of cognitive functioning (e.g., working memory).

The present research study addresses the long-term consequences of childhood adversity on psychological and cognitive functioning. Data collection took place online from February 2019 - April 2019 in Iceland and the United States. The survey assessed outcomes including anxiety, depression, resilience, PTSD, trauma, and working memory.

The results indicate that Iceland and the United States did not show differences in PTSD symptomology or adversity. There was a significant difference in the scores for depression between the two countries, conditions; $t(192.96)= 1.71$, $p=.04$. Additionally, resilience differed between the United States and Iceland, $t(146.537)= 1.21$, $p=.02$. The individuals with moderate trauma from both countries reported higher anxiety and depression compared to the participants without trauma. In addition, Individuals showing higher levels of PTSD symptomology had greater depression, anxiety, and lower resilience compared to individuals without PTSD symptomology.

The research study compared the types of reported traumas between the United States and Iceland and the differences in mental health functioning between the two countries. This study provides evidence that individuals from both countries who report more PTSD symptomology and higher trauma show differences in the following areas of anxiety, depression, and resilience.

A Cross-Cultural Comparison of the Longstanding Cognitive and Mental Health Repercussions of Childhood Adversity in Adulthood

Childhood Trauma

Childhood trauma can result from three different types of events including, physical abuse, emotional abuse, and non-intentional trauma (Kuhlman et al., 2018). Physical trauma often includes sexual assault, whereas emotional abuse can result from constant verbal ridicule. Non-intentional trauma is any adverse unpremeditated event, which was not caused purposefully to do harm to the victim ("Unintentional Injury", 2020). Unintentional trauma has often been divided into incidents involving situations that could or could not have been preventable such as motor vehicle accidents, natural disasters, and other types of events resulting in injuries (Brown et al., 1998). Furthermore, childhood neglect is an additional form of trauma and mostly results in physical and emotional problems in adulthood (Cloitre et al., 2019). According to the Substance Abuse and Mental Health Services Administration, more than two-thirds of children reported at least one traumatic event by age 16, referring to both types of traumas ("Understanding Child Trauma", 2017). In a large national sample of adolescents, 62% of the adolescent participants between the ages of 13-17 reported experiencing one traumatic experience in their lifetime (McLaughlin et al., 2013). Additionally, 19% of the adolescents stated they had experienced three or more total traumas in their lives (McLaughlin et al., (2013).

The prevalence of diverse types of childhood trauma can vary. For example, researchers usually address one type of trauma and ask about the individual occurrences of each distinct type within that category. For example, intentional trauma types normally include sexual assault, physical, or emotional abuse. In a sample of street-involved adolescents, the categories of

distinct intentional trauma types included: emotional neglect (92%), emotional abuse (91.7%), physical neglect (87.6%), physical abuse (83.4%), and sexual abuse (38.6%) (Bender et al., 2014). However, the overall prevalence of unintentional trauma is more challenging to distinguish because of the limited amount of research available addressing unintentional trauma. Certain determinants play a key role in the likelihood of experiencing trauma.

Youth who are at risk for other mental health disorders or self medicate with drugs or alcohol report greater trauma histories (Garland et al., 2013). The term “at-risk” is often overused and does not offer a concrete definition. However, when a child or adolescent is considered “at-risk”, the term most often refers to their environment rather than their own selves (Moore, 2006). At-risk can be interpreted as features of an environment of the child or adolescent that contains potentially dangerous components including, an unsafe neighborhood, parents with substance use problems, drug use, violence, etc. (Ungar & Hadfield, 2019). Children in these potentially dangerous environments or situations have unclear futures and additionally struggle with higher rates of trauma and psychopathology (Hadland et al., 2012). For example, the prevalence of childhood trauma was endorsed in 83% of a sample of adolescents from a variety of mental health facilities (Darnell et al., 2019).

The majority of the past research has focused on children who have gone through repeated often invasive traumatic events, which is referred to as *complex trauma* (“Complex Trauma”, n.d.). Complex trauma is associated with lifelong emotional problems (McCormack & Thomson, 2017). However, fewer individuals report past histories of complex trauma, compared to one significant traumatic event in their lifetime. In a correlational research study addressing the prevalence of childhood trauma, trauma histories were collected with a group of 806 adolescents combined with present and past mental disorder diagnoses. Even though complex

trauma was less commonly reported in the sample, early exposure to complex trauma is indicative of greater mental health problems such as major depressive disorder, PTSD, and hallucinations (Gamache Martin et al., 2016).

There is mixed research about which types of childhood adversity are characteristic of greater future mental health problems. The majority of childhood trauma research focuses on intentional trauma such as emotional abuse and/or sexual assault. The present research study is explicating the long-term implications that intentional trauma, such as sexual assault or unwanted sexual experiences, has on emotional and cognitive functioning. In addition, the mental health and cognitive functioning of people who experience unintentional traumas, including natural disasters or motor vehicle collisions during childhood, are addressed. The following section is a literature review on the long-term mental health associations, such as increased prevalence of developing depression, anxiety, or a substance use disorder as a result of the following types of trauma including, sexual assault, natural disasters, and motor vehicle collisions during childhood.

Resilience

Resilience is defined as the ability to overcome or bounce back after life adversity or change (Lock et al., 2020). Specific criteria must be met for someone to be resilient (Masten, 2001). The situation that the person is experiencing must be a threat to their wellbeing or development and the observable outcome related to their development must be considered good. Resilient children often have greater parenting resources and their parents demonstrate better skills, higher competence, and more effective parenting styles (Masten, 2001). Resilient people are able to demonstrate better life outcomes despite high levels of stress or trauma (Luthar et al., 2000). Resilience can act as a buffer between trauma-exposed individuals and negative life

outcomes. Thomas Boyce discussed the role of resilience in two types of children, which he referred to as the Dandelions or Orchids (Boyce, 2019). Dandelions are resilient individuals who have the ability to cope with adversity and do well with no adversity. On the other hand, the Orchids were described as children extremely sensitive to their environment and could either excel in a non-trauma exposed household or have lifetime emotional and physical health problems if exposed to adversity. The Orchids were the children with either the best or the worst outcomes. Boyce explained that the reason for the vast differences in long-term outcomes has to do with resilience (Boyce, 2019). Life experiences of the Orchid children, or presence of adverse childhood experiences can determine their long-term success.

Cross-culturally, researchers have concluded differences in resilience between white, African American, and Hispanic ethnicities. In a research study conducted by Cunningham et al., (2018), the researchers concluded that the adolescent African Americans with a strong racial identity, despite facing adversity (e.g., discrimination), had better resilience compared to the adolescents who had weaker racial identities. However, boys with strong racial identities with high adversity, did have greater beliefs about aggression whereas, girls with strong racial identities did not have strong beliefs about aggression and demonstrated better competence in dealing with adversity compared to the boys (Cunningham at al., 2018). Another research study looked at the role of resilience between White, Hispanic, African American, and Asian American veterans (Herbert et al., 2018). The white veterans with high levels of social support demonstrated strong resilience, but this finding did not apply to the other ethnicities. The white veterans had the highest levels of resilience, whereas the Asian American veterans had the lowest levels (Herbert et al., 2018).

Stress Response

Stress is present in everyday life where individuals encounter constant changes and demands in their environments. Stress is usually inferred as a threat, either psychological or physiological, to an organism (McEwen, 2000). Stress, therefore, causes a change in the body's normal response. Moreover, stress can result from a minor event such as receiving an inadequate exam grade in school, to a considerable difficult life event such as the death of a close family member. Homeostasis, a paramount term when learning about the stress response, is explicated as the body's need to maintain a certain level of stability optimal for the organism to thrive (Robinson, 2018). People's lives are filled with an abundance of stressful demands, - which can lead to elevated stress throughout the day. On one hand, stress can be positive; many events like establishing a new career or going on a relaxing vacation, are exciting but also activate the stress response. On the other hand, extreme stress, such as ceaseless work assignments or financial difficulties, can have negative long-term mental health and behavioral consequences. Constant stress changes homeostasis in the body in various ways. The body has limited resources to constantly react internally and externally to stressful stimuli (Jacobson, 2014). Furthermore, long-term disruption of homeostasis leads to physical, emotional, and cognitive changes in the body (Lupien et al., 2009). The stress response is an important mechanism, which activates systems throughout the body to respond when it is faced with a stressful event.

The stress response occurs when the brain detects an external threat in the environment and various systems in the organism are activated (Lupien et al., 2009). The stress response consists of the sympathetic–adrenal medullary (SAM) axis, the autonomic nervous system (ANS), and the hypothalamic-pituitary-adrenal (HPA) axis. The sympathetic–adrenal medullary (SAM) axis and the autonomic nervous system are the first systems to respond to a threat

detected by the amygdala (Muscatell & Eisenberger, 2012). The amygdala is the initial area in the brain which receives and interprets the stress response. The main functions of the amygdala are important for distressing situations that involve the processing of fear (Adolphs et al., 1999). The amygdala sends a signal to the SAM axis. The sympathetic–adrenal medullary (SAM) is the initial system that becomes activated during a stressful event and is a fast responding system (Timmers et al., 2018). The SAM axis is the system that is responsible for creating catecholamines such as adrenaline, which is imperative for a swift response to a threat (Timmers et al., 2018). The SAM axis activation is immediate and engages the autonomic nervous system. The automatic nervous system is simultaneously activated with the SAM axis during the stress response. The ANS is involved with involuntary functions (such as breathing and blood pressure); the system is divided into the sympathetic nervous system (SNS) and the parasympathetic nervous system (Won & Kim, 2016). A body's response to a potentially threatening stimulus activates the SNS, which signals the "fight-or-flight" response. Thus, varying physical reactions such as increased heart rate and pupil dilation will result from SNS activation ("Stress Effects on the Body", 2018). A person can expend more energy to respond to the specific threat and the SNS responds rapidly to the stressful stimulus with the assistance from adrenaline.

The longer-lasting part of the stress response is the Hypothalamic-pituitary-adrenal axis. Researchers define the Hypothalamic-pituitary-adrenal axis as a critical network that modulates cognitive, immune, and behavioral responses to stress (Lupien et al., 2009) First, the hypothalamus releases the corticotropin-releasing hormone and is secreted into the bloodstream (activates the SNS), followed by the production of the adrenocorticotropin hormone released by the pituitary gland, and ultimately cortisol (Aguilera, 1998). The final stages of the HPA axis

engagement of the stress response result in the production of cortisol (Muscatell & Eisenberger, 2012). Cortisol is secreted by the adrenal glands and helps the person cope long-term with the stress event and has similar effects on the body as adrenaline. Cortisol impedes the body from engaging in certain behaviors that would be pointless in a life-threatening situation such as reproduction or digestion (McEwen, 2008). A brief increase in cortisol can have positive benefits for an organism; the hormone can assist an individual in having energy to survive during a threat (Muscatell & Eisenberger, 2012). Once the threat vanishes or becomes less intense, the SAM Axis and HPA axis, will shut off until the next stressful event arises. The general adaptation syndrome elucidates the stages of the stress response: the alarm, resistance, and exhaustion phase.

General Adaptation Syndrome and Dysregulation of the Stress Response

The General Adaptation Syndrome, created by Hans Selye, is a frequently cited way to describe the body's reaction to stress. The general adaptation syndrome is partitioned into three phases: the alarm, resistance, and exhaustion phases.

The alarm phase is the initial stage of the general adaptation syndrome in which the threat is detected, and the body prepares itself for action (Robinson, 2018). During this stage, various hormones are secreted into the bloodstream and the body activates the fight-or-flight response. The fight-or-flight response takes control and leads the body to either fight the threat or run away from the threat.

In the resistance phase of the general adaptation syndrome, the body not only tries to resist and fight off the stress but also tranquilizes the body via the parasympathetic nervous system to seek homeostasis. In the resistance phase, the body will either adapt to the stressor, if it is innocuous and return to normal functioning, or learn to adapt long-term to the stressor

(Robinson, 2018). A new job can be taxing in the beginning, but after a period of time, most individuals adapt well and learn to excel in their job environment. On the contrary, the stressor can be too demanding and the body will not have a way to cope or resolve the stress; the resistance phase will persist for periods of time before the body reaches the exhaustion phase (Selye, 1950).

In the final stage called the exhaustion phase, the stressor is considered “chronic”, because the body is forced to cope long term with the stress with little energy and the system becomes exhausted (Robinson, 2018). The stressor can also disappear during this stage and the body will return back to normal. But oftentimes, the stressor persists and the result is a combination of emotional, physical, and cognitive impairments. Many people during this phase of the stress response, suffer from physical illnesses (Robinson, 2018).

The stress response is an intricate adaptive system designed to allow people to survive through moderately and highly stressful situations. But if the stress response is constantly activated throughout the day, the result is a dysregulation of the stress response. Dysregulation of the stress response is inferred as a hypersensitive or overactive HPA axis activation (Gutman & Nemeroff, 2002). The key hormone involved in the stress response dysregulation is cortisol; persistent cortisol elevation, (inflammation) can lead to hazardous cognitive and physical health outcomes (Kuhlman et al., 2015).

In the last decade, research has burgeoned about the detrimental effects that dysregulated stress response can have on mental, physical, and cognitive health. Too much cortisol in the body can disrupt cognitive functioning in various brain areas. Researchers have demonstrated that adults reporting childhood trauma often display diminished stress responses (Carpenter et al., 2007).

Posttraumatic Stress Disorder

For individuals to have a diagnosis of posttraumatic stress disorder (PTSD), they must have symptoms that result after at least one traumatic event (Carlson & Birkett, 2017). An individual must experience a variety of symptoms outlined in the DMS-5 (Carlson & Birkett, 2017). The symptoms are divided into four different categories: intrusive memories (e.g., flashbacks), avoidance (e.g., avoiding certain people), negative changes in thinking and mood, and changes in physical and emotional reactions ("Post-traumatic stress disorder (PTSD)", 2018); American Psychiatric Association, 2013). For someone to have a diagnosis of PTSD, they must have at least one symptom from all of the categories plus two symptoms related to cognitive/mood changes and two symptoms in the physical and emotional reactions category ("Post-Traumatic Stress Disorder", 2019). The diagnosis of PTSD is a more objective way to see if prior trauma has had a continuous impact on the individual whether they are a child or an adult.

Herbert et al., (2018) addressed PTSD symptomology and resilience among White, Hispanic, African American, and Asian American veterans (Herbert et al., 2018). The researchers found no significant differences in reported PTSD symptomology based on an individual's ethnicity. It was concluded that as PTSD symptomology increased, the reported resilience decreased in all of the ethnicities (Herbert et al., 2018). However, other researchers have found that African American veterans show higher levels of re-experiencing the trauma (e.g., flashbacks) compared to White veterans (Coleman et al., 2019). The finding that PTSD symptomology seems to be higher among African Americans is consistent with an additional study that found no difference in reported trauma between ethnicities but differences in PTSD symptomology (Gaffey et al., 2019). The African American women had higher symptoms of

PTSD symptomology compared to the White Hispanic and non-Hispanic women living in low-income neighborhoods (Gaffey et al., 2019).

Depression and Anxiety

People who have general anxiety disorder typically have excessive worry everyday for a minimum of six months that cause impairment in their daily functioning; the presented symptoms are usually physical such as increased heart rate, sleep disturbances, etc. (Locke et al., 2015). Individuals with this disorder report not only worrying about significant life events (e.g., losing a job or caring for a sick family member) but also show distress and worry related to mundane events or worries that impose on multiple domains of life such as relationships or health (Locke et al., 2015). Major depressive disorder is related to anxiety because they often occur at the same time (Sawchuk, 2017). Major depressive disorder is diagnosed by individuals having a wide variety of symptoms affecting their cognitive (e.g., trouble concentrating) emotional (e.g., feeling sad and hopeless), behavioral (e.g., not interacting with friends), and physical functioning (e.g., headaches and loss of appetite) for at least two weeks ("What is Depression?", 2017). A depressive episode is an intense period of depression that lasts for a minimum of two weeks ("What is a depressive episode?", 2020).

There have been reported racial differences in anxiety and depression. Researchers assessed the prevalence of reported symptoms related to anxiety and positive and negative affect among White and African Americans recruited from a primary care setting (Brenes et al., 2008). Positive affect is defined as experiencing positive emotions such as optimism and negative affect is related to experiencing negative emotions such as hostility and anger (Scott, 2020). The researchers found no significant reporting of General Anxiety Disorder symptoms among the White and African American participants. However, the African Americans reported more

positive affect symptoms compared to the White participants (Brenes et al., 2008). Several studies have addressed the prevalence of depression between White Americans and African American participants and concluded that White Americans have a higher prevalence of depression, 17.9%, compared to African Americans, 10.4% (Bailey et al., 2019). However, more African Americans reported the disease to be chronic and fewer reported seeking treatment compared to the White Americans (Bailey et al., 2019). This could result from the stigma in the African American community with regarding mental illness. Researchers assessed the prevalence of depression among Whites, Hispanics, and African Americans in a large sample of noninstitutionalized adults (Dunlop et at., 2003). The Hispanic and African American respondents had higher rates of depression compared to the White respondents. Whites had the lowest rate of depression (77.5 per 1000 respondents), Hispanics had the highest rate of depression (107.8 per 1000 respondents) (Dunlop et at., 2003).

Child Adversity and Mental Health Problems

Early exposure to trauma during childhood potentially perpetuates negative mental health issues into adulthood (Jaffee & Christian, 2014). The implications of child maltreatment, more specifically, sexual assault on mental health, is troubling because substantial research has linked sexual assault to a likelihood of psychological disorder diagnoses in adulthood (Cheasty et al., 2002). Many of the disorders are related to depression, anxiety, and/or addictive tendencies. Sexual assault has become discussed widely in recent years and has received considerable attention from the media. It is estimated that a child is the victim of sexual assault every nine minutes (“Scope of the Problem: Statistics”, 2020). However, the overall prevalence of sexual violence has actually decreased by more than 50% since 1993. Exposure to sexual abuse,

especially early on in childhood, can have devastating psychological consequences for adults (Cutajar et al., 2010).

The prevalence of mental health disorders, but more specifically, symptoms of major depressive disorder or a major depressive episode following sexual violence, continue to be well documented in the literature. In regards to depression, women who experience sexual abuse both during childhood and adulthood are presumably more likely to be depressed during adulthood (Cheasty et al., 2002). Similar findings are reported for adolescents who have experienced sexual assault. For instance, when adolescents with and without trauma histories are compared, youth with a history of sexual abuse show greater symptoms of depression and a higher likelihood of suicidal behaviors compared to the youth without a history of sexual trauma (Kisiel et al., 2014).

Women who experience sexual assault during childhood are more likely to meet criteria for current PTSD and Major Depressive Episode (Hanson et al., 2001). However, the researchers concluded that the prevalence was much greater for the women who experienced a combined form of abuse, including rape and aggravated assault during childhood. Even though the prevalence of the co-occurrence of combined mental disorder diagnoses with sexual assault or other types of trauma vary, the likelihood of experiencing one of them is likely when someone experiences sexual violence (Cook et al., 2013).

General Anxiety Disorder is common outcome of trauma (Tubbs et al., 2019). According to the National Alliance on Mental Illness, it is estimated that many individuals struggling with depression additionally have symptoms of anxiety (“Anxiety Disorders”, 2017). In a research study, the mental health respondent data was collected on a vast amount of men and women who experienced a diversity of childhood traumas. The researchers concluded women who

experienced severe childhood trauma, including sexual assault, reported higher levels of anxiety during adulthood (Rehan et al., 2017).

A frequent method of assessing the mental health of research participants has been to incorporate substance use questionnaires into research studies. It is estimated that around 19.7 million Americans, 12 years and older, have a substance use disorder ("Alcohol and Drug Abuse Statistics", 2020). About 43% of those people with a substance use disorder struggle with an additional mental illness. It is well understood how invasive traumatic events commonly lead to substance use (Wolitzky-Taylor et al., 2017). In a sample of 4,000 women with and without histories of interpersonal violence, it was determined that past sexual assault was associated with an increased likelihood of having a substance use problem in the past year (Hedtke et al., 2008). However, opposing conclusions have been discussed in other research where past sexual assault has not been indicative of future substance use problems. For example, in a study by Scheidell et al., (2018), data was collected on a variety of age groups to analyze the prevalence of trauma during childhood and drug use behaviors including recreational marijuana during adolescence, emerging adulthood, and adulthood. In the adolescents and emerging adulthood (combined age ranged of 11-24) group of participants, each type of trauma, except sexual abuse, was significantly associated with an increased of recreational marijuana during that time period (Scheidell et al., 2018).

Unintentional trauma, such as natural disasters or motor vehicle accidents, have received an inconsequential amount of attention in the literature compared to invasive types of trauma. The following section explains the prevalence of natural disasters and how they can lead to corresponding mental health struggles with depression, anxiety, and substance use.

The term natural disaster, even though a broad term, refers to a significant event in nature, that has caused substantial harm, physically and costly, to the place of occurrence (“Natural Disasters”, 2018). Natural disasters can range from extreme weather events, such as hurricanes, tornadoes, or hail storms to droughts and winter storms. The term, natural disaster, does encompass a wide variety of adverse events and depending on their severity, can lead to a high number of fatalities. Yet, they traditionally will produce physical and mental health consequences (Maclean et al., 2016). On average, it is estimated that about 13%-30% of people will experience at least one natural disaster, but often more than one in their lifetime (Briere and Elliot, 2000).

Hurricane Katrina was a catastrophic natural disaster that destroyed much of New Orleans Louisiana, in August of 2005. The hurricane was in the Gulf Coast of the United States, - and made landfall as a category three hurricane. The damage was estimated to have cost the United States 1.5 billion dollars and resulted in 1,000 deaths (Reid, 2019). Research examined mental health issues of people who had experienced the hurricane first hand. It was discovered that 79% of the youth victims in Hurricane Katrina reported negative mental health symptoms related to depression and anxiety following the hurricane (Roberts et al., 2010). In another sample, adolescents or youth victims involved in Hurricane Katrina reported experiencing greater anxiety levels regarding fate, guilt, and emptiness following the disaster compared to the nonexposed youth (Weems et al., 2016). In an additional study, youth exposed to Hurricane Katrina reported significantly greater panic symptoms at five months after the hurricane compared to the nonexposed youth (Varela & Hensley-Maloney, 2009).

Additional research conclusions have been made about the likelihood of engaging in substance use after experiencing a natural disaster. Researchers Maclean et al., (2016),

addressed natural disorders among children and the future likelihood of developing a mental health disorder in adulthood. It was concluded that children who experienced types of natural disasters such as serious fires, floods, tornados, earthquakes, or hurricanes will have a 15.7% increased likelihood of being diagnosed with a substance use disorder in adulthood (Maclean et al., 2016).

Motor vehicle accidents were another frequently cited trauma in the thesis project. The total number of children involved in car accidents in the United States is about 1.5 million annually (Winston et al., 2004). A survey of 3,614 adolescents, aged fifteen years and younger, was used to assess the prevalence of adolescent involvement in motor vehicle accidents. The researchers found that 10% of the adolescents reported having been being involved in at least one significant motor vehicle accident in their lifetimes (Williams et al., 2015). However, physical limitations following motor vehicle accidents is less known. Motor vehicle crash data from a sample of children involved in accidents between July 1999 and November of 2000 was used to assess physical injuries following the accidents. The researchers found that only 13 % of the children in the sample were evaluated by some emergency service personnel on-site following the car accident (Winston et al., 2004). Surprisingly, only 30% of the children involved in accidents where the vehicle was determined to be a total loss were assessed (Winston et al., 2004). Researchers conducted telephone interviews for families with children involved in motor vehicle crashes, with about half of the cars determined to be totaled. Only 3.3% of the children in the sample reported having one or more physical limitation following the crash (Greenspan et al., 2008). An interesting finding was the older children 13 to 15 years old, had the most injuries of 7.6% compared to the younger children, aged 0-3, with 0.7% reporting physical limitations (Greenspan et al., 2008).

The mental health repercussions of motor vehicle accidents have been well established, but it is more challenging to obtain data from people who have not suffered traumatic brain injuries resulting from motor vehicle accidents. Researchers Winje & Ulvik (1998) studied the psychological implications of children who were involved in a bus accident in Norway in 1988. The researchers concluded that a large proportion of the children showed psychological symptoms related to posttraumatic stress, anxiety, and depression a year after the accident (Winje & Ulvik, 1998). More specifically, about 78.5 % of the children displayed symptoms of anxiety and almost half, 46.4%, of the children displayed symptoms of depression during a clinical interview conducted by a psychiatrist. In addition to the psychological distress related to the bus accident, almost half of the students had cognitive ramifications such as lower grade performance, concentration, and memory issues. Adolescents who are involved in at least one serious motor vehicle accident are more likely to report symptoms of major depressive disorder and engage in alcohol use (Williams et al., 2015). The association between mental health and motor vehicle accidents is not limited to children and adolescents. Adult victims report more symptoms related to mental health disorders such as posttraumatic stress disorder, major depressive disorder, and generalized anxiety disorder (Grant et al., 2008).

Working Memory

The present research study is investigating various specific types of traumatic events and the long-term outcomes of childhood adversity on cognitive and psychological functioning during adulthood. The research study will focus on the cognitive process of working memory, in relation to the long-term effects of childhood trauma.

Working memory (WM) is defined as the system responsible for active maintenance and manipulation of information over a brief period of time (McCabe et al., 2010). Working memory

is associated with many important cognitive functions including directing attention, decision making, and maintaining task goals (McCabe et al., 2010). Working memory is different from short-term memory. Short-term memory involves temporarily storing information but does not require problem-solving or manipulation of information.

Working memory is divided into verbal and visual-spatial working memory (Alloway et al., 2006). Verbal working memory is the ability to manipulate, process, and remember auditory information. Verbal working memory is activated when information is being held in short term memory and needs to be processed into long-term memory (Dehn 2015). Visual-spatial working memory is important for mental representation and involves processing and manipulating a visual image from short-term memory to long-term memory.

Overall, working memory is vital for an individuals' ability to maintain goal-relevant information in their minds (Thomason et al., 2009). Therefore, individuals with a strong working memory excel in academics because of their ability to stay focused, solve complex problems, and make conscientious goal-related decisions.

Predominant WM Model

The principle model of working memory was originated by Baddeley and Hitch and later further developed by Braddeley. The *Baddeley working memory model* has four components: a phonological loop, visuospatial sketchpad, central executive, and the episodic buffer (Baddeley & Hitch, 1974).

The *phonological loop* is a component of the model that briefly holds auditory information. The phonological loop is comprised of the phonological store (stores auditory information) and the articulatory process (rehearsal of verbal information).

The *visuo-spatial sketchpad* briefly holds and then stores visual and spatial information. The system is divided into the visual cache for visual information and the inner scribe for spatial information (Baddeley & Hitch, 1974. The visual cache is responsible for storing stationary visual characteristics including an object's shape, size, and color. The inner scribe is responsible for storing dynamic information including location, motion, and direction (Baddeley & Hitch, 1974).

The third and recently incorporated component of the model is called the *episodic buffer*, which refers to the interrelatedness between working memory and long-term memory. Information in working memory (visual and verbal) becomes a part of the already existing representation of long-term memory (Baddeley & Hitch, 1974). In other words, the episodic buffer is responsible for encoding information to long-term memory. The episodic buffer also communicates with the various other systems in working memory.

The *central executive* is the supervisor and director of the three preceding components: the visuo-spatial sketchpad, the phonological loop, and the episodic buffer. The central executive is responsible for multitasking between temporally holding information while trying to process the other information.

Working Memory Development

Working memory (WM) is a distinct cognitive system with activation in specific brain regions. Moreover, various brain structures have been correlated with verbal and spatial working memory in children and adults. Prior research has addressed WM development comparing the task performance of children and adults.

Researchers have presumed the ability to complete working memory tasks appears at a younger age. For example, Alloway et al., (2006) assessed the short-term and working memory

abilities of 709 children for both verbal and visuospatial working memory tasks. It was reported the children displayed the ability to accomplish working memory tasks at age four. Additionally, verbal and visuospatial working memory both involve the cognitive process of executive functioning. However, the different types of working memory have a contrasting storage requirement.

The ability for a child to perceive between a verbal and visuospatial working memory task does not take place until later in childhood. Children do not differentiate between verbal and visuospatial working memory; the brain recognizes these two types of working memory as one combined type. Verbal and visuospatial working memory continue to develop throughout a child and adolescent's development, and do not reach complete independence as two distinct types of working memory until the child is about ten years old (Alloway et al., 2006).

In the past decade, specific brain areas have been discovered for the control of working memory in both children and adults. Thomason et al., (2008), utilized functional neuroimaging to compare the brain areas of adults and children when they completed a verbal and spatial working memory computerized assessment. The researchers discovered that both the adults and children showed greater activation during both the verbal and spatial working memory tasks in the following brain areas: parietal lobe, temporal lobe, basal ganglia, and the cerebellum. The children did show some distinct brain activation during both the spatial and the verbal working memory task. During the verbal working memory task, children had greater activation in the parahippocampal gyrus and a region in the right middle frontal cortex. During the spatial working memory task, they had distinct activation in the occipital lobe (Thomason et al., 2008). The main takeaway from the research study was that adults do better than children in working memory tests; adults also have more activation in the areas of the brain responsible for working

memory. Moreover, since children are continuing to develop, any significant adverse childhood event during their development can lead to delays in working memory.

Trauma and Working Memory

The research is sparse over the long-term cognitive functioning deficits resulting from childhood trauma; there has been some research focusing on certain aspects of cognitive functioning, such as working memory with sexual assault. Women who have been victims of sexual assault perform worse on working memory assessments compared to controls (Blanchette and Caparos, 2016). The deficits in working memory are not limited to sexual assault.

Overall, both men and women who endorse high instances of trauma show deficits in working memory performance compared to the non-trauma exposed individuals (El-Hage et al., 2006). Participants who have been exposed to early trauma during childhood have additionally been suggested to show problems with working memory tasks during adulthood (Philip et al., 2016; Metz et al., 2018). People with a history of emotional abuse and physical neglect demonstrate higher error rates on spatial working memory tests compared to control participants (Majer et al., 2010).

For unintentional trauma-including natural disasters and motor vehicle accidents, the research is less prominent. The current research study addresses how working memory might be affected by people who report high numbers of unintentional traumas including, motor vehicle accidents and natural disasters.

Iceland Cross-Sectional Research Study

A cross-sectional study is when a researcher measures an outcome variable at a single point in time. The type of study design can be beneficial when attempting to capture an individual phenomenon, such as mental health, on a given occasion and can be compared to

different areas in the world. Furthermore, cross-sectional research allows researchers to analyze outcome variables on a variety of people who may have independent backgrounds but share other characteristics such as age. A cross-sectional research design was utilized for the comparison of childhood adversity between American and Icelandic college students.

According to the World Happiness Index, which was created by the United Nations Sustainable Development Solutions Network, Iceland ranked number 4 in happiness compared to 156 countries and the U.S. Ranked 28th ("World Happiness Report", 2019). The World Happiness Report measures personal satisfaction via a question asking the participants to rate their overall current life satisfaction from a range of zero through ten, ten being the most positive rating. The World Happiness Report additionally provides the current statistics regarding to be what is considered the most important factors in determine happiness. The areas include: levels of GDP, life expectancy, generosity, social support, freedom, and corruption ("World Happiness Report", 2019). The report provides the six factors of happiness as a way to help further explain the reasoning behind the happiness ratings of different countries.

Less is known about the specific statistics regarding mental health in Iceland. The World Health Organization published a document in 2011, outlining Iceland's mental health history. The document stated that Iceland has not created mental health legislation but developed a mental health plan in 2011 ("Iceland", 2011). The paper also discussed that Iceland is currently working on developing manuals to care for people with psychological disorders. Because the last report from the World Health Organization on mental health was published in 2011, Iceland should currently be better equipped to treat mental illness.

Purpose of the Study

The majority of individuals in the United States experience at least one type of traumatic event before age 18 (e.g., community violence, childhood neglect, accidents, natural disasters, etc.); the prevalence could be even higher with unreported trauma (Saunders & Adams, 2014). The purpose of the present study was to address the long-term cognitive factors (i.e. working memory) and mental health (i.e. depression, anxiety) repercussions of early childhood adversity among a sample of college undergraduates in Iceland and the United States.

Based on previous research, more is known about invasive often-repeated traumatic events and how devastating repeated trauma can be for young adults' mental health (Gamache Martin et al., 2016). However, less is known about unintentional trauma and how kinds of unintentional trauma (e.g., natural disasters or car accidents) can lead to mental health problems and also if they can bring about working memory deficits. Some of the most recent natural disasters include Hurricane Florence, Hurricane Michael and the recent California wildfires (Shapiro, 2018). Sufficient working memory performance is an important aspect of success in individuals' education, careers, and everyday behaviors. Yet, the research is scarce over the consequences of childhood trauma on adults' working memory performances with both types of trauma-intentional and unintentional. Greater knowledge about the emotional and cognitive effects of childhood trauma will hopefully lead to more advocacy to treat children and adolescents prior to entering adulthood.

In the following study, the two measures of trauma included an index of previous reported trauma and PTSD. Past traumatic events were defined as the scores on the Life Event Checklist, (Weathers et al., 2013) and the PTSD Checklist for the Diagnostic and Statistical Manual of Mental Disorders-5th Edition (Weathers et al., 2013) measured PTSD symptomology.

The higher scores on both of these measures indicate higher numbers of reported trauma and greater PTSD symptomology. The following psychological functioning outcomes were measured in the study including: anxiety, resilience, positive and negative affect, and depression. Anxiety was measured by the Generalized Anxiety Disorder-7 (Spitzer et al., 2006). Resilience was assessed with the 10-Item Connor-Davidson Resilience Scale (Campbell-Sills & Stein, 2007). Positive and negative affect, measures of optimism and pessimism, were assessed with the Positive and Negative Affect Schedule (Watson et al., 1988). Depression was the final mental disorder and was measured by the Patient Health Questionnaire (Kroenke et al., 2001). The Alloway Working Memory Assessment (Alloway et al., 2008) measured various types of working memory including verbal and spatial working memory.

Research Questions

Q1a: To what degree will the American and Icelandic participants vary among the frequencies of reported traumatic events and PTSD symptomology?

Q1b: How will the PTSD measure of trauma and the Life Event Checklist measure of traumatic events explain the differences in mental health functioning between the participants from both samples?

Q2a. What are the cross-cultural differences in mental health functioning?

Q2b: Will there be certain predictors of the following mental health outcomes: anxiety, depression, and resilience?

Hypotheses

H_0: Iceland will not report differences in the reported traumatic events or PTSD symptomology compared to the United States and will additionally report the same categories of indicated traumatic events.

H_1: Iceland and the United States will report differences in reported traumatic events and PTSD symptomology; the two countries will not have the same reported categories of trauma because of the vast cultural differences.

H_0: There will be no differences with both the PTSD and Life Event Checklist measures of trauma in relation to the mental health functioning of the participants in both countries.

H_1: There will be significant differences in the PTSD and Life Event Checklist measures of trauma in relation to the mental health functioning of the participants in both countries, such that the participants with higher trauma scores in both measures will have the worst psychological functioning.

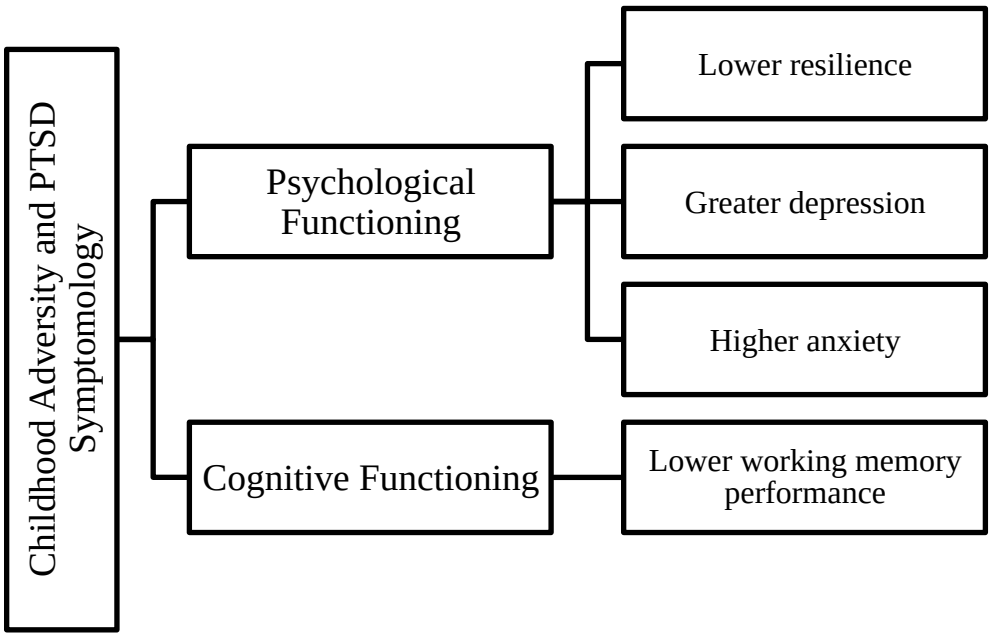
H_0: Iceland and the United States will not have differences in mental heath functioning.

H_1: The two countries will have reported differences in the following mental health outcomes including: depression, anxiety, positive and negative affect, and resilience.

H_0: There will be no predictors of the following mental health outcomes of depression, anxiety and resilience.

H_1: There will be significant predictors of the following mental health outcomes of depression, anxiety and resilience.

Theoretical Model



Model 1
It is hypothesized that the participants who report higher instances of childhood adversity and greater PTSD symptomology will have differences in the psychological and cognitive functioning measures. Participants with trauma histories and PTSD symptomology will report lower resilience and more symptoms related to depression and anxiety. Their working memory performances will additionally be poor compared to the participants without trauma or PTSD symptomology.

Method

Participants

Groups 1 and group 2 were composed of 356 total participants. In this sample, the majority of the participants were women (N= 353, 79%), and White (N= 76%, 350). The age range for both Iceland and the United States was between 18 and 55. The average age range of the participants was between 20 and 22 years old (N= 356, 23%). The next section details the group 1 and group

2 demographics. Furthermore, groups 1 and 2 study demographics are elucidated in Table 1.

Table 1

Cross-cultural Comparison of Participant Demographics

	United States	Iceland
Gender		
N	251	99
% Men	20%	16
% Women	79%	84
Ethnicity		
N	251	99
White	68%	98
African American	6%	<1%
Hispanic or Latino	12%	<1%
Asian or Pacific Islander	5.6%	<1%
Native American	<1%	<1%
Other	8%	2%
Age		
N	251	99
Median Age	18 to 55 (Median age = 20)	19 to 39 (Median age = 22)
Year in School		
N	248	99
Underclassman	20%	40%
Sophomores	22%	54%
Juniors	28%	6%
Seniors	29%	0%

Note. The table shows the differences between gender, ethnicity, age, and year in school between the United States and Iceland participants.

A total of 254 University of North Florida undergraduate students (group 1) who ranged in age from 18 to 55 (median age = 20), 68.1% were White, 79.3% were women, and 67% spoke only English. Additionally, students in group one were predominantly psychology majors (65%), 29.4% reported being seniors, and had GPAs ranging from <1.7 to < 3.7 (median GPA= 2.7 to

3.6). Out of the undergraduates in group one, 62.7%, answered that they currently hold a stable job and 54 % of the participants live with a roommate.

A total of 102 Reykijavik University undergraduate students (group two) who ranged in age from 19 to 39 (median age = 22), 95.1% were White, 83.8% were women, and 97% spoke more than one language. Additionally, students in group two were predominantly psychology majors (87%), 53.5% reported being sophomores, and had GPAs ranging from <1.7 to <3.7 (median GPA= < 1.7). Of the undergraduates in group two, 74.7%, answered that they currently hold a stable job and 56.6% % of the participants live with their parents.

Procedure

The study was approved by the University of North Florida's IRB in the fall of 2018. Data collection took place from February 2019 - April 2019. Participants completed an online survey, which included demographic questions, mental well-being measures and a working memory assessment. The Positive and Negative Affect Schedule, the Connor-Davidson Resilience Scale (10-Items), Generalized Anxiety Disorder (7 items), and the Patient Health Questionnaire measured positive and negative affect, resilience, anxiety, and depression. The PTSD Checklist for DSM-5 and the Life Event Checklist were the measures for trauma. The Alloway Working Memory Assessment measured cognitive functioning via working memory.

Materials

Demographic characteristic questions

The research subjects answered a total of nine opened ended and multiple-choice questions related to demographics. Each participant was asked questions in the following areas: age, ethnicity, gender, current employment status, living situation, academic major, year in school, Grade Point Average, and additional number of spoken languages.

Mental Health Measures

Positive and Negative Affect Schedule. The Positive and Negative Affect Schedule (Watson et al., 1988) consists of 20 descriptive words that measure both positive and negative emotions that the individual has felt in the past week (See appendix A). The research subject assigns each descriptive word with a rating based on how they currently feel. The Likert type scale ranges from one to five; a score of one means very slightly or not at all and a score of five means extremely (Watson et al., 1988). The items 1,3,5,9,10,12,14,16,17, and 19 represent the positive affect domain. The positive affect domain has an average global score of 35 among a control group college students (Watson et al.,1988). The higher the score, the greater level of positive affect ("Positive and Negative Affect Schedule", n.d.). Items 2,4,6,7,8,11,13,15,18, and 20 represent the negative affect domain. The negative affect domain has a mean global score of 18.1 among a control group college students. The lower the score, the lower the level of negative affect. Furthermore, the Positive and Negative Affect Scales have strong internal consistency. The Chronbach's α for the Positive Affect scale is .86 to .90 (Watson et al.,1988). The Chronbach's α for the Negative Affect scale is .84 to .87. The researchers reported strong convergent validity, ranging from .89 to .95.

10-Item Connor-Davidson Resilience Scale. The 10-Item Connor-Davidson Resilience Scale (Campbell-Sills & Stein, 2007) was adopted from the original 25-item Connor-Davidson Resilience scale. The 10-item measure of resilience includes statements in which the participant indicates how well in the past month they correspond with the presented statements related to maintaining a resilient outlook on life after adversity (See Appendix B). An example item includes, "Can handle unpleasant feelings." The answer choices range from zero (not true at all) to a four (true nearly all of the time). The total score of the scale is obtained by summating the

ten questions. The score range is from 0-40, with higher numbers indicating greater resilience. The scale has demonstrated strong reliability, with a Chronbach's α of .81 (Aloba et al., 2016). Chen et al., (2020), reported the resilience scale has strong structural validity among a sample of undergraduates.

Generalized Anxiety Disorder-7. The Generalized Anxiety Disorder-7 (Spitzer et al., 2006) is a measure of anxiety over the past two weeks (See appendix C). The Generalized Anxiety Disorder-7 requires the participant to rate seven statements on a Likert scale ranging from a zero, which means not at all, to a four, which means nearly every day. An example item includes, "Over the past 2 weeks, how often have you been feeling nervous, anxious, or on edge?" The participant is given a total anxiety score after summating all of the questions from one through seven. A total score of 10 to 14 would be considered moderate anxiety; a score higher than 15 represents severe anxiety (Anxiety and Depression Association of America, n.d.). The measure has strong reliability, with a Chronbach's α of .85 (Spitzer et al., 2006). Spitzer et al., (2006) reported the Generalized Anxiety Disorder- 7 had strong convergent validity by comparing the participant measure scores to other measures of anxiety.

Patient Health Questionnaire. The Patient Health Questionnaire (Kroenke et al., 2001) has nine multiple-choice items related to depression (See appendix D). The Likert type scale answer choices range from zero, meaning not at all, to three, meaning nearly every day. The total depression score is obtained by adding numerical responses to questions one through nine. An example item includes, "Over the past 2 weeks, how often have you been bothered by feeling down, depressed, or hopeless?". A score of 10-14 is considered moderate depression and a score of 20-27 is considered severe depression (Kroenke et al., 2001). The PHQ has strong internal consistency, with a Chronbach's α of .89. Martin et al., (2006) reported the convergent validity

of the measure of depression to be quite high compared to other measures of depression in the general population.

Trauma Measures

Life Event Checklist. The Life Events Checklist (Weathers et al., 2013) is a 17-item measure where the participants identify one of six possible answer choices from a list of past traumatic events (See appendix E). The answer choices include; happened to me, witnessed it, learned about it, part of my job, not sure, or doesn't apply. The answer choice of, "happened to me", was coded as a one. The other answer choices received a coded score of zero to create a "Trauma Sum Score" for the analyses. An example life event that the participant endorsed, included physical assault (for example, being attacked, hit, slapped, kicked, or beaten up). A resulting trauma sum score was calculated by summing values for all of the seventeen items. The higher the number of "happened to me" or one's, the higher was the reported trauma or likelihood of distress for each participant. The measure has strong internal consistency with a Chronbach's α of .667 (Gray et al., 2004). The researchers also concluded the Life Event Checklist has strong convergent validity with other questionnaires that address psychopathology following trauma exposure.

PTSD Checklist for DSM-5. The PTSD Checklist for DSM-5 (Weathers et al., 2013) is a 20-item self-report questionnaire of DSM- 5 PTSD symptomology in the past month (See appendix F). The scale ranges from zero, not at all to a four, extremely. An example item is, in the past month, how much were you bothered by, "blaming yourself or someone else for the stressful experience or what happened after it?" Total score ranges from 0-80. The questionnaire demonstrates strong internal consistency with a Chronbach's α of .94 (Blevins et al., 2015). Additionally, in a study examining college students who went through trauma, the researchers

stated that the PTSD Checklist for DSM-5 demonstrated strong convergent validity of *r* values between .74 and .85.

Cognitive Functioning Assessment

Alloway Working Memory Assessment. The Alloway Working Memory Assessment was utilized from the automated working memory assessment (Alloway et al., 2008), which measures both verbal and visuo-spatial tasks (Alloway & Alloway, 2010). In the verbal working memory task, the stimuli comprise of low, medium, and high tones. Participants are first presented with a tone auditorily, followed by a second tone. They first identify whether the two tones are similar and then recall the tones in the correct sequence. In the visuo-spatial working memory task, participants are shown one circle on a grid and then shown another colored circle presented in the middle of the computer screen. They first identify whether the two circles were the same color, and then recall the location of the circles in the correct sequence. There are a demonstration and practice, before the test. The tests begin with one item and increase by one item in each block. The discontinue rule is when the participant is unable to correctly recall both trials in a block and is automated by the program. Higher scores are indicative of better working memory. In the sustained attention task, participants completed a computerized assessment of auditory sustained attention, which measures vigilance over time. The task used in the present study was in accordance with continuous performance test protocols. These protocols required the participant to respond to a target auditory stimulus over an extended period, which measures both sustained attention and inhibitory control. Scores were calculated based on the number of correct targets detected (HITS) and the number of false alarms (e.g., incorrect responses to nontarget stimuli; FAs). The last task is the auditory part of the working memory test. There were two different auditory target versions, which were switched throughout 30 blocks. Each

block consisted of approximately five trials. The division of the tests into blocks enabled an investigation into the vigilance decline effect, which measures the decline in performance throughout the experiment. The target stimulus was 600 milliseconds and participants were given 500 milliseconds to respond before the next sound was presented. The target stimulus alternated between blocks, so that each target stimulus was represented 15 times. Participants clicked on a circle in the middle of the computer screen when they heard a stimulus that matches the target stimulus. There was no discontinue rule. Scores are calculated based on the number of correct targets detected (HITS) and the number of false alarms (e.g., incorrect responses to nontarget stimuli; FAs). The entire attention test took approximately two minutes to complete. The online Alloway Working Memory Assessment was a shortened version of the original working memory test. Researchers Alloway et al., (2008), stated that the Automated Working Memory Assessment has adequate test-retest reliabilities, with Pearson Correlation Coefficients ranging from .64 to .83 and additionally has strong diagnostic validity.

Results

Trauma Groups/ Preliminary Analyses

The purpose of the research study was to address how the participants who scored significantly higher on trauma and PTSD – demonstrated differences in their mental health and cognitive functioning compared to the participants who reported minimal or no trauma. Descriptive statistics (e.g., mean, standard deviation, range, kurtosis, and skewness) were obtained on the variables and the data met the assumption of normality. The analyses accounted for missing variables. On all of the analyses, both Iceland the United States were analyzed separately. Correlation matrixes revealed the highest correlations among the predictor variables; the significant correlations were used for the regression analyses and is elucidated in Table 2.

Table 2

Correlation Matrix Comparing the United States (bottom half) with Iceland (top half).

Construct	Trauma	PTSD	Resilience	Anxiety	Depression	Positive affect	Negative Affect	Visual Points sum
1. Trauma	1	.19	.000	.17	.23*	-.08	.27*	-.19
2. PTSD	**.27	1	-.51**	.70**	.68**	-.38**	.62**	-.04
3. Resilience	-.15*	-.29**	1	-.57**	-.55**	.48**	-.40**	-.02
4. Anxiety	.20**	.66**	-.30**	1	.73**	-.38**	-.40**	-.09
5.Depression	.20**	.66**	-.38**	.63**	1	-.50**	.75**	.02
6. Positive Affect	-.17**	-.20**	.54**	-.23**	-.36**	1	-.24**	.06
7. Negative Affect	.16*	.63**	-.37**	.66**	.63**	-.08	1	-.06
8. Visual Points Sum	.23*	.07	-.02	-.03	.17	-.07	.01	1

Note. Correlation matrix of the main variables comparing the United States (bottom half) with Iceland (top half).

* Correlation is significant at the 0.05 level. ** Correlation is significant at the .01 level.

Q1a-Cross-Cultural Difference in Frequencies of Reported Traumatic Events

An Independent Samples *t* Test was conducted to compare PTSD and traumatic life events between the United States and Iceland. There were no significant differences in the scores for PTSD between the United States, (*M*=22.62, *SD*=16.49) and Iceland (*M*=16.92, *SD*=16.87) conditions; *t*(330)= 2.81, *p*=.76. Furthermore, no significant difference resulted in the scores for traumatic life events between the United States (*M*=3.39, *SD*=2.571) and Iceland, (*M*=2.38,

SD=2.39) conditions; *t*(321)= 3.22, *p*= .23. Table 3 shows the cross-cultural differences of PTSD and traumatic events.

Table 3

Independent Samples t Test with Trauma/PTSD and the Mental Health Outcomes: Anxiety, Depression, and Resilience

Independent Samples *t* Test	United States	Mean	Standard Deviation	Iceland	Mean	Standard Deviation	*P* value
Trauma Variables							
Trauma Sum		3.39	2.57		2.38	2.39	.23
PTSD		22.62	16.49		16.92	16.86	.76
Mental Health Variables							
Anxiety		7.62	5.38		6.93	5.23	.39
Depression	* (significant)	8.39	5.71		7.295	5.233	*.04
Resilience	* (significant)	24.82	7.01		23.66	8.23	*.02

Note. This table shows significant values as * at the $p < .05$ level.

Independent samples *t* test were concluded to compare the difference in PTSD symptomology and traumatic events between the different categories of ethnicities. The African American, Hispanic, Asian, Native American, and other ethnicity category were combined to form a Minority category. There was no significant difference between traumatic events *t*(345)=-1.23, *P*=.172 or PTSD symptomology, *t*(329)= -2.265, *P*=.176 in comparison between the White and Minority category.

Q1b -Mental Health Predictors of Trauma and PTSD

In the first stepwise multiple regression, PTSD was the dependent variable. The independent variables in block 1 consisted of depression, anxiety, resilience, and positive and

negative affect. The variable in block 2 was visual working memory. For the United States, anxiety had the greatest *R* square change value of 56%, F (1,82) = 55.97, $p<.01$. The other two predictors, including, depression and negative affect, demonstrated lesser but significant values, of 10% and 5%. In Iceland, the results were similar. Anxiety was the biggest predictor and accounted for 52% of the variance in the dependent variable of PTSD, F (1,49) = 53.43, $p<.01$.

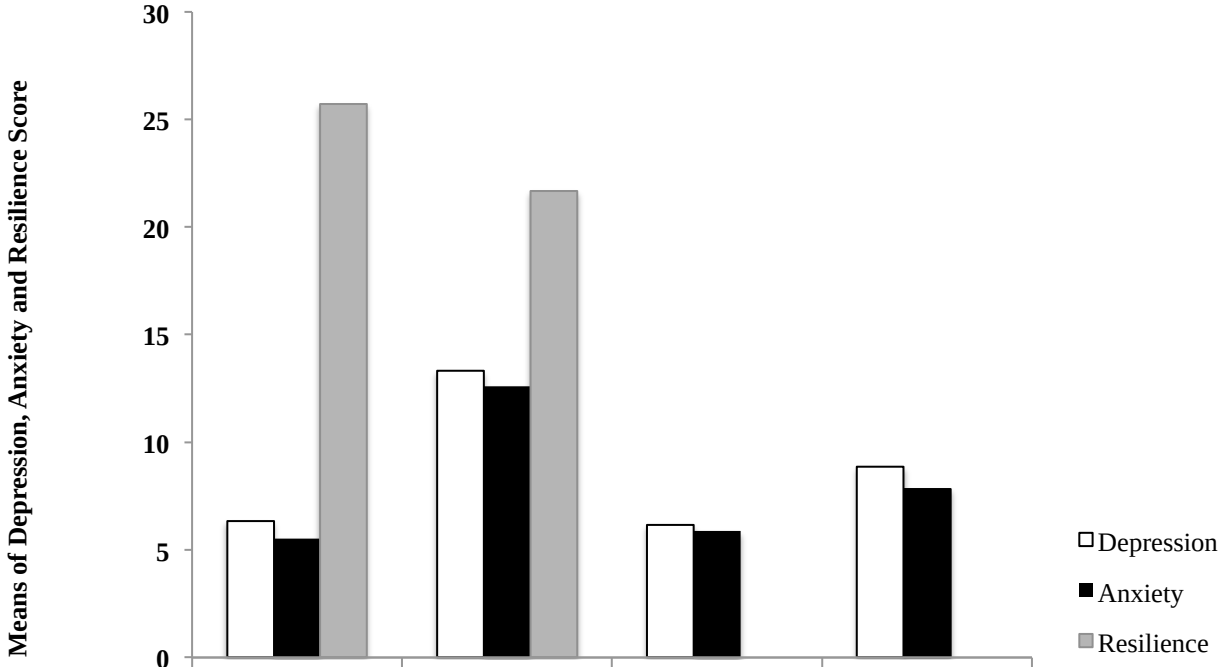
The next step was to divide reported traumatic life events into two categories, zero through one traumatic events, and two or more traumas. In the first multivariate analysis of variance, the predictor variables were traumatic events and country and the outcome variables included three measures of psychological functioning: depression, anxiety, and resilience. There was a statistically significant main effect on one or more of the outcomes variables of depression, anxiety, and/or resilience, based on individual differences in traumatic events, F (3, 269) = 3.25, p=.02; τ = .04, η^2 = .03. The post hoc test revealed significant differences in both anxiety and depression outcomes based on the classification of trauma. For anxiety, the minimal trauma group reported lower anxiety compared to the high trauma group, (*M*=5.88, *SD*=4.48, *N*=57). The moderate trauma group reported higher anxiety scores (*M*=7.83, *SD*=5.47, *N*=218). The depression scores had a similar pattern; the minimal trauma group reported less overall depression compared to the moderate trauma group. The minimal trauma group reported less depression (*M*=6.12, *SD*=4.26, *N*=57) while the moderate trauma group scored higher in depression, (*M*=8.86, *SD*=5.70, *N*=218). Table

Next, PTSD was divided into two groups; a non PTSD group with a score of 32 and below and then a possible diagnosis of PTSD group, a score of 33 and above. The second MANOVA analyzed the differences in the outcome variables (e.g., depression, anxiety, and resilience) compared to the predictors of symptomology in PTSD and country. There was a

statistically significant main effect of one or more of the outcome variables based on individual differences in posttraumatic stress disorder severity, F (3, 314) = 46.68, p<.001; τ =.45, η^2 =.31. The post hoc test revealed the individuals showing higher levels of PTSD symptomology had higher levels of depression (M=13.31, SD=5.88, N=84), and anxiety (M=12.61, SD=4.88, N=84) and lower resilience (M=21.68, SD=7.02, N=84) compared to individuals without PTSD symptomology. Figure 1 shows the three mental health outcomes of depression, anxiety and resilience based on the classification of trauma and PTSD.

Figure 1

Multivariate Analysis of Variance: The Mental Health Outcomes of PTSD Symptomology and Reported Lifetime Traumatic Events



	No PTSD	PTSD	Minimal Trauma	Moderate Trauma
Depression	6.34	13.31	6.16	8.86
Anxiety	5.54	12.61	5.88	7.83
Resilience	25.72	21.68		

Note. PTSD was coded into a score of 0 for a sum of 32 or lower on the PTSD Checklist for DSM-5 and a score of 1 for a sum of 33 or higher on the measure. The minimal trauma group received individual sums of 0 or 1 endorsed "happened to me" traumas on the Life Event Checklist. The modereate trauma group received sum scores of 2 or more total traumas.

Q2a- Cross-Cultural Differences in Mental Health Functioning

An independent samples t-test, between Iceland and the United States was conducted on the following mental health outcomes: depression, anxiety, and resilience. There was no significant difference in the scores for anxiety between United States and Iceland, $t(340)= 1.07$, $p=.39$). However, there was a significant difference in the scores for depression between the two countries, conditions; $t(192.96)= 1.71$, $p=.04$. Additionally, resilience differed between the United States and Iceland, $t(146.54)= 1.21$, $P=.02$.

Independent samples *t* tests were conducted between the various ethnicities in the United States and Iceland (e.g., White, African American, Hispanic, Asian and other), and the following mental health outcomes of resilience, depression, and anxiety. The African American, Hispanic, Asian, Native American, and other ethnicity category were combined to form a Minority category. It was concluded with the independent samples *t* test that only resilience $t(331)= .705$, $P=.019$ and negative affect $t(336)= -.714$, $P=.046$. differed between the two categories of ethnicity, White and Minority. The participants in the White ethnicity category displayed more resilience, with an average of 24.66 and the Minorities having an average resilience of 23.99. Additionally, participants in the Minority category had slightly higher levels of negative affect with an average of 21.80 compared to 21.05 (White participants). Distinct independent samples *t* test were ran between White and the other largest reported categories of ethnicities including, African American, Asian, Hispanic, and other, to report the differences in resilience. All of them were non significant.

For depression, independent samples *t* test were ran between White and the other largest reported categories of ethnicities including, African American, Asian, Hispanic, and other, to report the differences in depression. The only significant result found was between the White

category and other category, $t(285)= -1.82$, $P=.02$. The participants in the other category reported having an average of 10.1 in the Patient Health Questionnaire, Whites had an average of 7.73.

For anxiety, independent samples *t* test were ran between White and the other largest reported categories of ethnicities including, African American, Asian, Hispanic, and other, to report the differences in anxiety. All of the analyses were non-significant.

Q2b-Predictors of the Following Mental Health Outcomes: Anxiety, Depression, and Resilience

The following stepwise multiple regressions addressed anxiety, depression, and resilience as separate mental health outcomes of trauma in three distinct analyses. The resulting *R* square change and *f* values from the ANOVAs table are depicted in table 4.

Table 4

Stepwise Multiple Linear Regressions (1-3) Organized by Country

United States				Iceland		
DV	Predictor	Percentage (*R* square change)	*F* value	Predictor	Percentage (R square change	*F* value
Anxiety	Negative affect	45%	9.15	PTSD	70%	54.4
Depression	Positive affect	42%	7.96	Anxiety	55%	28.62
	PTSD	24%	9.57			
Resilience	Positive affect	48%	9.97	Attention	17%	4.9,
				Positive affect	43%	17.26

Note. All of the listed predictors are significant at the $p<.05$ level.

Anxiety. The outcome variable in the first stepwise multiple regression was anxiety. The predictor variables inputted into the first block included all of the working memory variables measuring verbal skill and attention: beep negative points sum, beep positive points sum, counting sum, crowd negative points sum, and crowd positive points sum. The second block consisted of the measures of PTSD, positive and negative affect scores, depression, followed by resilience. For the United States, negative affect accounted for 45% of the variance predicting the dependent variable, anxiety, as represented by the *R* square change, F (1,11) = 9.15, p =.012. The participants who scored higher on the negative feelings as measured on the PANAS (i.e. irritable or distressed) were more likely to have symptoms of anxiety. For Iceland, PTSD accounted for 70% of the variance (*R* Square change value) predicting the dependent variable, anxiety, F (1,23) = 54.44, p <.01. Specifically, the participants who endorsed higher PTSD symptomology displayed greater levels of anxiety.

Depression. In the second stepwise multiple regression, the dependent variable was depression. The predictor variables inputted into the first block included all of the working memory variables. The second block consisted of the measures of PTSD, positive and negative affect scores, and anxiety, followed by resilience. For the United States, the largest predictor was a lack of positive affect which accounted for 42% of the variance predicting, depression, F (1,11) = 7.96 p=.017. The second greatest predictor was PTSD and accounted for 24% of the variance predicting depression, F (2,10) = 9.57, p =.005. Moreover, participants who reported higher PTSD symptomology displayed greater levels of depression. For Iceland participants, anxiety, the greatest predictor, accounted for 55% of the variance predicting the dependent variable, depression, F (1,23) = 28.62, p<.01. The participants who reported greater levels of anxiety additionally scored higher on the measure of depression.

Resilience. For the third stepwise multiple regression, the dependent variable was resilience. The predictor variables inputted into the first block included all of the working memory variables. Block two consisted of the measures of PTSD, positive and negative affect scores, anxiety, followed by depression. For the United States group, positive affect accounted for 48% of the variance predicting the dependent variable, resilience, F (1,11) = 9.97, p= 01. The participants who endorsed more productive or optimistic feelings had the higher levels of resilience. For Iceland participants, the measure of attention (beep positive point sum) affect accounted for 17% of the variance predicting the dependent variable, resilience, F (1,23) = 4.90, p= .037. The second predictor, positive affect, accounted for 43% of the variance in the dependent variable of resilience, F (2,22) = 17.26, p<.01.

Discussion

Q1a- To What Degree Will the American and Icelandic Participants Vary Among the Frequencies of Reported Traumatic Events and PTSD Symptomology?

The first research question focused on the cross-cultural differences of reported PTSD symptomology and trauma between the United States and Iceland. Overall, there were no significant differences in PTSD symptomology or traumatic life events between Iceland and the United States. Additionally, both countries endorsed the highest frequencies of trauma for the following three categories: motor vehicle accidents, reported unwanted sexual experiences, and natural disasters. The percentages of the reported three traumas comparative to the two countries were: natural disasters (U.S. 55.8% versus Iceland 20.6%), transportation accidents (U.S. 55% versus Iceland 47.4%) followed by unwanted or uncomfortable sexual experiences (U.S. 47.4% versus Iceland 41.2%). It was hypothesized that the two countries would show differences in reported traumatic events, because of the vast cultural dissimilarities between the two cultures.

Since Iceland is so much smaller compared to the United States, the country has a more unified culture that places emphasis on family values and equality (“Exploring Iceland’s Culture and Traditions”, n.d.) However, it is challenging to find research specific to Iceland comparative to the United States, but some areas of research indicate that Iceland varies in the following areas: crime, natural disasters, and addiction/ mental health.

Iceland has less crime overall compared to the United States (“ Why violent crime is so rare in Iceland”, 2013) with some of the most common crimes being traffic offenses, theft and related offenses (Ólafsdóttir & Bragadóttir, 2006). In a sociology journal, researchers have stated that Iceland has been identified as a country where serious crime is rare, and therefore, it is more challenging to compare the crime rates in Iceland to other developed countries (Ólafsdóttir & Bragadóttir, 2006). In comparison to the other Nordic countries for the year 2000, Iceland ranked the lowest (7234 per 100,000 inhabitants) in crime, and Sweden ranked the highest (13,693 per 100,000 inhabitants) in criminal activity.

Natural disasters such as volcanic eruptions, earthquakes, avalanches, and floods are prevalent in Iceland; there is research over the long-term mental health consequences of more regular or recurrent natural disasters. Researchers assessed mental and physical health outcomes following the Eyjafjallajökull volcano eruption that took place in southern Iceland in 2010. The children who were closer to the volcano had greater mental health problems up to eight months after the disaster including, anxiety, constant worry, and sleep disturbances compared to the children not exposed to the volcano (Hlodversdottir et al., 2018). In a similar research study, three months following two major earthquakes in Iceland, 33% of the exposed children met criteria for an anxiety-related disorder, PTSD, even though no deaths resulted in the natural disasters (Bödvarsdóttir et al., 2006).

Mental health including substance abuse, was another area of research used to evaluate Iceland's psychological well-being. The United States consumes more alcohol compared to Iceland, with an average of 13.7 liters per year; Iceland consumes an average of 12.8 liters per year ("Alcohol Consumption by Country, 2020", 2020). In a study published in 2018, researchers addressed the mental health of family members of individuals with alcohol use disorder in the five Nordic countries: Denmark, Finland, Sweden, Iceland, & Norway (Ólafsdóttir et al., 2018). Iceland had the lowest alcohol consumption of the five countries. Weekly alcohol consumption in Finland was the highest, followed by Denmark. However, addiction is still an issue in Iceland. The researchers found that 36% of the family members of problem drinkers (e.g., children or spouses), reported having at least average to very serious mental health issues related to stress, anxiety, and/or depression (Ólafsdóttir et al., 2018).

For racial differences in PTSD and lifetime traumatic events, there was no significant difference between traumatic events or PTSD symptomology in comparing the White to Minority categories of ethnicity. However, literature has pointed to a different direction. Researchers looked at mental health outcomes in a study addressing traumatic events among adolescents of color who have witnessed traumatic events online, such as viewing videos of police killing innocent African American men (Tynes et al., 2019). The Latino and African American adolescents had poorer mental health (e.g., depressive symptoms) and greater likelihood of developing PTSD if they witnessed online viral videos depicting violence against their own ethnicity (Tynes et al., 2019). According to a 2020 statement by the American Psychological Association, the recent events that have happened in the African American community will likely have negative mental health consequences (e.g., depression and anxiety).

African Americans have more anxiety and fear when faced with police officers compared to whites because of racial profiling and negative stereotypes (Mills, 2020).

***Q1b*- How will the PTSD measure of trauma and the Life Event Checklist measure of traumatic events explain the differences in mental health functioning between the participants from both samples?**

In the United States and Iceland, anxiety was the largest predictor in PTSD symptomology. The finding is not surprising, given a significant relation between anxiety and the development of PTSD after a serious traumatic event (Yasik et al., 2012). The multivariate analysis of variance revealed that the individuals who reported higher instances of trauma were more likely to show symptomology of anxiety and depression. The classification of the PTSD variable demonstrated similar patterns, resulting in greater PTSD symptomology with higher anxiety, depression, and lower resilience. Literature supports the relation between early childhood trauma and the development of PTSD symptomology and negative mental health functioning (e.g., depression) during adulthood (Dunn et al., 2017). The MANOVA findings are significant and reveal that earlier traumatic experienced during childhood and early adulthood can lead to negative emotional outcomes during adulthood. This pattern was consistent across both Iceland and the United States. Hovens et al., (2010), utilized a sample from the Netherlands to assess if childhood trauma (e.g., sexual assault) or early more common negative life events (e.g., parental divorce) were more indicative of worse mental health functioning during adulthood. The researchers concluded the more severe traumatic events predicted later depressive and anxiety disorders during adulthood (Hovens et al., 2010).

***Q2a*- What are the cross-cultural differences in mental health functioning?**

The United States demonstrated overall higher levels of depression but also higher levels

of resilience compared to Iceland. The average mean score for depression in the United States was higher (M=8.39, SD= 5.710) compared to Iceland (M=7.29, SD=5.233). For the Patient Health Questionnaire, a score between five and nine is considered mild depression ("PHQ-9 (Patient Health Questionnaire-9", 2020). The higher score of depression in the United States is not surprising. In recent years, the United States has seen an increase in mass shootings, which are associated with PTSD and depressive symptomology (e.g., rumination) years after the event (Wozniak et al., 2020).

However, a clear relation between early exposure to traumatic events and resilience has not been established. Researchers investigated the role of resilience among a sample of adolescents exposed to childhood maltreatment among a Dutch population (Oldehinkel et al., 2014). The adolescents who did not develop depression after the trauma were more likely to demonstrate adaptive coping mechanisms five years later and show resilience compared to the children who did not experience trauma. However, the positive outcomes years after the trauma were limited to the adolescents who did not develop depression but had moderate levels of adverse experiences.

The higher resilience levels in the United States were unanticipated because Iceland is known for having better mental health overall (e.g., happiness project) compared to the United States as a country, even though mental health outcomes, including resilience, depression and anxiety vary based on ethnicity (Herbert et al., 2018; Brenes et al., 2008). One explanation is that Iceland may not be as attentive to the mental health needs of the citizens. Iceland does not have an abundance of literature or research studies addressing the mental health of Icelanders; this could possibly demonstrate overall unavailable mental health assistance in the country. It has been noted that despite free access to medical care in Iceland, mental health services, such as

private counseling, are not covered by insurance (Ægisdóttir & Einarsdóttir, 2012).

For racial differences in mental health functioning, the white category of ethnicity demonstrated better resilience and lower negative affect compared to the other category of ethnicity, which included participants who stated they were African American, Hispanic, Asian, or in the other category. There has been mixed findings about resilience levels between different ethnic identities; however, stronger racial identities and social support seem to be indicative of higher resilience (Herbert et al., 2018; Cunningham at al., 2018).

***Q2b*- Will there be certain predictors of the following mental health outcomes: anxiety, depression, and resilience?**

All of the findings related to the outcome variables of anxiety, depression, and resilience were anticipated, with the previous literature linking the mental health variables to negative or positive outcomes. For a long-term outcome of anxiety, negative affect seems to be the most important variable for developing anxiety in the United States sample. Individuals who show greater negative traits such as hostility and constant worry are more likely to be anxious (Jones et al., 1996). Among the Iceland sample, PTSD was predictive of anxiety. Among a sample of 2,402 adults with anxiety and depressive disorders in the Netherlands, researchers found the adults with anxiety-related disorders, had a greater prevalence of PTSD compared to adults without anxiety or depressive-related disorders in the sample of individuals with and without trauma histories (Spinhoven et al., 2014). For the outcome of depression, in the United States sample, individuals with a lack of positive affect had a greater chance of showing symptoms of depression. The stated findings correspond with prior conclusions on the association between positive and negative affect with the development of depression and anxiety (Lonigan et al., 2003). Among the Iceland sample, anxiety was the largest predictor of depression. A large total

of Australian adults (*N*=1,209) answered questionnaires about exposure to early stress, adult trauma, and depression and anxiety symptomology (Chu et al., 2013). Overall, early life interpersonal stressors such as bullying or peer rejection were most indicative of depressive and anxiety symptomology in adulthood.

For the last outcome of resilience, positive affect in the United States was the largest predictor and in Iceland, positive affect had a slightly smaller *R* Square Change value. The significant relation between feelings of positivity, such as feeling in control in one's life, could help explain why the participants in the United States had higher levels of resilience compared to the students in Iceland. Positive affect or positive emotions are important for productive coping mechanisms when faced with adversity, and the ability to maintain positive emotions are correlated with resilience (Robinson et al., 2014).

One of the goals of the research project was to investigate how working memory is affected by early traumatic events. The only significant correlation found with working memory was between the attention measure of working memory and resilience in the Iceland sample. However, there is limited literature over the executive functioning skill of working memory and resilience. In the sample, only 37% (*N*=95) of the United States participants answered the working memory assessment, compared to 66% (*N*=67) in Iceland. The small sample sizes could explain why there was no significant result found. As stated in the literature review, working memory performance was found to be significantly lower among women who were victims of sexual assault, independent of a diagnosis of PTSD (Blanchette and Caparos, 2016). Moreover, researchers have demonstrated a relation between sufficient working memory performances among individuals not exposed to trauma (Mirabolfathi et al., 2020). Greater research is needed to investigate the role that childhood trauma has on working memory and resilience.

The study results provide evidence that early life adversity is related to poorer mental health functioning (e.g., depression and anxiety) later in life. Individuals with PTSD symptomology are more likely to demonstrate not only greater depression and anxiety but also lower resilience. Further, the cross-cultural findings demonstrate Iceland and the United States have similar reported traumas but differences in mental health functioning after trauma.

Limitations

The measure of child adversity was the Life Event Checklist (Weathers et al., 2013). The Life Event Checklist does not measure a time period for the occurrence of trauma, such as childhood or early adulthood. Therefore, it is difficult to establish when the life adverse events took place for the sample. However, the age ranges were very similar for both countries' samples (the average age ranges were between 19-22) and it can be inferred that the traumas took place during childhood, adolescence, or early adulthood. The Life Event Checklist has been used in prior studies measuring childhood trauma including, (Wu et al., 2013). However, the Adverse Childhood Experiences (Felitti et al., 1998) questionnaire would be an ideal measure of childhood trauma because a large number of research studies that have utilized the measure.

The data system used to collect the Untied States participant data was SONA. SONA is an online system where undergraduates can volunteer or participate in studies to receive extra course credit. Participating students were given a Qualtrics link to complete both parts of the study (the childhood trauma survey and working memory test). Since the survey could be taken anywhere, the students could have had various time constraints and distractions limiting their accuracy on the self reported measures. Some researchers have proposed that self-report measures are less accurate because respondents are not always aware of their own mental states and can underreport or overreport in surveys administered online, resulting in response bias(Brenner & DeLamater, 2017). However, SONA was a strong data collection tool for various

reasons. SONA provided data that was easily accessible and straightforward to analyze using SPSS since it was collected online and within a short time frame (e.g., two months). The survey answers were additionally anonymous, so the individuals may have been more likely to be straightforward with their answers regarding mental health.

Another limitation included not having a diverse enough sample. As stated in the methods section, Iceland had about 98% of the sample consisting of white participants, compared to 68% in the United States sample. The U.S. was more diverse and consisted of 6% of the sample stating they identified as African American, 12% identified as Hispanic/Latino, and 6% identified as Asian. If the sample had greater diversity, more cross-cultural differences might be identified in mental health functioning.

The last limitation was not having a clinical diagnosis of post-traumatic stress disorder. Even though the PTSD Checklist for DSM-5 has strong validity and reliability, it was nevertheless a self-reported measure of mental health functioning. Therefore, either having another assessment of potential PTSD in addition to the PTSD Checklist for DSM-5 or having a trained clinician assessing PTSD symptomology among the sample would have improved the reliability of the PTSD variable.

Directions for Future Research Regarding Limitations

Many different factors are related to the emotional health among individuals who have experienced childhood adversity. The following confounds or third variables were considered in the research study including, family history of trauma (transgenerational trauma; epigenetics), current psychiatric disorder diagnoses, and timeframe for experiencing the traumatic events.

Transgenerational trauma was a term first applied to Holocaust survivors of trauma; the children of the parents who were in the Holocaust were also influenced by the trauma, even

though they did not witness the adversity (Danieli, 1998). The resilience theory implies that individuals who suffer trauma are able to develop positive coping mechanisms to conquer the challenges that go with overcoming adversity (Walsh, 2002). Epigenetics stresses the interaction between the child's genotype and his or her environment. For the Holocaust survivors, there has been research documenting the association between parental PTSD and stress response dysregulation for the offspring (Yehuda et al., 2000). The parents without PTSD who were also Holocaust survivors, could have passed down resilience to their offspring, buffering them from negative stress response disruptions. The role of resilience among children with maltreatment histories is becoming a well-known topic in the field of child clinical psychology. The individuals with PTSD had lower resilience compared to those without the disorder.

Current psychiatric diagnoses would be an important question to ask for an indicator of psychological functioning. Due to the sensitive nature of asking about current mental health disorder diagnoses, the question was not asked in the study. But as mentioned in the introduction, individuals with a current mental illness (Generalized Anxiety disorder, Major Depressive Disorder, and stress-related disorders) are more likely to report trauma histories (Darnell et al., 2019). Moreover, individuals who go through trauma are at greater risk for experiencing anxiety, depression, and having a diagnosis of PTSD ("Abuse, trauma, and mental health", 2018).

The timeframe for experiencing traumatic events is important to consider for long-term mental health outcomes. In a study of adverse childhood experiences among adults receiving treatment for a mental illness (e.g., schizophrenia) and/or addiction, researchers investigated the relation between exposure to trauma during different time periods and mental illness (Stumbo et al., 2015). The percentage of adults in the sample who experienced childhood trauma (91%) was higher than those who only experienced trauma during adulthood (82%). Both the ACE's and the

AAE's (adult adverse experiences) predicted worse mental health functioning, especially when the two types of trauma were combined (Stumbo et al., 2015). However, the researchers concluded with linear regression analyses that adulthood trauma had a stronger correlation with adult psychiatric disorders compared to only the presence of trauma during childhood.

As stated in the introduction, Iceland has continuously ranked high in comparison to other countries on the happiness index. More cross-cultural research is needed to investigate not only factors of psychological well-being, but also indicators of the physical well-being of Icelanders compared to individuals in the United States. Because the reporting of traumatic events did not significantly differ between the two countries, there could be other explanations as to why Iceland is still able to have lower rates of depression. Exercise, diet, and other lifestyle patterns (e.g., sleep) could indicate better psychological functioning in Iceland.

Future research should address the severity and various types of childhood maltreatment in predicting the impact on the lesser-known cognitive process of working memory. Research could focus on different components of working memory including: attention, visual, and verbal WM. For example, researchers assessed adults using the Childhood Maltreatment Scale, which inquires about a variety of childhood maltreatment experiences (e.g., neglect, family violence, etc.) and they concluded that the participants with a history of psychological abuse had the greatest difficulties on the working memory assessment (e.g., areas of verbal recall and attention) in comparison to the other abused individuals (Dodaj et al., 2017). Therefore, there seems to be evidence of lower working memory performance among invasive types of trauma but little published research about noninvasive life experiences.

Future research should address effective interventions designed to aid children, adolescents, and young adults in developing coping mechanisms after trauma. Negative affect

and lack of positive affect have been related to both anxiety and depression (Lonigan et al., 2003). Better therapeutic interventions could be designed to promote more of a positive psychology mindset through improving resilience to cope with the aftereffects of trauma. For example, Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) has been shown to greatly reduce the common behavioral (e.g., aggression), cognitive (loss of concentration), and emotional issues (e.g., anger) that arise after trauma during childhood ("About Trauma-Focused Cognitive Behavior Therapy", n.d.). TF-CBT is a form of counseling or psychotherapy and can improve the symptoms of PTSD in young adults who have suffered significant trauma ("About Trauma-Focused Cognitive Behavior Therapy", n.d).

The types of traumas endorsed on the Life Event Checklist were similar for the two countries. The two main endorsed traumas were related to natural disasters and motor vehicle accidents. Research is limited over the long-term emotional outcomes of motor vehicle accidents unrelated to traumatic brain injuries. Additionally, with the lack of literature on the impact of natural disasters, less is understood about the psychological outcomes for children and adolescents involved in these events. There is some research highlighting the role of resilience among individuals involved in catastrophic natural disasters. For instance, a strong relation was discovered between positive quality of life scores, greater resilience, and lower mental health problems among Hurricane Katrina victims (Hansel et al., 2019). The environment heavily influenced the participants' ability to cope with adversity and not suffer from mental health problems.

Conclusion

There is research illustrating that persistent childhood adversity can lead to mental health problems associated with PTSD, depression, and anxiety. This study focused on how the United

States and Iceland might have statistically significant differences in reported trauma, PTSD symptomology, and long-term outcomes of adversity. Additionally, the study investigated how having a likely diagnosis of PTSD or a history of moderate life event traumas can increase depression and anxiety in adulthood. Even though the United States did not have mean differences from Iceland in PTSD symptomology or life event traumas, the mental health outcomes of depression and resilience did differ between the two countries. More cross-cultural research is needed to further investigate the differences between the United States and Iceland's mental health and the prevalence of different types of early life adversities. Moreover, programs can be developed to target young adults with trauma histories to help improve positive mental health outcomes such as resilience for long-term healthy psychological functioning.

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Appendices

Appendix A

Positive and Negative Affect Schedule (Watson et al., 1988).

Indicate the extend you have felt this way over the past week.		Very slightly or not at all (1)	A little (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
PANAS 1	Interested	1	2	3	4	5
PANAS 2	Distressed	1	2	3	4	5
PANAS 3	Excited	1	2	3	4	5
PANAS 4	Upset	1	2	3	4	5
PANAS 5	Strong	1	2	3	4	5
PANAS 6	Guilty	1	2	3	4	5
PANAS 7	Scared	1	2	3	4	5
PANAS 8	Hostile	1	2	3	4	5
PANAS 9	Enthusiastic	1	2	3	4	5
PANAS 10	Proud	1	2	3	4	5
PANAS 11	Irritable	1	2	3	4	5
PANAS 12	Alert	1	2	3	4	5
PANAS 13	Ashamed	1	2	3	4	5
PANAS 14	Inspired	1	2	3	4	5
PANAS 15	Nervous	1	2	3	4	5
PANAS 16	Determined	1	2	3	4	5
PANAS 17	Attentive	1	2	3	4	5
PANAS 18	Jittery	1	2	3	4	5
PANAS 19	Active	1	2	3	4	5
PANAS 20	Afraid	1	2	3	4	5

Appendix B

10-Item Connor-Davidson Resilience Scale (Campbell-Sills & Stein, 2007)

Indicate in past month, how well you correspond with the presented statements.	Not true at all (0)	Rarely true (1)	Sometimes true (2)	Often true (3)	True nearly all the time (4)
1. Able to adapt to change	0	1	2	3	4
2. Can deal with whatever comes	0	1	2	3	4
3. Tries to see humorous side of problems	0	1	2	3	4
4. Coping with stress can strengthen me	0	1	2	3	4
5.Tends to bounce back after illness or hardship	0	1	2	3	4
6. Can achieve goals despite obstacles	0	1	2	3	4
7. Can stay focused under pressure	0	1	2	3	4
8.Not easily discouraged by failure	0	1	2	3	4
9. Thinks of self as strong person	0	1	2	3	4
10. Can handle unpleasant feelings	0	1	2	3	4

Appendix C

Generalized Anxiety Disorder 7-item (GAD-7) scale (Spitzer et al., 2006)

Over the last 2 weeks how often have you been bothered by the following problems	Not at all true (0)	Several days (1)	Over half the days (2)	Nearly every day (3)
1. Feeling nervous, anxious, or on edge	0	1	2	3
2.Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being restless that it's hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Becoming afraid as if something awful might happen	0	1	2	3

Appendix D

Patient Health Questionnaire (Kroenke et al., 2001)

How often have you been bothered by the following over the past 2 weeks?	Not true at all (0)	Several Days (1)	More than half the days (2)	Nearly every day (3)
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5.Poor appetite or overeating?	0	1	2	3
6. Feeling bad about yourself- or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or being so fidgety or restless that you have been moving a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or thoughts of hurting yourself in some way	0	1	2	3

Appendix E

Life Event Checklist (Weathers et al., 2013)

Event	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
1. Natural disaster (for example, flood, hurricane, tornado, earthquake)	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
2. Fire or explosion	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
3. Transportation accident (for example, car accident, boat accident, train wreck, plane crash)	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
4. Serious accident at work, home, or during recreational activity	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
5. Exposure to toxic substance (for example, dangerous chemicals, radiation)	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
6. Physical assault (for example, being attacked, hit, slapped, kicked, beaten up)	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
7. Assault with a weapon (for example, being shot, stabbed, threatened with a knife, gun, bomb)	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
8. Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat of harm)	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
9. Other unwanted or uncomfortable sexual experience	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
10. Combat or exposure to a war-zone (in the military or as a civilian)	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
11. Captivity (for example, being kidnapped, abducted, held hostage, prisoner of war)	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
12. Life-threatening illness or injury	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
13. Severe human suffering	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
14. Sudden, violent death (for example, homicide, suicide)	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
15. Sudden, unexpected death of someone close to you	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
16. Serious injury, harm, or death you caused to someone else	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply
17. Any other very stressful event or experience	Happened to me	Witnessed it	Learned about it	Part of my job	Not Sure	Doesn't apply

Appendix F

PTSD Checklist for DSM-5 (Weathers et al., 2013)

In the past month, how much were you bothered by:	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Repeated, disturbing, and unwanted memories of the stressful experience?	0	1	2	3	4
2. Repeated, disturbing dreams of the stressful experience?	0	1	2	3	4
3. Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)?	0	1	2	3	4
4. Feeling very upset when something reminded you of the stressful experience?	0	1	2	3	4
5. Having strong physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)?	0	1	2	3	4
6. Avoiding memories, thoughts, or feelings related to the stressful experience?	0	1	2	3	4
7. Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)?	0	1	2	3	4
8. Trouble remembering important parts of the stressful experience?	0	1	2	3	4
9. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?	0	1	2	3	4
10. Blaming yourself or someone else for the stressful experience or what happened after it?	0	1	2	3	4
11. Having strong negative feelings such as fear, horror, anger, guilt, or shame?	0	1	2	3	4
12. Loss of interest in activities that you used to enjoy?	0	1	2	3	4
13. Feeling distant or cut off from other people?	0	1	2	3	4
14. Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?	0	1	2	3	4
15. Irritable behavior, angry outbursts, or acting aggressively?	0	1	2	3	4

16. Taking too many risks or doing things that could cause you harm?	0	1	2	3	4
17. Being “super alert” or watchful or on guard?	0	1	2	3	4
18. Feeling jumpy or easily startled?	0	1	2	3	4
19. Having difficulty concentrating?	0	1	2	3	4
20. Trouble falling or staying asleep?	0	1	2	3	4