2023

Relationship Between Childhood Trauma, ,Adverse Childhood Experiences, and Self-Management of Type 1 and Type 2 Diabetes

Deserie J. OToole
Walden University

Walden University

College of Psychology and Community Services

This is to certify that the doctoral dissertation by

Deserie J. O'Toole

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Anthony Perry, Committee Chairperson, Psychology Faculty
Dr. Hedy Dexter, Committee Member, Psychology Faculty
Dr. Patti Barrows, University Reviewer, Psychology Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2023

Abstract

Relationship Between Childhood Trauma, Adverse Childhood Experiences, and Self-Management of Type 1 and Type 2 Diabetes

by

Deserie J. O'Toole

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Psychology

Walden University

June 2023

Abstract

Poorly controlled diabetes is the result of lack of self-care, which contributes to complications, ill quality in life, the rise in health care costs, and early death. The purpose of this quantitative, nonexperimental study was to examine the extent to which diabetes type (Type 1 and Type 2), childhood trauma, and adverse childhood experiences predict diabetes self-management (glucose management, dietary control, physical activity, health care use, total self-management). Contemporary trauma theory suggests that early childhood trauma results in negative health-related consequences in adulthood. Standard multiple regression analyses showed that (a) higher levels of physical neglect and emotional abuse predicted poorer overall self-management, (b) higher levels of physical neglect predicted poorer glucose management, (c) diabetes type predicted health care use with Type 2 diabetics using healthcare more frequently than Type 1, (d) higher levels of physical neglect predicted lower levels of healthcare use, and (e) higher levels of emotional abuse predicted lower levels of physical activity. These results may be used for positive social change by informing health care providers on factors that impact diabetes self-management. Health care practitioners and organizations may use the results to design educational programs or counseling interventions with diabetes patients to improve diabetes self-management behavior.

Relationship Between Childhood Trauma, Adverse Childhood Experiences, and Self-Management of Type 1 and Type 2 Diabetes

by

Deserie J. O'Toole

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Psychology

Walden University

June 2023

Dedication

For my mother Mary, my rock, my role model, and my best friend who never gave up on me. For my son, Sean, whom I love more than life itself, and whom I am so proud of, and for my younger brother, Dion, who I always looked up to although he is younger; he is an amazing father to my only nephew Dalton, who I cannot wait to see grow up. For Rob, thank you for putting up with my craziness and many hours of homework and procrastination that drove us both crazy. For Bill Patten, your extended kindness, humility, honesty, vulnerability, and friendship with my mother have made her feel worthy, appreciated, and valued. I cannot thank you enough for your contribution to her life. As you know, she means everything to me. To Dr. Anthony Perry, you have amazing patience and I appreciate your guidance and words of wisdom. You provided me with the courage, confidence, and determination to keep pushing through. You met with me on weekends, holidays and during tearful meltdowns. Finally, a big thank you to my father, who tore me down, lied to me, and traumatized me; if it were not for you, I would not know the tremendous amount of resilience that is possible for one human being.

Acknowledgments

I would like to acknowledge the people that helped me through this journey. My journey has been long, and at every tumultuous corner I wanted to give up. However, there are lessons learned in life and one of them is “never give up.” Not only did Winston Churchill coin the phrase but my Mother Mary endlessly instilled this in me. I would like to first acknowledge Dr. Anthony Perry for not giving up on me when he read Chapter 2 for the 36th time. When I would breakdown and want to cancel Zoom meetings, Dr. Perry would send an email saying “no” let’s talk about it, and he would re-frame the issue as doable. Dr. Dexter and Dr. Barrows for the speedy feedback and returns, I had an amazing committee! I want to acknowledge my partner Rob Coy, my Mother Mary O’Leary, my son Sean O’Toole, and my brother Dion O’Leary who always encouraged me. For all my family members and few close friends that said they were proud of me and offered words of support along the way. To the best co-worker/mentor I have ever had, Michael Case, who listened attentively, motivationally interviewed me, and taught me the important lesson of “waiting a day.” To the best supervisor I have ever had, Linda Craig, she encourages staff and lets them know they are appreciated. To the heavens above, someone’s been watching over me all these years, or I would not be alive today. Finally, to my dog Oliver, who I thought I rescued, but in reality, he rescued me, without him, I would never know true unconditional love. When I was tearfully frustrated and overwhelmed, he was always there to listen with his gigantic ears, they are that big for a reason. I am forever grateful for all the two legged and four legged mentors, family, and friends along the way, which has made my dream come true.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to Study

When diabetes is inadequately managed, elevated glucose levels can increase diabetic complications, leading to poor quality of life and a higher risk of death. Poorly controlled diabetes is the result of lack of self-care, which also contributes to the rise in health care costs (American Diabetes Association, 2020). It was estimated from 2013 to 2017 that diabetes expenses were at 327 billion dollars (CDC, 2020). Thus, diabetes is a global health problem with many patients failing to adhere to recommended treatment plans (Rushforth et al., 2016). The most important part of a treatment plan is self-management, which includes checking blood sugars as directed by the physician, choosing food for optimal blood sugar levels, keeping diabetes-related doctor appointments, taking medication as prescribed, recording blood sugar levels, and engaging in regular physical activity (ADA, 2020). The development of self-management skills, and empowering diabetics to use them, contributes to successful diabetes outcomes.

Despite the benefits of self-care, there are several barriers to self-management that include a lack of communication from health care providers, inadequate education, health inequalities related to minorities, lack of finances or insurance coverage, and lack of motivation to change behaviors (Adu et al., 2019). Although childhood trauma and adverse childhood experiences have been associated with negative behaviors, illness, and diseases such as diabetes, those who have studied barriers to self-management have not examined Type 1 and Type 2 diabetes self-management from a trauma theory perspective (Felitti et al.1998). This emphasized the need to examine the extent to which childhood

trauma and adverse childhood experiences impacted Type 1 and Type 2 diabetes self-management.

In Chapter 1, I give a brief explanation of the background of my study, problem statement, purpose, research questions and hypotheses. In addition, I discuss Herman's (1992) contemporary trauma theory, which helps describe the nature of the study. I also provide definitions of relevant constructs, assumptions, scope, and delimitations. Finally, I address the limitations and significance of this study.

Background

Adverse childhood experiences (ACEs) can be described as childhood abuse, neglect, and household challenges that have an impact on future violence, victimization, perpetration, lifelong health conditions, and disease such as diabetes and many others (Felitti et al., 1988). Many have examined the impact of childhood trauma and childhood adversity on health-related behaviors such as smoking, binge drinking, illicit drug use, teen pregnancy, and high school dropout rates. For example, Widom et al. (2012) followed known abused children after 30 years and found that 40% of children who experienced ACEs dropped out of high school. In addition, physical and sexual abuse was associated with increased levels of incarceration and smoking. Chronic illnesses and diseases have also been correlated with childhood trauma and adversity, including asthma, chronic bronchitis, lupus, diabetes, pneumonia, elevated blood pressure and cholesterol, depression, anxiety, and heart disease (Felitti et al., 1998). In a review of 36 studies on the association between adverse childhood experiences and risk for Type 1 diabetes, results also indicated that abuse at home and school significantly predicted

increases in the diagnoses of Type 1 diabetes (Karavanaki et al., 2014). Further, research has shown that children who suffered from sexual and emotional abuse had increased vulnerability to mental illness and chronic diseases such as cardiovascular disorders, Type 2 diabetes, hepatitis, and chronic obstructive pulmonary disease (Egle et al., 2016).

A case study with an 18-year-old male, Type I diabetic, who suffered significant childhood trauma also indicated that the abuse and trauma appeared to be related to his poor diabetes self-management (Meadows & Marsac, 2020). But to date, there have not been any quantitative studies examining the relationship between childhood trauma, adverse childhood experiences, and self-management of adult diabetes. Thus, this study filled the gap through examining the extent to which childhood trauma and adverse childhood experiences are related to components of self-management (i.e., physical activity, dietary control, glucose management, health care use) among Type 1 and Type 2 adult diabetics.

Problem Statement

Diabetes is one of the most expensive and deadliest health care related diseases due to elevated glucose levels affecting all major systems in the body. Increased levels of glucose affect kidneys, heart, eyesight, skin integrity, and many more bodily functions that increase the co-morbidities associated with the disease (CDC, 2020). In 2018 the United States had 34.2 million diabetics, and it is projected that that there will be 38 million people with diabetes in 2025 (CDC, 2020). Self-management is the most important aspect of managing Type 1 and Type 2 diabetes. Self-management behaviors include food choices, physical activity, proper medication adherence, health care use, and

blood glucose monitoring to prevent diabetes related mortality (Centers for Disease Control and Prevention [CDC], 2020). Extensive research has identified a number of barriers to diabetes self-management, but researchers have not examined the relationship between childhood trauma, adverse childhood experiences, and Type 1 and Type 2 diabetes self-management.

Purpose of the Study

The purpose of this quantitative study was to explore the extent to which type of diabetes, childhood trauma, and adverse childhood experiences are related to components of diabetes self-management among adult diabetics. Childhood trauma was measured with the Childhood Trauma Questionnaire-Short Form (CTQ-SF; Bernstein et al.,1994). ACEs were measured by the ACE questionnaire (Felitti et al.,1998). Finally, adult diabetes self-management was measured by the Diabetes Self-Management Questionnaire (DSMQ; Schmitt et al., 2016).

Research Questions and Hypotheses

This quantitative study was designed to determine to what extent type of diabetes, childhood trauma, and adverse childhood experiences predict components of diabetes self-management. This study sought to answer the following research questions and the respective hypotheses:

RQ 1: To what extent does type of diabetes (Type 1 and Type 2), childhood trauma (as measured by the CTQ-SF), and adverse childhood experiences (as measured by ACE-Q) relate to diabetes self-management (physical activity subscale score), as measured by the DSMQ, while holding other predictors constant?

$H_0$1: Type of diabetes, childhood trauma, and adverse childhood experiences do not significantly predict diabetes self-management (physical activity subscale score) while holding other predictors constant.

$H_1$1: Type of diabetes, childhood trauma, and adverse childhood experiences do predict diabetes self-management (physical activity subscale score) while holding other predictors constant.

RQ 2: To what extent does type of diabetes (Type 1 and Type 2), childhood trauma (as measured by the CTQ-SF), and adverse childhood experiences (as measured by ACE-Q) relate to diabetes self-management (dietary control subscale score), as measured by the DSMQ, while holding other predictors constant?

$H_0$2: Type of diabetes, childhood trauma, and adverse childhood experiences do not significantly predict diabetes self-management (dietary control subscale score) while holding other predictors constant.

$H_1$2: Type of diabetes, childhood trauma, and adverse childhood experiences do predict diabetes self-management (dietary control subscale score) while holding other predictors constant.

RQ 3: To what extent does type of diabetes (Type 1 and Type 2), childhood trauma (as measured by the CTQ-SF), and adverse childhood experiences (as measured by ACE-Q) relate to diabetes self-management (glucose management subscale score), as measured by the DSMQ, while holding other predictors constant?

$H_0$3: Type of diabetes, childhood trauma, and adverse childhood experiences do not significantly predict diabetes self-management (glucose management subscale score) while holding other predictors constant.

$H_1$3: Type of diabetes, childhood trauma, and adverse childhood experiences do predict diabetes self-management (glucose management subscale score) while holding other predictors constant.

RQ 4: To what extent does type of diabetes (Type 1 and Type 2), childhood trauma (as measured by the CTQ-SF), and adverse childhood experiences (as measured by ACE-Q) relate to diabetes self-management (healthcare use subscale score), as measured by the DSMQ, while holding other predictors constant?

$H_0$4: Type of diabetes, childhood trauma, and adverse childhood experiences do not significantly predict diabetes self-management (healthcare use subscale score) while holding other predictors constant.

$H_1$4: Type of diabetes, childhood trauma, and adverse childhood experiences do predict diabetes self-management (healthcare use subscale score) while holding other predictors constant.

RQ 5: To what extent does type of diabetes (Type 1 and Type 2), childhood trauma (as measured by the CTQ-SF), and adverse childhood experiences (as measured by ACE-Q) relate to diabetes self-management (total self-management score), as measured by the DSMQ, while holding other predictors constant?

$H_0$5: Type of diabetes, childhood trauma, and adverse childhood experiences do not significantly predict diabetes self-management (total self-management score) while holding other predictors constant.

$H_1$5: Type of diabetes, childhood trauma, and adverse childhood experiences do predict diabetes self-management (total self-management score) while holding other predictors constant.

Theoretical Foundation

Herman's (1992) contemporary trauma theory explains how humans suffer with their ability to function in the aftermath of trauma. Contemporary trauma theory is based on five central tenets that affect functioning: dissociation, attachment, re-enactment, impairment of emotions, and long-term effects in adulthood. Herman's contemporary trauma theory suggests that traumatic events and ACEs interrupt normal development, predisposing trauma victims to physical and mental health problems as adults. Childhood trauma and adversities have manifested as negative behaviors that can impact multiple areas and lead to illness and disease such as depression, anxiety, asthma, diabetes, heart disease. Thus, contemporary trauma theory offered the framework to understand the relationship between childhood trauma or ACEs and lack of desire, knowledge, or inability to effectively manage diabetes. A more detailed explanation of contemporary trauma theory is presented in Chapter 2.

Nature of Study

The nature of this study was a quantitative, nonexperimental, correlational design. Quantitative research was appropriate for examining relationships among variables.

Participants were Type 1 and Type 2 diabetic adults aged 21 to 65. The independent variables included type of diabetes (Type 1, Type 2), childhood trauma, and ACEs. Childhood trauma was measured by the CTQ-SF **(**Bernstein et al., 1994), ACEs were measured using the ACE-Q (Felitti et al., 1998), and diabetes self-management was measured by the DSMQ (Schmitt et al., 2016). Components of diabetes self-management were the dependent variables. The DSMQ is an interval scale, with a total score and four subscale scores, including physical activity, glucose management, dietary control, and health care use. Participants completed an online survey using Survey Monkey. Five separate standard multiple regression analyses were used to test the hypotheses.

Definitions

Adverse childhood experiences (ACEs): Defined as experiencing violence, abuse, or neglect, witnessing domestic violence in the home, having a family member attempt suicide, or any experience that can compromise a child's sense of safety, stability, and feeling of being loved (Felitti et al., 1998). Adverse experiences include growing up in a household with substance use problems, mental health problems, divorce, or incarceration of a household member (Felitti et al., 1998).

Childhood trauma: The construct of trauma for this study is based on Herman's 1992 definition of trauma. Trauma is affiliated with the defenseless and is the result of violence. These experiences can overwhelm the thought processes that help adaptation to normal life. Trauma for this study's purpose involves threats to life, bodily integrity, violence, and death (Herman, 1992).

Diabetes self-management: Diabetes self-management includes healthy eating,

being active, checking blood sugar regularly, engaging in regular physical activity, getting enough sleep, keeping regular appointments with health care providers, monitoring feet, skin, and eyes to catch problems early, and managing stress levels. These self-management activities are all done to keep blood sugar/glucose at controlled levels for both types of diabetes (CDC, 2020).

Type 1 diabetes: Type 1 diabetes occurs when the pancreas in the human body does not make insulin or not enough insulin. Insulin helps the body use sugar or glucose for energy. Without insulin, sugar builds up in the bloodstream. Brains need glucose to function, but too much glucose /sugar is detrimental to the body and can cause many of the body systems or organs to fail. Type 1 diabetes was once thought to be insulin-dependent or juvenile diabetes. It usually develops in children, teens, and young adults but can happen at any age. About 7–10% of diabetics in the United States are Type 1 (CDC, 2020).

Type 2 diabetes: Approximately 90–93% of diabetics are Type 2. Type 2 diabetes most often develops in people over age 45, but more children are also developing it. With Type 2 diabetes, the body does not respond normally to insulin, referred to as insulin resistance. The pancreas makes more insulin trying to keep up but eventually cannot, at which point blood sugar rises, leading to Type 2 diabetes. Just as in Type 1 diabetes, high blood sugar can cause other serious health problems and damage to many other bodily systems, functions, and organs (CDC, 2020).

Assumptions

In this study, it was assumed that participants were patients diagnosed with either

Type 1 or Type 2 diabetes; it was necessary to assume diagnoses, as I did not have access to medical records. It was also assumed that participants completing the questionnaires responded honestly and as accurately as possible. Finally, reports of traumatic events and adversities were assumed to be accurate, as I had to rely on participants' memories.

Scope and Delimitations

Diabetes is a chronic disease and a significant contributor to rising health care costs (CDC, 2020). The treatment for both Type 1 and Type 2 diabetes relies on the patient performing self-management, which is the key variable in this study. Specific aspects of this study included a focus on adults aged 21 to 65 with either Type 1 or Type 2 diabetes who have had the diagnoses for over 1 year. Factors that I focused on were diabetes type, childhood trauma, and ACEs and their relationship to diabetes self-management. I acknowledge that there are other factors that may affect diabetes self-management such as finances, mental health, health inequalities among minorities, medication affordability, time restraints, stress, depression, anxiety, and the complexity of using glucose monitors. However, this was beyond the scope of this study.

Limitations

Circumstances related to diabetes self-management can rely on other factors besides traumatic or adverse experiences. Diabetes self-management may be influenced by familial, social, and economic situations such as only one family member cooks for everyone or healthy food is not affordable for some families. Diabetes self-management can be negatively affected by factors including finances, mental health, health inequalities among minorities, medication affordability, time restraints, stress,

depression, anxiety, and the complexity of the disease (Adu et al, 2019). Participants with co-occurring health issues, or a severe level of uncontrolled diabetes, may have been less likely to volunteer for the study. Similarly, participants who have experienced childhood trauma may have been reluctant to share information about those experiences and/or may have been more likely to withdraw from the study. In addition, research bias could have played a role, given that I work in health care and understand diabetes and self-management. To address these limitations, I let participants know that their information would be confidential, anonymous, and not shared.

Significance

This study was significant as it filled a gap in the literature by determining the extent to which childhood trauma and ACEs are related to diabetes self-management among Type 1 and Type 2 adult diabetics. There are several positive social change implications related to this study. The results may be used to inform health care providers on factors that impact diabetes self-management among Type 1 and Type 2 diabetics. Specifically, health practitioners, health care organizations, and hospitals may use the results to design educational programs or counseling interventions with diabetes patients to improve diabetes self-management behavior. In addition to addressing diabetes prevention, adding more screening for childhood adversities, and implementing parent education have implications for positive social change.

Summary

The purpose of this study was to determine the extent to which type of diabetes, childhood trauma, and ACEs predict components of diabetes self-management (physical

activity, glucose management, dietary control, healthcare use). Poorly controlled diabetes is the result of lack of self-care. In this chapter, I discussed the background of childhood abuse, neglect, and household challenges that have an impact on health behavior, illness, and lifelong-health conditions and disease such as diabetes. I also discussed contemporary trauma theory and revealed that previous research has not examined the extent to which childhood trauma and ACEs predicted self-management of diabetes.

In Chapter 2, I discuss the current literature pertinent to Type 1 and Type 2 diabetes and diabetes self-management, which includes glucose management, dietary control, physical activity, and health-care use. I also discuss the history of trauma theory and Herman's (1992) contemporary trauma theory. In addition, I review the literature on how childhood trauma and ACEs relate to behavior, illness, and disease.

Chapter 2: Literature Review

According to the American Diabetes Association of Diabetes Educators (2020), the estimated total costs of diabetes health care increased from $245 billion in 2013 to $327 billion in 2017 when the cost was last examined. This figure represents a 26% increase over a 5-year period. Most poorly controlled diabetes is the result of poor self-management (American Diabetes Association of Diabetes Educators, 2020). Poor diabetes self-management can have negative health consequences including diminished eyesight, vascular issues, organ failure, loss of limbs, and neuropathy of feet, which can lead to frequent infections, gangrene, and amputation (American Association of Diabetes Educators, 2020). Other health issues include cardiovascular disease, kidney disease, and hypertension, resulting in significantly lower life expectancy. Thus, there are significant consequences of this disease on the individual, families, doctors, society, insurance premiums, and on health care costs. Educating patients on the importance of diabetes self-management is the most crucial factor in keeping health care cost down and preventing chronic suffering, pain, and poor-quality life, yet many diabetics do not make self-care a priority (American Diabetes Association of Diabetes Educators, 2020).

Barriers to self-management

There are many barriers to self-management of diabetes. A survey of Type 1 and Type 2 adult diabetics in Europe, Australia, Asia, and the United States showed that barriers to effective self-management included medication affordability, time restraints, stress, depression, anxiety, and the complexity of using glucose monitors (Adu et al, 2019). Stress, depression, and anxiety also played key roles in overeating, not taking

medications as prescribed, and adjustment of insulin or food intake to current glucose levels (Adu et al., 2019).

Trauma and health

Previous research has further demonstrated a relationship between childhood trauma and a number of negative health outcomes (Afifi et al., 2016; Bick et al., 2016; Cheong et al., 2017). These negative outcomes include mental health disorders and vulnerability to physical illnesses such as heart disease and diabetes. Thus, childhood trauma and ACEs may also negatively impact health behaviors such as diabetes self-management. Researchers concluded that diabetes self-management is suboptimal in the general population, and people with mental illness experience even greater difficulty in managing their diabetes (Mulligan et al., 2018). Childhood trauma has been shown to have a relationship with behaviors, illness, and diseases like anxiety, depression, bipolar disorder, conduct disorders, bulimia, anorexia, obsessive-compulsive disorder, and psychotic disorders (Cheong et al., 2017). Similar findings indicated that those who had suffered abuse had increased vulnerability to depression, anxiety, pain, asthma, lupus, COPD, chronic bronchitis, heart disease, and diabetes (Egle et al, 2016). Child abuse, specifically physical abuse, sexual abuse, and witness to domestic violence are related to an increased chance of negative health outcomes such as arthritis, back pain, high blood pressure, migraine headaches, asthma/chronic bronchitis/emphysema/COPD, cancer, stroke, bowel disease, and chronic fatigue syndrome, and diabetes, heart disease, and epilepsy (Afifi et al., 2016).

ACEs and health

Other research has specifically supported that ACEs lead to diseases prevalent later on, including depression, anxiety, eating disorders, lupus, COPD, asthma, diabetes, cancer, and ADHD (Felitti et al., 1998). Placing a child into a positive and protective family environment that can provide stability and security can improve the chances of overall physical and mental health (Bick et al., 2016). ACEs and traumatic events such as abuse, violence, family dysfunction, parental mental health, incarceration, and substance abuse, have been linked to negative behaviors, illness, and diseases in adulthood (Deschene et al., 2018). These experiences flood the immune system with a pro-inflammatory process that predispose children to increased biological responses to stress and emotional dysregulation. Over time, this can lead to negative behaviors as coping skills and to the development of chronic diseases like diabetes.

Focus of the study

Many studies have been done connecting traumatic events to negative behaviors, illnesses, and disease. However, this was the first study looking at the repercussions of child abuse as a mediator and a direct risk of diabetes, specifically. In this study, I examined relationships between diabetes type (Type I and Type 2), childhood trauma, ACEs, and diabetes self-management based on Herman's (1992) contemporary trauma theory. Based on literature reviewed, there is relevant information to support investigating a relationship between these variables. For example, in a recent case study by Meadows and Marsac (2020), a Type 1 diabetic had an increase in his blood glucose numbers and neglected to calibrate his glucose monitor. They found that he was not

counting carbohydrates, not testing his blood sugars, and he was only guessing at the amount of insulin he needed because he did not want to deal with his diabetes. After consulting with a social worker, it was discovered that the patient was a victim of childhood trauma and had experienced some recent triggers. His specific trauma was being a witness to domestic violence. The authors suggested that the early trauma may have been negatively affecting the ability to self-manage his diabetes.

Outline of chapter

Chapter 2 presents the literature search strategy followed by a description and application of contemporary trauma theory. Following that, I provide an exhaustive review of the literature related to key variables (e.g., Type 1 and 2 diabetes, diabetes self-management, childhood trauma, ACEs). The chapter ends with a summary and conclusions.

Literature Search Strategy

In conducting the review of literature, I searched articles from APA PsycArticles, Wiley Online Library, EBSCO, APAPsycInfo, Research Gate, SAGE Journals, PubMed, National Library of Medicine, and The Centers for Disease Control Thoreau, Science Direct, Google Scholar, the National Institute of Health American Diabetes Association, and Online Research Databases. The following is a list of key search terms and combination of terms that were used: *adverse childhood experiences, child abuse, child neglect, childhood trauma, diabetes self-care, diabetes self-management, diabetic negative health outcomes, diabetes treatment, Type 1,* and *Type 2 diabetes*. These terms were searched individually and in combination. Most studies were less than 5 years old;

however, some seminal research relevant to the study was also included.

Theoretical Foundation

Herman's (1992) contemporary trauma theory developed from the Freudian trauma model that suggests trauma is a horrific event or series of horrific events that fragment the psyche. Herman's contemporary trauma theory included Charcot, Freud, and Breuer's ideas about hysteria. In the 1880s, Freud, Breuer, and Charcot concluded that hysteria was caused by a traumatic event or events. They agreed that responses to trauma produced an altered state of mind. After World War I, soldiers returning with what was then termed shell shock, evolved into post-traumatic stress disorder (PTSD) classified as non-concussive injuries that had symptoms previously associated with hysterical women. Psychological first aid for shell shock was developed to help World War I soldiers overcome their altered state of mind that included intense weeping, screaming, memory loss, physical paralysis, and lack of responsiveness. The soldier returning home from war who forgets where he is and reenacts the war experience, according to contemporary trauma theory, is a normal response to an excruciating situation. For example, the Vietnam War soldiers returned with debilitating symptoms that affected their capacity to cope and function in everyday life, often returning with coping skills that involved alcohol, drugs, anger, and violent behavior.

Herman's (1992) theory of contemporary trauma is based on five tenets that affect functioning: dissociation, attachment, re-enactment, impairment of emotions, and long-term effects in adulthood. Dissociation is a break in how the mind manages information or experiences, where the mind disconnects from the traumatic thoughts, feelings,

memories, and surroundings that are currently happening. Trauma can affect sense of identity and perception of time. The second tenet is attachment; if basic needs were met as a child, the child will establish secure attachments as an adult, feel secure in close relationships, and have the ability to trust and form bonds. If caregivers failed to meet those needs or showed signs of abuse, the child may grow up feeling insecure and will be unable to trust and form bonded relationships. Re-enactment is the third tenet and is explained by having repeated thoughts and patterns of behavior that create stressful situations. Herman suggested that reenactment is an unconscious process of seeking stressful situations that when repeated often enough will ultimately resolve. Impairment of emotions (i.e., emotional dysregulation) is the fourth tenet that describes reactional responses that fall outside of the norm, such as mood changes, debilitating anxiety, depression, substance abuse, and self-harm. Over time, these reactional responses may interfere with social interactions, relationships, work, or school. Emotional dysregulation can evolve from traumatic brain injuries, childhood traumas including physical, sexual, and emotional abuse, and feelings of worthlessness. The fifth tenet of Herman's contemporary trauma theory is long-term effects in adulthood described as an extreme experience impacting identity and memory that profoundly influences the emotional organization and perception of life over a lifespan. Moreover, prolonged abuse and adversity can result in hypervigilance, anxiety, agitation, night terrors, and somatization.

Although PTSD had been established as a diagnosis for soldiers and now civilians, this does not address the impact of trauma in the early developmental stages of childhood when abuse and neglect were present. A PTSD diagnosis does not begin to

explain the impact on prolonged social, emotional, or cognitive functioning that trauma has on a child's personality, development, and the ability to self-regulate (Herman, 1992). Courtois et al. (2009) developed the diagnosis of complex trauma, which is the inability to self-regulate due to a history of multiple traumas and/or household dysfunctions. Contemporary trauma theory provides the foundation for understanding the complexities of the biopsychosocial impact of childhood trauma (Courtois et al., 2009). Thus, contemporary trauma theory is also significant for therapists collaborating with patients to integrate these traumatic experiences to produce a change (Piers, 1998). Therapists can do this by customizing interventions to the individual's trauma history, triggers, and specific needs. In addition, contemporary trauma theory is imperative to understanding adult behavior after suffering childhood trauma and adversities as it explains the victim's continuous, unarticulated form of functioning—for example, when someone cuts themselves and they do not know why they have hurt themselves on purpose. Contemporary trauma theory is also a major contributor to a change in perception and how to treat survivors of traumatic events ;rather than viewing the patient as low functioning or passing judgment on their moral character, this shift reframes survivors as psychologically wounded and in need of help (Goodman, 2017).

Responses to trauma may include an inability to function, sometimes by disassociation, shutting down emotional responses, or re-enactment of the abuse (Suleiman, 2008). In a study of 3,000 participants diagnosed with a mental disorder, 300 of them were sexually abused, and six of the sexually abused went on to re-enact the sexual abuse on another child (Chou, 2012). Research also showed that abuse that

occurred by a trusted or primary caregiver was the only abuse resulting in internalized emotions and the likelihood of self-harm (Sabri, 2012). The child that internalizes abuse is the child that goes to school every day, acts normal, plays sports, and has friends, and is never suspected of abusing drugs, alcohol, and negative behaviors like cutting themselves or suicidal ideations (Sabri, 2012). Abuse from outside the family and known people resulted in either combined internalized and externalized emotions or the emotions were externalized only and were exhibited as negative or violent behaviors such as fighting, hurting animals, smoking, drinking, and dropping out of school (Sabri, 2012).

In a review of the literature, Huffhines et al. (2016) examined the association between ACEs, other trauma exposure, and risk for diabetes. Thirty-eight studies were reviewed using the childhood adversity model to provide an explanation for the relationship between greater abuse severity and increased diabetes risk. The researchers found that Type 1 diabetes was most prevalent in children with a lower ACE score and Type 2 diabetes in adulthood was associated with physical and sexual abuse as a child. When the trauma occurred, severity of the trauma, and the type of relationship with the perpetrator of the abuse were the other variables in the study. Their research suggested that Type 1 diabetes usually appeared 2 years after the abuse occurred and was related to parental abuse. Severity of abuse, frequency of abuse, and parental abuse were associated with greater risk for Type 1 diabetes. Type 2 diabetes was related to higher ACE scores and developed in adulthood.

Literature Review Related to Key Variables

Diabetes

Diabetes is an autoimmune disease that stops or slows the pancreas from producing insulin (CDC, 2020). Diabetes is caused by a lack of insulin produced by the pancreas. When this happens for a prolonged period, sugars build up in the body and can damage the heart, blood vessels, eyes, kidneys, and nerves. Diabetics are two to three times more likely to have heart attacks, strokes, suffer nerve damage, and blindness. In addition, diabetes is the number one cause of kidney failure, and the damage can spread throughout other systems (World Health Organization [WHO], 2020).

In 2018, 34.2 million of Americas had diabetes, and it is projected that that there will be 38 million people with diabetes in 2025. The World Health Organization (WHO, 2020) concurred with the CDC, stating that diabetes is chronic and in 2019 was the direct cause of 1.5 million deaths in the United States. Zimmet (2017) conducted a global study on the diabetes epidemic and stated it is likely to be the largest epidemic in human history, concluding that diabetes has also been extremely underestimated across the world.

Epidemiologists have been focused on genetic factors, lifestyle, and behavioral change; however, the attention is starting to turn to the impact of intra-uterine and childhood environment on future risk of diabetes in adult life (Zimmet, 2017). There is an urgent need for research on diabetes prevention with an emphasis on maternal and child health. Zimmet (2017) stated that major traumatic events such as the Dutch winter famine, the Chinese famine, and the drought in Africa's Horne, may have an effect on the

development of diabetes later in life. Researchers went back after 30 years and found high rates of diabetes, obesity, hypertension, and schizophrenia among children born at the time of the Dutch famine. This highlights the impact of traumatic experiences in childhood and the development of illness and disease.

Type 1 Diabetes

Type 1 diabetes is an autoimmune disease and genetic disorder that frequently emerges early in life. Of all individuals diagnosed with diabetes, about 10% are Type 1 (CDC, 2020). Symptoms often appear suddenly anytime from early childhood to adulthood. Type 1 diabetics require insulin daily to survive and there is no cure (CDC, 2020). In Type 1 diabetes, the pancreas stops making insulin, a hormone that helps cells (beta cells) use glucose (sugar) for energy. Diabetes occurs when the immune system attacks and destroys the beta cells in the pancreas (Nygren et al., 2015). Thousands of people worldwide are diagnosed with Type 1 diabetes each year. Type 1 diabetics are usually not overweight; however, the daily use of the growth hormone insulin begins to tell the body to store energy as fat (Singh et al., 2016). Type 1 diabetics have to manage weight in order not to become insulin resistant. If weight is not managed, more insulin will be required to control glucose levels (Singh et al., 2016).

Type 2 Diabetes

Millions of people have the more common form of the disease, known as Type 2, which is linked to obesity and advanced age and does not involve destruction of beta cells (Nygren et al., 2015). Type 2 diabetes can be genetic and is usually environmentally influenced. The obesity factor is often an independent predictor of fatigue, injury, and

physiological pain, which could start a plethora of negative health behaviors, illness, and other diseases (Casqueiro et al., 2012). Type 2 diabetes is generally diet-related and develops over time. Type 2 diabetes results from the pancreas not producing insulin proficiently and accounts for 90 to 93% of all diabetics. Symptoms often do not appear until adulthood, although the CDC (2020) stated it is starting to appear in younger adults to late teens. Unlike Type 1 diabetes, Type 2 diabetes can be prevented with lifestyle changes, behavior modifications, medication, and/or insulin depending how far the disease has progressed (CDC, 2020).

Type 1 and Type 2 Diabetes Symptoms

The symptoms of Type 1 and Type 2 diabetes are similar. One of the first symptoms people notice with both types of diabetes is frequent urination called polyuria. It usually takes place when the kidneys cannot absorb any more glucose. Frequent urination can leave the body in a dehydrated state (Singh et al., 2016). Diabetics may experience extreme thirst, referred to as polydipsia. This excessive thirst is due to the dehydration that polyuria has caused (Singh et al., 2016). If either Type 1 or Type 2 diabetes is managed well, neither polyuria nor polydipsia should be an issue. Although stress, infections, and some medications can sometimes alter glucose levels; excessive thirst and urination returning in an otherwise well-controlled diabetic would be an indicator that something is wrong, most likely their glucose levels (Singh et al., 2016).

Type 1 and Type 2 diabetics have a 50% chance of both neuropathy and retinopathy if glucose is not managed well (ADA, 2020). Diabetic retinopathy occurs when elevated levels of glucose over time damage the blood vessels in the retina, causing

blind spots, blurred vision, and vision loss. Vision can change at any time, from day to day, or week to week or there can be multiple changes over the month. Elevated levels of glucose over time can damage the nerves in the body called diabetic neuropathy most often in the legs and feet. Painful symptoms can occur in the urinary tract, heart, blood vessels, and the digestive tract, in addition to the numbness in the legs and feet. With appropriate self-management this can be avoided (ADA, 2020). Finally, infections, low immunity, and slow-healing wounds are more frequent and can be catastrophic in people with Type 1 and Type 2 diabetes (ADA, 2020). Elevated glucose causes an internal biological environment that destroys immunity and antibacterial activity in the body, affecting all organs and systems. This may first appear as a foot infection or a wound that has a prolonged healing time. Diabetics may get frequent and suffer longer from influenza, pneumonia, bronchitis, and common colds (ADA, 2020).

Diabetes Self-Management

Self-management behaviors play a significant role in Types 1 and 2 diabetes. Self-management refers to effective choices made to maintain well-being that can alleviate the progression of diabetes and improve quality of life (ADA, 2020). Diabetes self-management behaviors are essential to keep blood glucose levels under control and include medication, and/or insulin adherence, diet, exercise, decreasing stress, monitoring blood sugars, quitting smoking, keeping blood pressure and cholesterol within normal range, and keeping doctor appointments (ADA, 2020). Shrivastava (2013) supported the idea that good self-management behavior can reduce the risk of complications and can result in controlled diabetes. Ernawati et al. (2021) recently conducted a systematic

review of the literature on Type 2 diabetes self-management, education, and intervention effectiveness. The review indicated that lifestyle changes associated with diabetes self-management are integral to longevity, as the diabetic oversees the management of this disease themselves. This review focused on self-management of meal planning, changes in lifestyle, and physical activity habits. Ernawati et al. (2021) stated many healthcare providers who treat diabetes have limited expectations in their own ability to be successful practitioners when it comes to this disease because successful treatment lies within the patient's own self-management. However, diabetes educators and social workers play a significant role in supporting the patient with self-management and educational interventions. The literature reviewed showed significant improvement in self-management when diabetes education was added to the regimen. Medication and instructions alone are limited in controlling glucose levels. Attitude, beliefs, knowledge, health literacy, financial resources, treatment of co-morbidities, and social support also play a crucial role in the disease progression (Ernawati et al., 2021).

Rasoul et al. (2019) examined diabetic patients referred to a diabetes clinic in 2018 through 2019 to see if web-based, self-management education would improve overall glucose control. The terms self-management and treatment can be used interchangeably as the diabetic alone controls almost everything about the disease, e.g., when and what to eat, when and how much medication or insulin to take, when and if they exercise, and many other factors. In other words, the individual is responsible for the successful treatment of their own disease. The study suggested that web-based applications on self-management can encourage individuals and increase the quality of

life of diabetic patients. In addition, there was a positive psychological and clinical effect, including self-management of HbA1c and weight, using the web-based application. The role of social media in diabetes education can play a necessary role by improving skills in self-management and by creating a forum for sharing experiences with other diabetics. These self-care activities and behaviors are necessary to successfully manage the disease (Rasoul et al., 2019). Diabetes self-management includes adhering to recommended medications and/or insulin dosing. The type of medication depends on the type of diabetes and how well blood glucose is controlled. With Type 1 diabetes, insulin must be taken up to several times a day as the body no longer makes this hormone. People with Type 2 diabetes usually can manage their diabetes by making good nutritional choices and by engaging in daily physical activity. Although some Type 2 diabetics do need medications or insulin, balancing nutrition with physical activity can maintain blood glucose levels in an acceptable range (ADA, 2020). Because many diabetics do not know the difference between healthy and unhealthy food, carbohydrates and sugars, and starchy vegetables and non-starchy vegetables, diabetes education is important. It is important to eat a variety of healthy foods like vegetables, fruits, whole grains, lean protein, and dairy that is nonfat or low fat. Diabetics should limit fried foods and foods high in sodium, sweets, and beverages with added sugars; they should drink water and consider using a sugar substitute in coffee or tea. Alcohol should be consumed in moderation (Rasoul et al., 2019). Physical activity has many health benefits related to managing diabetes; it burns extra calories so you can keep weight down if needed. Durai et al. (2021) conducted a hospital-based cross-sectional study of overweight adults with Types 1 and 2

diabetes who ate fewer calories and engaged in physical activity more frequently. Those diabetics had greater long-term health benefits compared to those who did not make those physical activity and nutritional changes, benefits including improved cholesterol levels, less sleep apnea, and the ability to move around more easily. Daily activity was associated with improved blood flow, which lowered blood pressure and cholesterol, reduced depression symptoms, and improved mood (Durai et al., 2021). Monitoring glucose is the basis for achieving optimum control of this disease. Blood sugar levels provide information that allows for guiding adjustments in diet, exercise, and medication. A 3-month blood test called A1C (i.e., glycated hemoglobin) measures the percentage of sugar attached to the blood's hemoglobin protein. The A1C test result gives a measure of how well the body has controlled the amount of sugar in the blood over the past three months. Ideally this number should be under 5.5 for people without diabetes and under 7 is an indication of controlled diabetes (Durai et al., 2021).

The ADA (2020) recommends a daily self-management regimen of foot care. People with diabetes may have problems with their feet because of poor blood flow and nerve damage that can result from high blood glucose levels. If an infection does not resolve with treatment, the toes, foot, or part of the leg may need to be amputated to save a life. With daily checking, diabetics can identify problems early and get treated immediately. Podiatrists recommend checking feet for cuts, redness, swelling, sores, blisters, corns, calluses, and any skin changes and they should never go barefoot. In addition, diabetics should see a podiatrist every year to check blood flow and signs of nerve damage.

Smoking cessation can help prevent many other health problems that can occur with diabetes. Tobacco products can make diabetes problems worse (Spratt et al., 2009). Smoking restricts the blood flow to organs and extremities making heart disease, lung disease, and amputations more likely (ADA, 2020). Diabetics need to see an eye doctor and get yearly dilated eye exams. In this exam, eye drops are added to the eyes to make the pupils larger, helping to see inside the eyes to look for signs of diabetic retinopathy that can be a complication of diabetes. Diabetic retinopathy is caused by damage to the blood vessels in the retina by uncontrolled diabetes or elevated levels of glucose. Mild cases can be treated with successful diabetes self-management. Complex cases of diabetic retinopathy may require surgery (ADA, 2020).

Barriers to Self-Management

Shi (2020) used a descriptive qualitative method to collect data through telephone interviews that provided a description of diabetics' perceptions of barriers to diabetes self-management from the patient's perspective. The purpose of this study was to explore perceived barriers among Type 2 diabetes patients during isolation following their recovery from COVID-19. The findings identified new barriers such as comprehension and fear. Perceived barriers to self-management included difficulty with comprehension of COVID-19 and fear of its effects; diabetics became fearful of the future, employment status, finances, and insurance coverage. COVID-19 left people isolated, uninformed, and unmotivated to take care of themselves. Emotional, physical, and financial support was limited to who they lived with in isolation and nutrition and medication was what they had on hand or could afford to have brought to them. The price of diabetic medication

can be costly, and insulin can be unaffordable for some. Tasks like choosing the right kinds of food**,** measuring food, finding time to exercise, counting carbohydrates, monitoring glucose, lab visits, doctors' appointments, and weight management were often viewed more like chores and were time consuming. These obstacles can affect care, from not taking medication as prescribed, not adhering to a diet, and being in a state of denial. Family support played a role in maintaining a positive attitude when living in isolation and family was not allowed to visit. These challenges make decision-making related to self-management behaviors difficult, and the possibility of contracting Covid-19 again or living in isolation with COVID-19 added another layer of uncertainty (Shi et al., 2020).

Liu et al. (2017) examined diabetes stigma and its associated psychosocial impact as a self-management barrier in patients with Type 1 and Type 2 diabetes. Diabetes stigma refers to the experiences of negative feelings such as exclusion, rejection, or blame due to the perceived stigmatization of having diabetes. The researchers used a qualitative method using an online survey sent to 12,000 diabetics. Open-ended responses were reviewed to identify key words and phrases that allowed for categorization into psychosocial themes. The majority of statements were placed into one category of best fit, with some statements that included multiple themes placed into more than one category. The results showed that Type 1 diabetes carried more stigma, with 83% reporting that being in public and having to administer insulin injections, using needles, or having a pump physically attached to the body was a source of embarrassment, especially for children and teenagers. Type 2 diabetes stigma was reported by 49% of the

sample who viewed diabetes as a result of being overweight, a character flaw. There were other perceived stigma-related issues, including lack of knowledge and laziness that were considered barriers to self-management (Liu et al., 2017). Many foods contain sugar and are disguised on the label as other words such as fructose. Just as medication labels can be confusing, food labels can be more difficult. When left to figure out labels on their own, especially with little education, it can be overwhelming and a barrier to self-management. Exercise can be daunting, embarrassing, and dangerous without guidance. Suffering from health problems and/or physical pain is likely to be a barrier to effective self-management behavior as it can re-prioritize the focus of care while ignoring the self-management of the disease (Liu et al., 2017).

Attempting to help health professionals achieve better health outcomes for diabetes patients, Adu et al. (2019) examined barriers to diabetes self-management with the potential to negatively influence patient self-efficacy. Barriers included lack of motivation, use of technological devices, frustration due to the constant care issues, financial burden, physician expectations, and environmental/work factors. The authors suggested that improved approaches to transportation-related difficulties, financial difficulties, and lack of accessible diabetes education are needed to prevent diabetes complications (Adu et al., 2019). Adherence to diabetes self-management is expected by physicians and yet it is a complicated set of behavior modifications that the patient is sent home with. The diabetic is expected to know how and when to make lifestyle changes including diet, exercise, medication, glucose monitoring, and checking feet daily. Some diabetics do not have the means or capabilities to follow the recommendations.

Adherence to these self-management activities has been found to be low, and physicians should not blame the patients when compliance is poor (Adu et al., 2019).

Shrivastava et al. (2013) conducted a diabetes self-management study with Type 2 diabetics and only 30% of the participants were found to be compliant with medication regimens. Non-compliance with medication was found to be even higher among lower socioeconomic groups of participants. Patients with diabetes can significantly reduce the chances of developing complications by adhering to medication, access to diabetes education, and spending more time with medical health professionals. In addition, these researchers suggested that to prevent diabetes-related costs, co-morbidities and mortalities, there is a need for improved self-management behaviors in several areas, including food choices, physical activity, medication adherence, and blood glucose monitoring. The role of self-management has to be emphasized and promoted by health care providers to empower the patient to take charge of their own health and health behaviors (Shrivastava et al., 2013).

Mulligan et al. (2017) looked at mental illness and diabetes self-management among 77 participants. The researchers wanted to identify barriers and enablers to effective diabetes self-management. Self-management for this study included taking medication, following a healthy diet, regular exercise, performing foot care, seeing their mental health provider, attending regular health checks with primary care, and self-monitoring of blood glucose levels. Of the participants who had a mental illness, 28% made a self-management plan, 40% reported getting mental health support, less than 50% managed their blood glucose, and over 90% ate what they wanted to, including

sweets and soda. The conclusion was that people with mental illness and diabetes experience poorer outcomes than those with diabetes alone and need additional support (Mulligan et al., 2017).

Childhood Trauma and Health

Childhood traumas include child experiences characterized by an intense event that threatens or causes harm to his or her emotional and physical well-being (Herman, 1992). Trauma can be the result of exposure to a natural disaster such as a hurricane or flood or to events such as war and terrorism. Trauma can also refer to witnessing or being the victim of violence, severe injury, or physical or sexual abuse (SAMHSA, 2022). One of every four children will experience a traumatic event before the age of 16 (SAMHSA, 2022). The biological response to trauma lies within the endocrine system and the adrenaline hormone (Sherin et al., 2011). Adrenaline allows us to flee a situation or fight for our lives. However, repeated traumas or abuse constantly release adrenaline at times when it is not needed. This constant release is what causes inflammation and sets the body up for chronic illness and disease (Sherin et al., 2011). Children who are exposed to traumatic life events are at significant risk for developing serious and long-lasting health conditions across multiple areas of development.

Karavanaki et al. (2014) reviewed literature to provide an overview of the association between adverse childhood experiences and risk for Type 1 diabetes. Twenty-two studies investigating adversity or exposure to war in childhood and 16 studies examining PTSD were examined to determine the extent to which trauma was a risk factor for developing Type I diabetes. The results indicated that abuse at home and school

significantly predicted increases in the diagnoses of Type 1 diabetes. In addition, when socioeconomic class was added, childhood adversity and PTSD increased within the lower socioeconomic participants. McNutt et al. (2002) also conducted a literature review that addressed the relationship between cumulative experiences of abuse and health behaviors. Two behaviors and two mental health conditions associated with cumulative abuse consistently emerged: smoking, drinking alcohol in excess, anxiety, and depression. In addition, when socioeconomic hardship was added, there was an increase in smoking, alcohol consumption, anxiety, and depression. Moreover, women who experienced domestic violence were three times more likely to exhibit the same behaviors and mental health conditions (McNutt et al., 2002).

Nygren et al. (2015) examined connections between trauma and immune system. Psychological trauma can influence the immune system and cause an inflammatory process including the development of Type 1 diabetes. The researchers found that traumatic events during the first 14 years of life increased the risk of Type 1 diabetes, even after considering family history for any form of diabetes (Nygren et al., 2015). Afifi et al. (2016) determined the extent to which child abuse was related to negative health outcomes in Canadian adults. The correlational study found that childhood trauma was associated with increased odds of having 9 of 13 chronic physical conditions in adulthood, one of them being diabetes. The other health conditions included asthma, arthritis, back problems high blood pressure, migraine headaches, chronic bronchitis/emphysema, and chronic obstructive pulmonary disease for participants that were aged 35 or older. The other diseases that emerged were diabetes, epilepsy, heart

disease, cancer, stroke, bowel disease, Crohn's disease, colitis, irritable bowel syndrome, and chronic fatigue syndrome. Egle et al. (2016) looked at a decade of long-term studies that examined sexual and emotional abuse in children to determine if those children were significantly more vulnerable to mental and physical disorders throughout life. The findings revealed that those who had suffered abuse had increased vulnerability to mental illness and chronic diseases such as cardiovascular disorders, Type 2 diabetes, hepatitis, and chronic obstructive pulmonary disease.

Spratt et al. (2009) examined links between cigarette smoking and severe child abuse among healthy individuals. Participants included 57 individuals without any formal mental health diagnoses. There were 26 men and 31 women with an average age of 36.6 years. Their traumas included witnessing a murder, being a prisoner of war or held hostage, combat exposure, victim of physical assault, being tied up or locked in a closet, victim of rape, and forced genital, oral, or anal intercourse. Gender was also included as a covariate. Contingency table and logistic regression analyses were used to examine the odds of nicotine use among participants with versus without a history of severe childhood abuse. The findings indicated that 80% of the abused participants started smoking before the age of 16. This study suggested that children who had been severely abused were four times more likely to smoke than those who had not been abused (Spratt et al., 2009).

Wegman and Stetler (2009) performed a quantitative meta-analysis comparing results from 24 studies including 48,801 individuals to examine the relationship between childhood abuse and physical health in adulthood. The authors concluded that childhood trauma raises the risk of frequent illnesses due to low immunity and autoimmune diseases

in adults, resulting from increased adrenalin and inflammation levels. The brain will adjust to the increase; however, this adaptation makes the body more susceptible to disease and illnesses over time (Wegman & Stetler, 2009).

Widom et al. (2012) examined the relationship between several types of childhood abuse and certain illnesses or disease in a 30-year study. These researchers followed documented cases of children who were physically abused, sexually abused, or neglected from ages 0-11, from 1967 to 2005; the study also included children of the same age during the same time period who were not abused. Both groups completed a medical examination, blood test for a multitude of health conditions, and an interview thirty years later. Widom et al. (2012) suggested that the study was able to match the individual's blood results with the individual's type of abuse. When more than one health consequence was detected in the blood sample, it was positively correlated with multiple types of abuse or maltreatment. For example, Hepatitis C was linked with sexual abuse. In addition, physical abuse and neglect predicted elevated levels of glucose (Widom et al., 2012).

Van Duin et al. (2019) examined the role of adverse childhood experiences in young male adults who exhibited problematic behaviors and those who did not. Compared to the general population, many young adults who exhibited problematic behavior often received mental health care during adolescence. These adolescents who are now adults were affected by both internalizing and externalizing emotions and related behaviors. A sample of 643 young adult men aged 18–27 years with multiple traumatic experiences in childhood demonstrated externalization of emotions like fighting,

violence, running away, school elopement, etc. These actions had harmful consequences including police involvement, family estrangement, and incarceration, or home placement. A single traumatic experience of emotional abuse or neglect was related to internalizing problems and internalization of emotions, usually displayed as anxiety or depression. (Van Duin et al., 2019).

Ford et al. (2014) examined the relationship between adverse childhood experiences and smoking behavior among 25,809 adult participants. Results showed that 59.4% of men and women reported at least one adverse childhood experience. More importantly, the prevalence for smoking increased as the adverse childhood experience scores increased. Each of the eight adverse childhood experiences measures was significantly associated with smoking status. The eight adversities were emotional, physical, and sexual abuse plus witness to domestic violence, substance abuse, mental illness, parental separation or divorce, or an incarcerated parent.

van der Kolk (2014) stated that traumatic stress is associated with functional and chemical changes in the part of the brain that is responsible for emotions. Some traumatic memories remain vivid and can cause panic and agitation in people with PTSD. Patients with PTSD are prone to develop risky behaviors, including alcoholism, substance abuse, or self-injury. Individuals with substance abuse are usually dealing with anxiety, depression, or post-traumatic stress disorder by themselves, and using substances that can be abused is one way of coping (van der Kolk., 2014). When trauma and substance use are present, suicidal ideations and sometimes homicidal ideations can occur because of ill-equipped emotional and behavioral skills needed to cope. Trauma victims may not

have the ability to regulate moods and emotional responses when they become adults. Co-occurring trauma and substance use, such as physical abuse and alcohol use, can impede personality development, potentially leading to increased psychopathology.

Bryant et al. (2010) determined the extent to which psychiatric disorders occurred after mild traumatic brain injury from physical abuse. The results indicated that about 12 months after injury, 31% of patients reported a psychiatric disorder, ranging from depression, generalized anxiety disorder, posttraumatic stress disorder, and agoraphobia. The patients that scored 4 or higher on the adverse childhood experience questionnaire were more likely to develop PTSD, panic disorder, social phobia, and agoraphobia, all with some level of functional impairment (Bryant et al., 2010).

Suglia et al. (2018) examined traumatic childhood events and the relationship with cardio-metabolic outcomes such as high blood pressure and elevated cholesterol levels in adults. The researchers concluded that those cardio-metabolic outcomes do not necessarily come from childhood trauma, per se, but rather from the stress that those traumatic events cause. That stress, as an adult, can induce elevated pressure levels. As with cholesterol, it is not the traumatic event that elevates the cholesterol, it is the increased rates of obesity and Type 2 diabetes, resulting from the childhood traumatic events that affect the cholesterol levels.

Adverse Childhood Experiences and Health

Felitti et al. (1998) was the first researcher to examine the link between adverse childhood experiences and a connection to later life illness and disease. His study examined exposure to 10 categories of potential emotionally traumatic events: emotional

neglect, physical neglect, emotional abuse, physical abuse, sexual abuse, parental mental illness, parental substance use, parental separation, familial violence, and parental incarceration. Childhood traumatic stress was linked to later increased risk of cardiovascular disease among adults with Type 1 diabetes. In addition, 12% of adults who scored a 4 or more on the ACE questionnaire reported Type 2 diabetes. More recently, the CDC (2020) reported that children who experience four or more ACE's are 10–12 times at greater risk for intravenous drug use and attempted suicide, 2–3 times at greater risk for developing heart disease and cancer, and 32 times more likely to have learning and behavioral problems (CDC, 2020).

Lukaschek et al. (2013) evaluated the association of PTSD and Type 2 diabetes in 2970 participants in Germany aged 31-87. The researchers found when traumatic experiences overwhelmed the bodies stress function, which included the central, peripheral, nervous, endocrine, and immunological systems, the overwhelming of the system played a significant role in the pathway from traumatic psychological stress to Type 2 diabetes. Moreover, negative behaviors like smoking, drinking, and poor nutrition provoke an inflammatory response from the body, increasing the risk for developing Type 2 diabetes. In addition, trauma-related stress and negative behaviors will negatively impact the course of diabetes over the diabetic's lifetime (Lukaschek et al., 2013). Danese et al. (2009) conducted a 32-year longitudinal study of a representative birth cohort examining specific biomarkers to determine if they were associated with distinct kinds of ACEs. During their first decade of life, participants were assessed for exposure to 3 adverse psychosocial experiences: socioeconomic disadvantage, maltreatment, and

social isolation. In addition, the study examined the extent to which adverse childhood experiences predicted a more clustered metabolic risk of disease in adults. They assessed high blood pressure, high cholesterol, obesity, elevated glucose levels, depression, anxiety, positive inflammatory markers, low immunity, and risk factors for age-related diseases such as COPD, diabetes, and heart disease. The results showed that higher levels of ACEs were significantly associated with higher metabolic risk for disease (Danese et al., 2009).Using a population-based survey, Nurius et al. (2013) examined the effects of ACEs on adult mental health within a social disadvantage framework. Participants were adults aged 18 years or older, using a random sampling method. The study showed a relationship between unhealthy behaviors, mental health, chronic illness, and disease and adverse childhood experiences, increasing when social disadvantage was added. Less education, resources, and income were associated with higher levels of ACEs (Nurius et al., 2013). Villodas et al. (2012) identified groups of youth with allegations of adverse childhood experiences during preschool, early, and late childhood to determine if there was a relationship to violence or aggression later in life. There was significant violence recorded in all three youth groups in the 20-year follow up, including a history of violent behavior, incarceration, assaults, and domestic violence (Villodas et al., 2012).

Hillis et al. (2004) examined the relationship between teen pregnancies and concurrent negative behaviors such as alcohol, drugs, smoking, school suspension, and high school dropout among teenage girls. It was concluded that the more adverse childhood experiences a female teenager had, the more chances of displaying negative behaviors while pregnant. These behaviors were responsible for a change in blame for

fetal death, from teenage pregnancy to adverse childhood experiences (Hillis et al., 2004).

Loudermilk et al. (2018) examined the association between alcohol consumption and ACEs. Both adult males and females of all levels of education took part in the study. Results showed that abused male college graduates were significantly more likely to consume alcohol compared to abused male high school graduates. Males were two times more likely to binge drink than females, and the impact of adverse childhood experiences combined with alcohol abuse, leave long term negative effects. Similarly, Leung (2016) examined the individual and cumulative effects of adverse childhood experiences on weekly alcohol consumption and found for every adverse childhood experience, alcohol consumption increased later in life by 1.45%.

Cheong et al. (2017) investigated associations between adverse childhood experiences and later-life depressive symptoms to determine if perceived social support (PSS) moderated that relationship. The participants were 2047 men and women aged 50-69 years. Self-reported measures included the ACE questionnaire, the PSS Social Support Scale, and the Center for Epidemiologic Studies Depression Scale CES-D. Results showed that the great number of adverse childhood experiences corelated with higher risk of later-life depression, anxiety, schizophrenia, and suicidal ideations, especially among those with limited finances and support. The odds of depressive symptoms were progressively higher among individuals who experienced a greater number of ACEs, and the symptoms persisted into older adulthood (Cheong et al., 2017).

Remigio-Baker et al. (2015) evaluated the ACEs-asthma and ACEs-COPD relationships to poor health factors such as smoking, binge drinking, and obesity among

women in Hawaii. The participants were 3363 women who self-reported ACEs. The researchers looked at the associations to asthma and COPD and found that for every adverse childhood experience, the probability for asthma increased by 7% and the probability of developing COPD increased by 21%. Adjustments for smoking, binge drinking, and BMI did not impact the ACE-asthma associations but decreased the ACE-COPD relationships by a minimal amount (Remigio-Baker et al., 2015).

Ports et al. (2019) conducted a literature review of 155 quantitative, peer-reviewed articles published between 2005 and 2015 that examined associations between ACEs and cancer risk factors, including alcohol, environmental carcinogens, chronic inflammation, sex hormones, immunosuppression, infectious agents, obesity, radiation, ultraviolet radiation, and tobacco, among adults living in the United States. The articles all included a measurement of ACEs before age 18 and measurement of cancer risk factors in adulthood. The overall results found that as the number of ACEs increased, so did the risk for obesity, heart disease, cancer, autoimmune disorders, and depression. Patients experienced a higher risk of diabetes if they reported at least 4 ACEs. The authors suggested that adverse childhood events affect the hypothalamic-pituitary adrenal, nervous, and immune system, setting it up for failure and causing numerous negative health outcomes that exacerbated both illness and disease. Childhood stress, arising from abuse, programs pro-inflammatory cell behaviors, causing an inflated cytokine response that manifests in impaired self-regulation or unhealthy lifestyle choices. This results in increased risk for chronic disease in adulthood. Exposure to adverse childhood experiences has been found to affect the immune system by

prolonging activation of the stress response system that increases cortisol production and damages the immune response; this depressed immune response increases overall illness and disease, including cancer risk (Ports et al., 2019).

One of the lesser-known diseases associated with adverse childhood experiences is lupus. Lupus is an inflammatory disease caused when the immune system attacks its own tissues, affecting the joints, skin, kidneys, blood cells, brain, heart, and lungs. The symptoms include fatigue, joint pain, rash, and fever. There is no cure for lupus, only lifestyle modifications and medications that include sun protection, diet, anti-inflammatories, and steroids (Mayo Clinic, 2020). DeQuattro et al. (2019) examined the prevalence of ACEs in patients with systemic lupus erythematosus. Findings showed a significant association between high overall ACE scores and patient-reported disease, illness, depression, and overall declining health status. Depression across the lifespan had been reported in those with high ACE exposure and lupus diagnosis. DeQuattro et al. (2019) noted that it is important to address trauma and ACEs early given that some diseases, e.g., lupus, are incurable.

Summary and Conclusions

The CDC (2022) reported that there were 37 million people in the United States that have diabetes. Total medical costs and lost work and wages for people with diagnosed diabetes is at $327 billion a year. Risk of early death for adults with diabetes is 60% higher than for adults without diabetes as there is higher risk of serious health complications. The most common types of diabetes are Type 1 and Type 2. Diabetes self-management can help diabetics manage their diabetes, prevent additional short or long-

term complications, reduce the number of emergency room or hospital visits, and prolong quality and quantity of life. Diabetes self-management is the single most important thing that Type 1, and Type 2 diabetics can do to take care of their health, yet many do not take part in this crucial activity.

Decades of research has suggested that childhood trauma and adverse childhood experiences inhibit optimal development in children and are associated with poorer health outcomes across their lifespan. Exposure to childhood trauma and adverse childhood experiences have been linked to negative health behaviors, illnesses, and disease. To date, no studies have examined the relationships among childhood trauma, adverse childhood experiences, and diabetes self-management among Type 1 and Type 2 diabetics. This study fills the gap and provides information to enhance treatment for self-management of Types 1 and 2 diabetes. Findings from this study prompts healthcare organizations to further study the relationship among childhood trauma, adverse childhood experiences, and diabetes self-management.

Chapter 3 describes the research design and rationale, the methodology, population, sampling, and sampling procedures, instrumentation, and data analysis plan that I used. In addition, threats to validity and ethical procedures are described.

Chapter 3: Research Method

The purpose of this study was to explore the extent to which type of diabetes, childhood trauma, and ACEs relate to diabetes self-management among adult diabetics between the ages of 21 and 65. Previous research explored the relationship between childhood trauma, ACEs, and health-related issues (health behavior, illness, and disease). However, childhood trauma and ACEs had not been investigated as potential predictors of components of diabetes self-management. In this chapter I explain the research design and rationale, population, sample and sampling procedures, procedures for recruitment, participation, and data collection, instrumentation and operationalization of constructs, data analysis plan, threats to validity, and ethical procedures.

Research Design and Rationale

This quantitative nonexperimental correlational study was conducted to examine the extent to which diabetes type (Type 1 and Type 2), childhood trauma (subscale scores of emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect, and a total childhood trauma score), and ACEs (total childhood adverse experiences score) predict components of diabetes self-management (subscale scores of physical activity, glucose management, dietary control, and health care use, and a total self-management score). The independent (predictor) variables included diabetes type (Type 1, Type 2), childhood trauma (subscale scores of emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, and a total childhood trauma score) and ACEs (total adverse childhood experiences score). The dependent (outcome) variables included components of diabetes self-management (subscales scores of glucose

management, dietary control, physical activity, health care use, and a total diabetes self-management score). A correlational design is consistent with the research that was needed to advance this type of knowledge due to its capability of examining relationships among the independent variables of type of diabetes, childhood trauma, ACEs, and the dependent variables of components of diabetes self-management that represent a sample at a given point in time. Correlation research is appropriate when consistent events appear simultaneously to see how they are related or to investigate characteristics, averages, trends, and associations between variables (Simon, 2010).

Standard multiple regression analyses were used to assess the relative strength of type of diabetes, childhood trauma, and adverse childhood experiences in predicting components of diabetes self-management. There were five outcome variables related to diabetes self-management: glucose management, dietary control, physical activity, healthcare use, and total self-management score. Thus, five separate multiple regression analyses were conducted.

Methodology

Population

According to the CDC (2020), there were 331.45 million people in the United States in 2018, and 37 million of them had diabetes. The percentage of Americans that have diabetes has gone from 6% in 2000 to almost 10% in 2018. Type 1 diabetes accounts for 5 to 10% of the diabetic population, and Type 2 diabetics are the remaining 90 to 95%. Diabetes diagnoses has almost doubled and so have related health care costs (CDC, 2020).

Sampling and Sampling Procedures

Participants were recruited via Survey Monkey. Survey Monkey is a recruiting service with a nominal fee for participating in research studies. The inclusion criteria for participation included (a) 21 years to 65 years of age, (b) diagnosed with Type 1 or Type 2 diabetes for over 1 year, and (c) participants were not in a hospital or hospice setting. The age range of 21 to 65 years was selected because Type 1 diabetes is typically diagnosed in early teens, whereas Type 2 diabetes is typically diagnosed in adulthood with the average age of diagnosis being 45 years of age (CDC, 2020). All ethnicities, races, and genders were included. Exclusion criteria included diabetics currently hospitalized or outside of the age range and any diabetics diagnosed with diabetes less than a year.

G*Power 3.0 software was used to calculate the recommended sample size for this study (Faul et al., 2009). The parameters for the power analysis included an alpha level of 0.05, 7 predictor variables, an anticipated effect size of 0.20, and statistical power of 0.95. In a recent study examining contemporary trauma (racial microaggressions and stressful life events) and diabetes self-management among Native Americans, Jolley (2020) reported medium to large effect sizes. The power analysis resulted in a recommended sample size of 117.

Procedures for Recruitment, Participation and Data Collection

Participants were recruited, and data were collected via Survey Monkey. The order of forms contained in the Survey Monkey were as follows: informed consent, the CTQ, the ACE-Q, and the DSMQ. A debriefing page was added at the end of the survey

explaining the purpose of the study. Minimal risk to the participants was expected in completion of the surveys, but they may have had a negative experience when recalling childhood traumas and ACEs. Participants were given two mental health resources described in the consent form and the debriefing page. If anyone had a negative experience, they were directed to contact Mental Health America and a National Mental Health Hotline, which is available 24/7 with information and referrals to local hotlines, testing centers, and counseling. This information was provided on the consent form and on the debriefing page for any participant that had an adverse experience taking the survey. All participants are able to get a copy of the results of the study by following a link that I provided. To ensure participant anonymity, a unique number was assigned to each participant within Survey Monkey.

Instrumentation and Operationalization of Constructs

Diabetes Self-Management Questionnaire

The DSMQ was used to measure glucose management, dietary control, physical activity, and healthcare use (Schmitt et al. 2013). The 16-item scale consisted of a total self-management score and four subscale scores. The glucose management subscale had five items (Items 1, 4, 6, 10, and 12). The dietary control subscale had four (Items 2, 5, 9, and 13). The physical activity subscale had three items (Items 8, 11, and 15). The health-care use subscale had three items (Items 3, 7, and 14). One item, Number 16, requested an overall rating of self-care and is included in the total score only. The participants responded to statements describing self-care activities related to self-management of diabetes over the last eight weeks and specified the extent to which each statement

applies. The participants responded to each item using a 4-point Likert scale ranging from *does not apply to me at all* (score 0) to *applies to me very much* (score 3). Examples of questions include "I check my blood sugar levels with care and attention" and "the food I choose to eat makes it easy to achieve optimal blood sugar levels."

Overall internal consistency (Cronbach's alpha) was good (0.84), and consistencies of the subscales were acceptable (GM: 0.77; DC: 0.77; PA: 0.76; HU: 0.60) (Schmitt et al., 2013). To measure validity, the DSMQ was compared with another instrument called the Summary of Diabetes Self-Care Activities (SDSCA). The SDSCA was commonly used as a self-management tool, but it has problems measuring depression in diabetes (Schmitt et al., 2013). The predictive power to measure glycemic control was considerably higher for the DSMQ and is the preferred tool to analyze self-reported behavioral issues associated with diabetes (Schmitt et al., 2016). The DSMQ is in the public domain and takes approximately 5 minutes to complete.

Childhood Trauma Questionnaire

Childhood trauma was measured by the CTQ-SF (Bernstein et al., 1994). The questionnaire includes 28 items, 25 of these items measure childhood trauma including five subscales of five items each: emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect. All five abuse and neglect subscales are sums of the responses using a 5-point Likert scale ranging from *never true* (score 1) to *always true* (score 5). An example item from the physical abuse subscale is "I experienced physical abuse as a child." Three of the 28 questions are used to measure denial or biases. The scale is still 1 to 5 but the last three answers of *sometimes true*, *very often true*, and

always true, are not counted in the total score because they suggest the possibility of underreporting child abuse or false negatives. Only the highest positive scores 4 and 5 were counted. If someone scored a 1, 2, or 3 on these specific three questions it does not mean the entire form was negated. These questions were just not counted in the total. The CTQ-SF is a valid self-report to use for childhood maltreatment on age 14 years of age and older, and the short form of the Childhood Trauma Questionnaire (CTQ-SF); is one of the most widely used scales of measurement of childhood trauma (Bernstein & Fink, 1998; Bernstein et al., 2003).The test-retest reliability of the CTQ-SF was measured in a clinical population (n=40). The retests were conducted after 1.6 to 5.6 months with a mean of 3.6 months, and showed high test-retest correlations for all subscales ranging from .79 to .86 (Bernstein & Fink, 1998). Test-retest reliability was confirmed in three other independent studies with different populations (Hagborg et al., 2022). Reliability for the CTQ is good with high internal consistency scores (Bernstein et al., 1994, Fink et al., 1995). Bernstein et al. (1994) reported that sexual abuse, emotional neglect, emotional abuse, physical abuse had alpha coefficients of .93-.95, .88-92, .84-.89, and .81-.86, respectively. In addition, Bernstein et al. (1994) found a test-retest correlation of close to 0.80. Factor analysis on the five-factor CTQ model showed structural invariance which demonstrate good construct validity. In addition, the psychometric assessment of the CTQ–SF was determined by assessing the association of CTQ–SF scales with analogous Childhood Trauma Interview (CTI) scales by Spearman's rank order correlation coefficients and convergent validity between CTQ subscales and assessments based on CTI (Bernstein et al., 1994, Fink et al., 1995). The correlation between the CTI

and the CTQ were significant in adults with and without the DSM-5 mental health diagnoses demonstrating reliability. The short form of the CTQ takes no more than 5 to 10 minutes to complete (Bernstein & Fink, 1998). This survey is copyrighted by Pearson, and I purchased the rights to use the instrument for research purposes, (see appendix A).

Adverse Childhood Experience Questionnaire

The Adverse Childhood Experiences (ACEs) Questionnaire (Felitti et al., 1998) is a 10-item measure used to measure childhood adversity. The questionnaire assesses 10 types of childhood adversity including abuse and neglect. The types of personal adverse experiences include physical abuse, verbal abuse, sexual abuse, physical neglect, and emotional neglect. The other five adverse experiences are related to other family members and include a parent who's an alcoholic, a family member who's a victim of domestic violence, a family member in jail, a family member diagnosed with a mental illness, or the absence of a parent through divorce, death or abandonment. Example items include, "before the age of 18 did your parents get a divorce (yes or no)?" Before the age of 18 did one of your parents go to prison (yes or no)?" There are 10 yes or no questions. A point was scored for each item that is answered "yes." The ACE questionnaire provides a total score with a possibility of a cumulative score of 10 points, 1 point for each question.

Bethell et al. (2017) evaluated the psychometric properties ACEs measure. The ACE questions included the list of ACEs used in the original CDC/Kaiser adult ACEs study, with modifications that were evaluated using standard cognitive interviewing-based survey item testing through the CDC's National Center for Health Statistics

(NCHS). The NSCH-ACEs items were worded to minimize under-reporting associated with social desirability bias. The NSCH confirmed content validity and did not result in recommended modifications to the NSCH-ACEs items. The NSCH surveyed a representative sample of 95,677 children ages 0 to 17 years old. Despite the extensive distribution and use of the ACE questionnaire, to date there has been only one article published about its psychometric properties. Zanotti et al (2022) examined the test–retest reliability of the ACE questionnaire over a one-year period in a sample of 141 college athletes. The Pearson correlation was calculated and a modest test–retest coefficient was found, $r = .71$, $p < .001$. Household dysfunction items demonstrated a higher stability coefficient, $r = .65$, $p < .001$, than did abuse and neglect items which resulted in $r = .52$, $p < .001$. According to the CDC (2020), the ACE questionnaire takes no more than 5 minutes to complete. The ACE questionnaire was available in the public domain and free to use. I received permission to use this form from the CDC (see Appendix B).

Data Analysis Plan

The data was analyzed using the Statistical Package for the Social Sciences (SPSS) 28.0 program. I did a basic cleaning of the data looking for missing data, or respondents that may have unintentionally or intentionally left an item unanswered. In addition, I looked for outliers. Survey Monkey had the ability to filter respondents that straight-lined answers, meaning choosing the same answer all through the survey, giving it little to no thought, and these were rejected.

Research Questions and Hypotheses

RQ 1: To what extent does type of diabetes (Type 1 and Type 2), childhood trauma (as

measured by the Childhood Trauma Questionnaire-Short Form –CTQ-SF), and adverse childhood experiences (as measured by Adverse Childhood Experiences Questionnaire - ACE-Q) relate to diabetes self-management (physical activity subscale score), as measured by the Diabetes Self-Management Questionnaire (DSMQ), while holding other predictors constant?

H_{01}: Type of diabetes, childhood trauma, and adverse childhood experiences do not significantly predict diabetes self-management (physical activity subscale score) while holding other predictors constant.

H_1: Type of diabetes, childhood trauma, and adverse childhood experiences do predict diabetes self-management (physical activity subscale score) while holding other predictors constant.

RQ 2: To what extent does type of diabetes (Type 1 and Type 2), childhood trauma (as measured by the Childhood Trauma Questionnaire-Short Form - CTQ-SF), and adverse childhood experiences (as measured by Adverse Childhood Experiences Questionnaire - ACE-Q) relate to diabetes self-management (dietary control subscale score), as measured by the Diabetes Self-Management Questionnaire (DSMQ), while holding other predictors constant?

H_{02}: Type of diabetes, childhood trauma and adverse childhood experiences do not significantly predict diabetes self-management (dietary control subscale score) while holding other predictors constant.

H_2: Type of diabetes, childhood trauma and adverse childhood experiences do predict diabetes self-management (dietary control subscale score) while holding

other predictors constant.

RQ 3: To what extent does type of diabetes (Type 1 and Type 2), childhood trauma (as measured by the Childhood Trauma Questionnaire-Short Form - CTQ-SF), and adverse childhood experiences (as measured by Adverse Childhood Experiences Questionnaire - ACE-Q) relate to diabetes self-management (glucose management subscale score), as measured by the Diabetes Self-Management Questionnaire (DSMQ), while holding other predictors constant?

$H_{03:}$ Type of diabetes, childhood trauma, and adverse childhood experiences do not significantly predict diabetes self-management (glucose management subscale score) while holding other predictors constant.

H_3: Type of diabetes, childhood trauma, and adverse childhood experiences do predict diabetes self-management (glucose management subscale score) while holding other predictors constant.

RQ 4: To what extent does type of diabetes (Type 1 and Type 2), childhood trauma (as measured by the Childhood Trauma Questionnaire-Short Form - CTQ-SF), and adverse childhood experiences (as measured by Adverse Childhood Experiences Questionnaire - ACE-Q) relate to diabetes self-management (healthcare use subscale score), as measured by the Diabetes Self-Management Questionnaire (DSMQ), while holding other predictors constant?

H_{04}: Type of diabetes, childhood trauma, and adverse childhood experiences do not significantly predict diabetes self-management (healthcare use subscale score) while holding other predictors constant.

H_4: Type of diabetes, childhood trauma, and adverse childhood experiences do predict diabetes self-management (healthcare use subscale score) while holding other predictors constant.

RQ 5: To what extent does type of diabetes (Type 1 and Type 2), childhood trauma (as measured by the Childhood Trauma Questionnaire-Short Form - CTQ-SF), and adverse childhood experiences (as measured by Adverse Childhood Experiences Questionnaire - ACE-Q) relate to diabetes self-management (total self-management score), as measured by the Diabetes Self-Management Questionnaire (DSMQ) while holding other predictors constant?

H_{05}: Type of diabetes, childhood trauma and adverse childhood experiences do not significantly predict diabetes self-management (total self-management score) while holding other predictors constant.

H_5: Type of diabetes, childhood trauma and adverse childhood experiences do predict diabetes self-management (total self-management score) while holding other predictors constant.

I tested the following assumptions of multiple regression: normality, multicollinearity, lack autocorrelation, and homoscedasticity. Linearity was assessed by examining a scatterplot. Normality was assessed using Q-Q plots. Multicollinearity was assessed by examining variance inflation factor (VIF) values. Multicollinearity diagnostics were determined to ensure that the independent variables are independent of one another. A Durbin-Watson's *d* test was conducted to determine no autocorrelation. Lastly, homoscedasticity and independence of residuals were checked by examining a

scatterplot of the residuals. These tests of assumptions were performed prior to the multiple aggression analyses. The internal consistency was evaluated using Cronbach's coefficient alpha for the three instruments. There was 5 standard multiple regression analyses performed, one for each of the dependent variables of diabetes self-management (glucose management, dietary control, physical activity, healthcare use, and total self-management).

Threats to Validity

Internal validity refers to the degree of confidence that the causal relationship being tested is trustworthy and not influenced by other factors or variables. External validity is the generalizability of the findings in a study that are beyond the sample population (Creswell, 2014). Correlational studies typically have low internal validity because nothing is manipulated or controlled but they often have high external validity. Since no variables were manipulated or controlled, the results are more likely to reflect relationships in the real world (Sechrest, 2005). Another factor that is unknown and could present a threat to internal validity may be the attitude of a family member that could influence or discourage truthful participation in the study due to thoughts of exposing personal family information (Sechrest, 2005). In addition, Mulligan et al. (2017) mentioned mental illness as a barrier to glycemic control; however, this could be a validity issue with false reporting or underreporting. Moffitt et al. (2009) linked heart disease, elevated cholesterol, clustered metabolic risk, childhood abuse, and risk of diabetes, potentially leading to comorbidities that increase severity of disease. Both mental illness and comorbidities may lead to severity of disease and threaten the validity

of the study.

Ethical Procedures

Ethical procedures included an informed consent for participants emphasizing their ability to withdraw from participation at any time without repercussions. Minimal risk to the participants was expected in completion of the surveys, but there may have been minor discomforts when recollecting childhood trauma and adversities. Participants were given two mental health resources described in the consent form and the debriefing page. If any participant had a negative experience, they were directed to Mental Health America and a National Mental Health Hotline: http://www.mentalhealthamerica.net (1-800-969-6642); the National hotline at 1-800-232-4636, which is available 24/7 with information and referrals to local hotlines, testing centers, and counseling. To ensure anonymity a unique number associated with Survey Monkey was assigned to participants. Data will be stored for a period of five years on my personal password protected computer.

Summary

A nonexperimental correlational design examined the relationships among the independent variables of diabetes type, childhood trauma, and adverse childhood experiences, and the dependent variables of diabetes self-management. Standard multiple regression analyses was used to determine the relative strength of type of diabetes, childhood trauma, and adverse childhood experiences in predicting diabetes self-management. There were five outcome variables related to diabetes self-management: glucose management, dietary control, physical activity, healthcare use, and total self-

management score. Thus, five separate multiple regression analyses were conducted. In Chapter 4, I introduce details concerning data collection efforts and the results from using the multiple regression analyses.

Chapter 4: Results

The purpose of this study was to examine the extent to which type of diabetes (Type 1 and Type 2), childhood trauma (physical abuse, physical neglect, emotional abuse, emotional neglect, sexual abuse), and ACEs predicted diabetes self-management (glucose management, dietary control, physical activity, health care use, total self-management). Childhood trauma was measured with the CTQ-SF **(**Bernstein et al.,1994), ACEs were measured by the ACE-Q (Felitti et al., 1998), and adult diabetes self-management was measured by the DSMQ (Schmitt et al., 2016). Five multiple regression analyses were used to answer the research questions focused on the relationship between type of diabetes, childhood trauma, and ACEs and physical activity, diet, glucose management, health care use, and total self-management. The remaining sections of Chapter 4 include data collection procedures, summary of demographic data for the sample, followed by a discussion of the statistical assumptions and the results of the multiple regression analyses.

Data Collection

After approval from the IRB at Walden University, data collection began on February 6, 2023 at 7:00am and ended on February 9, 2023 at 5:00pm via Survey Monkey. I could not calculate the response rate for this study. There were 191 individuals who were interested in completing the survey; however, 130 participants finished the survey with no missing data or outliers. Demographic data included type of diabetes, age group, gender, and ethnicity. There were 64 Type 1 diabetics that completed the survey (N = 64, 48%), and 66 Type 2 diabetics who completed the survey (N = 66, 52%). Most

of the participants were male (*N* = 76, 58.5%). The participants varied by age groups, with most being 35-44-year-olds (*N* = 37, 28.5%). The participants varied by ethnicity, with most being White (*N* = 93, 71.5%). Table 1 provides a demographic summary for type of diabetes, age groups, gender, and ethnicity.

Table 1

Frequency Table for Type of Diabetes Age Groups Ethnicity and Gender

Demographic Variables	*n*	%
Diabetes Type		
Type 1	64	48
Type 2	66	52
Age Groups		
21 – 24 years old	10	7.7
25 – 34 years old	26	20
35 – 44 years old	37	28.5
45 – 54 years old	29	22.3
55 –64 years old	23	17.7
65 years old	5	3.8
Ethnicity		
White	93	71.5
Black	6	4.6
Hispanic	7	5.4
Asian	15	11.5
Mixed Race/Other	9	6.9
Gender		
Male	76	58.5
Female	53	40.8
Other	1	.08
Total (N = 130)	130	100

There may be limits in generalizing the results to all diabetics due to not using a random sample. The diabetics who volunteered to participate were in a pool of participants with specific health conditions and were paid a nominal fee to fill surveys out by Survey Monkey. In addition, the average time it took participants to complete the survey was 8 minutes. This may indicate that little effort or thought was given to reading and responding to the questions.

Results

Descriptive Statistics

One hundred and thirty diabetic participants were included in this study. Means and standard deviations were calculated for the predictor variables related to diabetes self-management. Trauma subscale scores ranged from a minimum of 5 to a maximum of 25 for physical abuse, emotional abuse, physical neglect, emotion neglect, and sexual abuse. In addition, the total ACE score had a minimum score of 0 and a maximum score of 10 (M = 7.11, SD = 2.93). Table 2 provides the means and standard deviations for the predictor variables.

Table 2

Means and Standard Deviations for the Predictor Variables

Predictor Variables	*M*	*SD*
Childhood Trauma Questionnaire		
Physical abuse	9.12	4.61
Physical neglect	8.57	3.85
Emotional abuse	11.1	5.38
Emotional neglect	11.9	5.07
Sexual abuse	8.62	5.60
Total ACE score	7.11	2.93

Means and standard deviations were also calculated for the outcome variables

related to diabetes self-management, which included health care use, glucose management, physical activity, dietary control, and an overall total self-management score. Table 3 provides the means and standard deviations for the outcome variables.

Table 3

Means and Standard Deviations for the Outcome Variables Related to Components of Diabetes Self-Management

Components of Diabetes Self-Management	*M*	*SD*
Healthcare Use	6.55	2.06
Glucose Management	9.42	3.38
Physical Activity	5.21	1.99
Dietary Control	5.72	2.10
Total Self-Management Score	25.6	6.93

Evaluation of Statistical Assumptions

I examined the values for skewness and kurtosis to determine data distribution differences versus normal data distribution. For medium-sized samples $n = 130$, which corresponds with an alpha level 0.05, the skewness value of a normal distribution is 0, implying symmetric distribution. Outside the normal range is an absolute skewness value > 2, or less than, or equal to -2. When the kurtosis is > 3 or less than or equal to -3, then the variable's distribution is not (Field, 2013). The Kolmogorov–Smirnov test was conducted to test for normality, and the results of the tests indicated that the data for each variable was significant, suggesting nonnormal distributions. However, Williams et al. (2013) noted that multiple regression analyses is a robust test and permitted when variables are not normally distributed as long as there are normal distributed errors. Therefore, the data were considered to have met the requirement of normality required to use parametric analysis. Table 4 presents the results of the Kolmogorov-Smirnov test for

normality, skewness, and kurtosis.

Table 4

Normality Testing for Study Variables

Variables	Statistic[a]	*df*	*p*	Skewness	Kurtosis
Childhood Trauma					
Physical Abuse	.223	130	<.001	1.212	.697
Physical Neglect	.189	130	<.001	.103	.596
Emotional Abuse	.137	130	<.001	.636	-.482
Emotional Neglect	.121	130	<.001	.572	-.339
Sexual Abuse	.318	130	<.001	1.439	.908
Total ACE Score	.171	130	<.001	-.878	-.269
Diabetes Self-Management					
Healthcare Use	.159	130	<.001	-.504	-.559
Glucose Management	.109	130	<.001	.136	-.171
Physical Activity	.120	130	<.001	-.334	.018
Dietary Control	.127	130	<.001	-.086	.207
Total Self-Management	0.73	130	.087	-.040	.002

a. Kolmogorov-Smirnov test of normality

Assumptions for standard multiple regression were tested (i.e., multicollinearity, normality, homoscedasticity, and independence of residuals). Multicollinearity was assessed by examining the variance inflation factor (VIF). The VIF values were below ten, and tolerance scores were not lower than 0.1. Therefore, the assumption of multicollinearity was met. The VIF scores and tolerance scores of the predictor variables are shown in Table 5.

Table 5

Multicollinearity Predictor Variables for Diabetes Self-Management

Predictor Variables	VIF	Tolerance
Physical Abuse	.375	2.68
Physical Neglect	.369	2.52
Emotional Abuse	.290	3.45
Emotional Neglect	.440	2.27
Sexual Abuse	.484	2.06
Total ACE Score	.303	3.30

Type of Diabetes	.961	1.04

To assess homoscedasticity between the independent and dependent variables, I examined scatterplots. The linearity assumption and homoscedasticity showed that the error is constant along the values of the dependent variables. The scatterplots for all variables demonstrate data points are close to or on the line for each variable. Therefore, the assumption of homoscedasticity was met. The following graphs present the residual scatterplots for homoscedasticity for each of the independent variables.

Figure 1

Scatterplot for Glucose Subscale

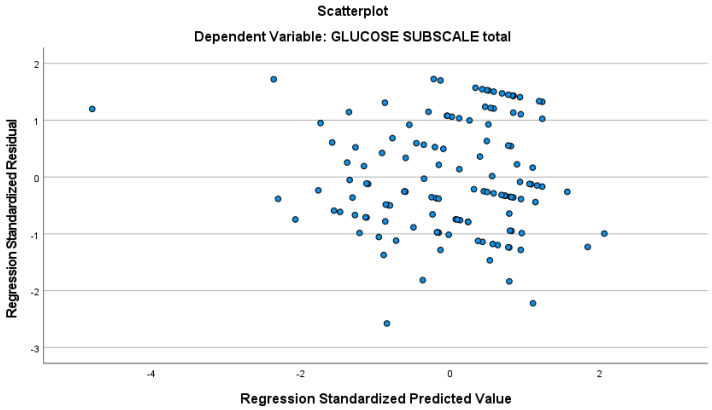


Figure 2

Scatterplot for Diet Subscale

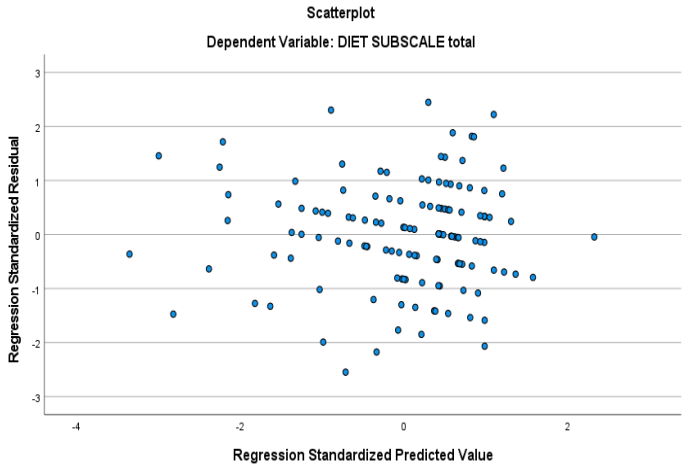


Figure 3

Scatterplot for Health Care Use Subscale

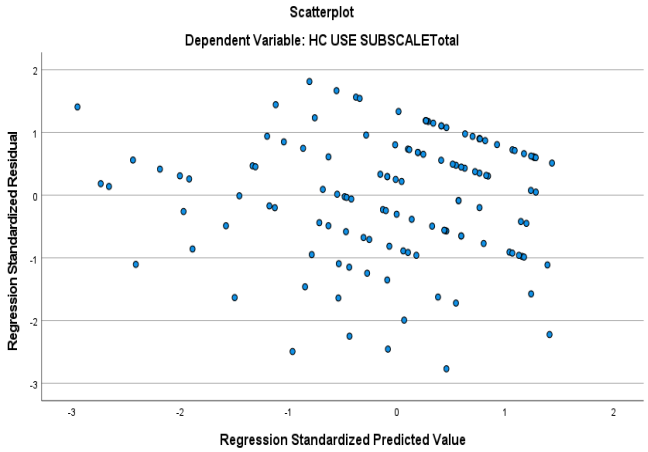


Figure 4

Scatterplot for Physical Activity Subscale

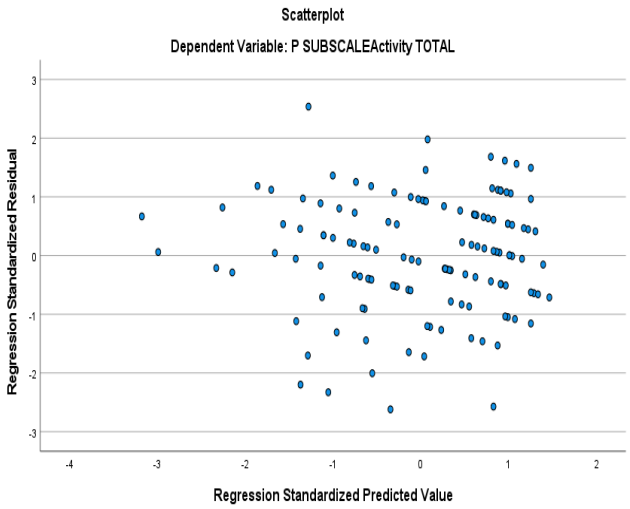
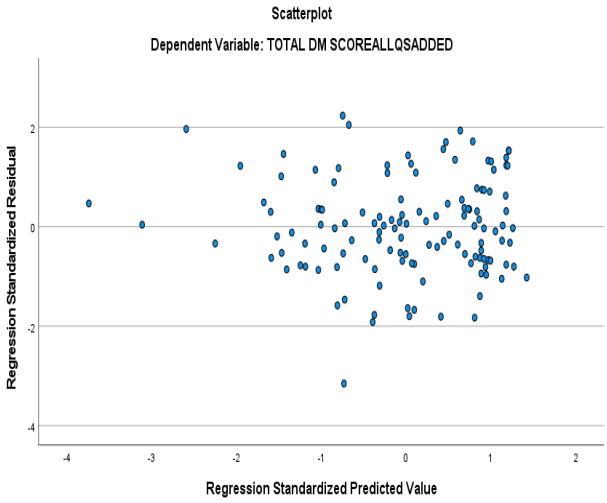


Figure 5

Scatterplot for Total Score



Cronbach's alpha was measured for internal consistency. A reliability coefficient of .70 or higher is considered acceptable (Greg & Mallory, 2003). Cronbach's alpha for childhood trauma subscale and the total ACE score were above .70, showing acceptable

internal consistency ranging from .797 for physical neglect to .956 for sexual abuse. In addition, I calculated Cronbach's alpha for each of the subscale scores for diabetes self-management. Alpha scores ranged from .285 for dietary control to .589 for glucose management. However, total diabetes self-management Cronbach's alpha was .768 showing acceptable internal consistency as shown in Table 6.

Table 6

Cronbach's Alpha for DSMQ, ACE-Q, and CTQ-SF

Variables	Cronbach's alpha
Diabetes Self-Management	
Physical Activity	.406
Glucose Management	.589
Healthcare Use	.394
Dietary Control	.285
Total Self-Management	.768
Total Ace Score	.854
Childhood Trauma	
Physical Abuse	.879
Physical Neglect	.797
Emotional Abuse	.896
Emotional Neglect	.835
Sexual Abuse	.956

Standard Multiple Regression Analyses

Predicting Total Self-Management

The first research question explored the extent to which diabetes type, physical abuse, physical neglect, emotional abuse, emotional neglect, sexual abuse, and adverse childhood experiences predict diabetes total self-management. The results showed that the overall regression model was significant, $F(7,122) = 3.527$, $p < .002$, $R^2 = .168$. The results showed that there were two significant predictors of total self-management scores: the physical neglect score ($p = .013$) and the emotional abuse score ($p = .028$). Therefore,

the null hypothesis was rejected. Physical neglect was significant and negative in predicting overall self-management (b = -.596, β = -.331, p = .013). On average, for every one-unit increase in the physical neglect score, there was a decrease of -.331 in the total self-management score. In addition, emotional abuse was significant and negative in predicting overall self-management (b = -.440, β = -.341, p = .028). On average, for every one-unit increase in the emotional abuse score, the total self-management score decreased by -.341. Table 7 presents the regression coefficients for all the predictors.

Table 7

Regression Coefficients for all Predictors

Predictor Variables	*b*	*SE*	β	*t*	*p*
Diabetes Type	.091	1.164	.007	.078	.938
Physical Abuse	.142	.203	.095	.701	.485
Physical Neglect	-.596	.236	-.331	-2.524	.013
Emotional Abuse	-.440	.198	-.341	-2.225	.028
Emotional Neglect	.210	.170	.153	1.231	.221
Sexual Abuse	.025	.147	.020	.169	.866
Total ACE Score	-.047	.355	-.020	-.131	.896

Predicting Glucose Management

The second research question explored the extent to which diabetes type, physical abuse, physical neglect, emotional abuse, emotional neglect, sexual abuse, and adverse childhood experiences predict glucose management. The results showed that the overall regression model was not significant, $F(7,122) = 1.407$, $p < .208$, $R^2 = .075$. The results showed that the only significant predictor of glucose management was physical neglect (p = .028). Physical neglect was significant and negative in predicting glucose management (b = -.270, β = -.307, p = .028). Therefore, the null hypothesis was rejected. As physical

neglect increased, glucose management decreased. On average, for every one-unit increase in physical neglect there was -.307 decrease in glucose management scores. Table 8 presents the regression coefficients for all the predictors.

Table 8

Standard and Unstandardized Regression Coefficients for Independent Variables Predicting Glucose Management

Predictor Variables	*b*	*SE*	β	*t*	*p*
Diabetes Type	-.012	.600	-.002	-.020	.984
Physical Abuse	.145	.105	.198	1.39	.167
Physical Neglect	-.270	.122	-.307	-2.21	.028
Emotional Abuse	-.096	.102	-.153	-.947	.345
Emotional Neglect	.013	.088	.019	.143	.886
Sexual Abuse	-.032	.076	-.053	-.426	.671
Total ACE Score	-.092	.183	-.080	-.503	.616

Predicting Dietary Control

The third research question explored the extent to which diabetes type, physical abuse, physical neglect, emotional abuse, emotional neglect, sexual abuse, and adverse childhood experiences predict dietary control. The result showed that the overall regression model was not significant in predicting dietary control, $F(7,122) = 1.469$, $p = .185$, $R^2 = .078$. Therefore, I failed to reject the null. Table 9 presents the regression coefficients for all the predictors.

Table 9

Standard and Unstandardized Regression Coefficients for Independent Variables Predicting Dietary Control

Predictor Variables	*b*	*SE*	β	*t*	*p*
Diabetes Type	-.328	.373	-.078	-.881	.380

Physical Abuse	.069	.065	.150	1.05	.293
Physical Neglect	.014	.076	.026	.189	.850
Emotional Abuse	.121	.063	-.308	-1.91	.058
Emotional Neglect	.001	.055	.002	.012	.990
Sexual Abuse	.073	.047	.194	1.55	.123
Total ACE Score	.093	.113	.129	.819	.414

Predicting Health Care Use

Research question four examined the extent to which diabetes type, physical abuse, physical neglect, emotional abuse, emotional neglect, sexual abuse, and adverse childhood experiences predict healthcare use. The results showed that the overall regression model was significant, $F(7,122) = 6.219$, $p < .001$, $R^2=.263$. The multiple regression showed that diabetes type and physical neglect were significant predictors of healthcare-use. Therefore, the null hypothesis was rejected. Diabetes type was statistically significant and positive in predicting healthcare use ($b = .707$, $\beta = .172$, $p = .032$) demonstrating that Type 2 diabetics used healthcare more frequently than Type 1 diabetics**.** In addition, physical neglect was statistically significant and negative in predicting healthcare use ($b = -.158$, $\beta = -.295.$, $p = .018$). On average, for every one-unit increase in the physical neglect scores, healthcare use decreased by -.295. Table 10 presents the regression coefficients for all the predictors.

Table 10

Standard and Unstandardized Regression Coefficients for Independent Variables Predicting Health Care Use

Predictor Variables	*b*	*SE*	β	*t*	*p*
Diabetes Type	.707	.326	.172	2.17	.032
Physical Abuse	-.026	.057	-.057	-.451	.653
Physical Neglect	-.158	.066	-.295	-2.38	.018
Emotional Abuse	-.072	.055	-.188	-1.30	.194

Emotional Neglect	.045	.048	.110	.935	.352
Sexual Abuse	-.016	.041	-.045	-.400	.690
Total ACE Score	.044	.099	.062	.439	.661

Predicting Physical Activity

The fifth research question explored the extent to which diabetes type, physical abuse, physical neglect, emotional abuse, emotional neglect, sexual abuse, and adverse childhood experiences predict physical activity. The results showed that the overall regression model was significant, $F(7,122) = 3.126$, $p < .005$, $R^2 = .152$. The multiple regression results showed that emotional abuse was the only significant predictor of physical activity. Emotional abuse was significant and negative in predicting physical activity ($b = -.139$, $\beta = -.375$, $p = .017$). Therefore, the null hypothesis was rejected. On average, for every one-unit increase in emotional abuse, there was a -.375 decrease in physical activity. Table 11 presents the regression coefficients for all of the predictors.

Table 11

Standard and Unstandardized Regression Coefficients for Independent Variables Predicting Physical Activity

Predictor Variables	*b*	*SE*	β	*t*	*p*
Diabetes Type	-.127	.337	-.032	-.377	.707
Physical Abuse	.063	.059	.145	1.06	.289
Physical Neglect	-.088	.068	-.171	-1.29	.199
Emotional Abuse	-.139	.057	-.375	-2.42	.017
Emotional Neglect	.051	.049	.130	1.03	.304
Sexual Abuse	-.021	.043	-.059	-.489	.626
Total ACE Score	.024	.103	.036	.238	.812

Summary

The results from the multiple regression analyses demonstrated that diabetes Type and the specific traumas of physical neglect and emotional abuse significantly predicted

different components of diabetes self-management including glucose management, physical activity, healthcare-use, and total diabetes self-management. The multiple regression analyses demonstrated that higher levels of physical neglect and emotional abuse predicted poorer overall total diabetes self-management. In addition, higher levels of physical neglect predicted poorer glucose management. Type 2 diabetics used healthcare more frequently than Type 1 diabetics. Finally, higher levels of emotional abuse predicted lower levels of physical activity. In Chapter 5, I interpret the findings in the context of Herman's (1992) contemporary trauma theory, discuss limitations, provide recommendations, and the implications for positive social change.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this study was to determine the extent to which type of diabetes, childhood trauma, and ACEs predict components of diabetes self-management. Childhood trauma and ACEs have been associated with negative behaviors, illness, and diseases such as diabetes (Egle et al., 2016; Loudermilk et al., 2018; Nygren et al., 2015; Ports et al., 2019; Suglia et al, 2018; Van Duin et al., 2019). However, previous research on potential barriers to self-management has not examined diabetes self-management from a trauma-theory perspective. Results from the multiple regression analyses demonstrated higher levels of physical neglect and emotional abuse resulted in poorer overall diabetes self-management. In addition, higher levels of physical neglect resulted in poorer glucose management. Diabetes type also predicted frequency of health care use, with Type 2 diabetics using healthcare more frequently than Type 1 diabetics. Higher levels of physical neglect predicted a decrease in the frequency in healthcare use. Finally, higher levels of emotional abuse predicted lower levels of physical activity.

Interpretation of Findings

Type of Diabetes

The current study found that Type 2 diabetics reported a higher level of health care use than Type 1 diabetics. This higher level of health care use may be related to the fact that Type 2 diabetics are usually obese and over the age of 40 when disease is first diagnosed (ADA, 2018). The accrual of medical issues leading up to diagnoses would lead to more frequent health care use. In addition, the usual age of onset is later in life and age-related conditions and illnesses have started making this a more complex disease

to treat, increasing health care use due to such complexities. Type 2 diabetics incurred $59 billion of the total cost of prescription medications and $3.6 billion of the total cost for equipment, resources, vision care, wound care supplies, hearing aids, artificial limbs, etc., and to be able to get these items diabetics must first see a physician, if not multiple specialty physicians. Obesity and age are often the main predictors of Type 2 diabetes and the co-morbidities that run concurrent with age and/or obesity include high blood pressure, high cholesterol, digestive issues, increased infection rates, gallstones, sleep apnea, many types of cancer, depression, anxiety, and chronic pain. These comorbidities may also explain the higher level of health care use among Type 2 diabetics (Casqueiro et al., 2012).

Type 1 diabetes is often diagnosed in childhood before comorbidities are acquired (ADA, 2018). Type 1 diabetes is often caught early and treated with insulin, which requires doctors' visits regularly. Regular visits reduce risks of getting sick, leads to detection of health conditions or diseases earlier, increases chances for treatment and cures, and limits risk of complications by closely monitoring existing conditions. In addition, children are typically more resilient and adapt to injections and the wearing of equipment rather easily, usually with parental guidance to monitor adherence. There is a difference between regular visits for preventive care (usually in childhood for Type 1 diabetics) and extensive health care use (usually in middle-age for adult Type 2 diabetes) due to the complexities of disease. Thus, the data on obesity, comorbidities, and health care costs associated with Type 2 diabetes may help explain the current finding that Type 2 diabetics reported a higher level of health care use than Type 1 diabetics.

Childhood Trauma

The measure of physical neglect in this study was defined as having to go hungry as a child, having no protection from harm, parents were too drunk or high to take care of the child, not having clean clothes to wear, and not having medical care on a regular basis or when needed. The current study found that higher levels of physical neglect predicted lower levels of total diabetes self-management, lower levels of glucose management, and less frequent health care use. Trauma is associated with functional and chemical changes in the part of the brain that is responsible for emotions (van der Kolk, 2014). Having mental health issues associated with trauma (e.g., depression, anxiety, or PTSD; Bryant et al., 2010; Cheong et al., 2017), victims may not have the ability to regulate moods or appropriate emotional responses sufficient to manage disease or illness in adulthood. Childhood trauma results in mental health issues (e.g., anxiety, depression, anxiety, PTSD, etc.) that negatively impacts health-promoting behavior (self-management of the disease; McNutt et al., 2002). This may include specific aspects of diabetes self-management.

A possible explanation for the results of the current study is that individuals in the sample who reported higher levels of physical neglect may have also been experiencing mental health issues (e.g., depression, anxiety, agoraphobia, PTSD, fear, etc.) associated with that type of trauma (i.e., physical neglect). These mental health issues may have created barriers to successful diabetes self-management. Mulligan et al. (2017) suggested that of the diabetics who have mental health issues, only 28% create a self-management plan, 40% report getting mental health support, less than 50% manage their blood

glucose, and over 90% eat what they want to regardless of medical recommendations. This implies that diabetics with mental health issues do not take care of themselves. Similarly, Jolley (2020) examined Type 2 diabetes self-management among American Indian/Alaska-Native adult women and found that higher levels of contemporary trauma (i.e., recent stressful life events and microaggressions) predicted poorer glucose management, less physical activity, less health care use, and poorer overall diabetes self-management. Meadows and Marsac (2020) also reported a case study in which a Type 1 diabetic who had experienced childhood trauma had a sharp increase in his blood glucose numbers as he was not counting carbohydrates, not testing his blood sugars, and only guessing at the amount of insulin he needed. The findings from the current study confirm and extend the existing knowledge regarding barriers to diabetes self-management involving traumatic experiences. The current study is unique in that the results demonstrated that early childhood trauma (i.e., physical neglect and emotional abuse) is associated with poorer diabetes self-management (i.e., less frequent health care use, poorer glucose management, and poorer overall diabetes self-management).

Higher levels of emotional abuse also predicted lower levels of physical activity. The measure of emotional abuse in this study was defined as name calling, hearing your parents say, "I wish you were never born," or your parents using insults like you are fat, lazy, or stupid, being left alone for long periods of time, and feeling like your parents hated you. Higher levels of emotional abuse in childhood have significantly predicted emotional, immune, and metabolic abnormalities that contribute to elevated risk for age-related disease such as Type 2 diabetes, depression, anxiety, high inflammation levels,

obesity, hypertension, high cholesterol, elevated blood sugars, and low oxygen levels (Danese et al., 2009). Afifi et al. (2016) suggested childhood trauma was associated with an increased chance of having 13 chronic illnesses and diseases in adulthood, including diabetes. These illnesses and diseases stem from a lifetime of poor coping mechanisms such as smoking, drinking, overeating and substance abuse. In addition, having chronic illnesses and diseases negatively impact mental health. Poor treatment outcomes are associated with vulnerability to mental health effects of adult stress in both men and women (Nurius, 2013). Childhood trauma may represent a general tendency to suffer from various types of psychopathologies that persist, which may also negatively impact diabetes self-management behavior. Previous research provides additional evidence that mental health issues associated with emotional abuse in childhood leads to the development of chronic disease and illness in adulthood and poorer self-management of those health problems. Thus, mental health issues may explain the current findings that childhood emotional abuse resulted in lower levels of physical activity and poorer overall diabetes self-management.

Childhood trauma predisposes the child to physical and mental health issues later in life including comorbidities (Herman, 1992). The basic sense of self is broken and leads to destruction of intrapersonal and interpersonal capacities (Courtois, 2008; Herman, 1992). My research extends this literature by demonstrating that higher levels of physical neglect and emotional abuse predicted poorer diabetes self-management (overall self-management, glucose management, healthcare use, and physical activity). The likely explanation for these results may be explained by contemporary trauma theory, which

describes the connection between childhood trauma and the development of mental and physical health comorbidities. These results will be discussed further in the context of Herman's (1992) contemporary trauma theory.

Adverse Childhood Experiences

The current study found that adverse childhood experiences (ACEs) did not predict any of the components of diabetes self-management. The ACE questionnaire measures feelings and or experiences related to childhood adversity. Example items include, "I often felt that people I lived with did not love me, look out for each other, feel close to each other, or were a source of strength and support," "Were your parents ever separated or divorced?" The scoring on the ACE questionnaire suggests that if someone has experienced four or more of the adverse childhood experiences listed, then these circumstances can affect the child's stress response and become predictors of disease (such as diabetes) later in life (Felitti et al.,1998). In the present study, ACEs did not predict diabetes self-management. It may be that the adverse childhood experiences on the ACE questionnaire do not reach the level of extreme childhood trauma (physical, emotional, and sexual abuse) that impact health-related self-management behaviors. In fact, contemporary trauma theory discusses the severity of childhood trauma and subsequent mental health issues and poor coping styles in adulthood (e.g., Cheong et al., 2017; Chou, 2012; Deschene et al., 2018; Herman, 1992; Suleiman, 2008). The Childhood Trauma Questionnaire-SF (Bernstein et al., 1994) was developed based on contemporary trauma theory and measures the most extreme forms of childhood abuse and neglect.

Interpretation of Findings in the Context of Herman's Theory

Herman's (1992) contemporary trauma theory is based on five central principles that affect functioning including dissociation, attachment, re-enactment, impairment of emotions, and long-term effects in adulthood. The current study evaluated the research questions based on Herman's contemporary trauma theory. The theory suggests that traumatic events interrupt normal development, predisposing trauma victims to poor coping mechanisms, illness, and disease, in addition to physical and mental health problems later in life. Thus, contemporary trauma theory related to my research problem as it offered the framework to understand the relationship between specific types of childhood trauma and components of diabetes self-management. Contemporary trauma theory suggests that there can be various long-term cognitive adjustments due to stressful experiences such as memory, planning, reasoning, and problem-solving. Multiple researchers, including Herman, have established connections between childhood trauma, emotional functioning, poor coping mechanisms, and mental health issues such as depression and anxiety (e.g., Cheong et al., 2017; Courtois & Ford, 2019; Deschene et al., 2018). The results in this study demonstrate that specific traumas (physical neglect and emotional abuse) were associated with poor diabetes self-management. Contemporary trauma theory offers a logical explanation for the relationship between childhood trauma and poor diabetes self-management found in the current study. It is likely that childhood physical neglect and emotional abuse predisposes individuals to develop mental health problems in adulthood. It is those mental health issues and poor coping mechanisms that may serve as significant barriers to health-promoting behaviors such as diabetes self-

management.

Contemporary trauma theory describes trauma as having lasting effects on the individual's functioning, and the Substance Abuse and Mental Health Services Administration (2012) states that trauma overwhelms the ordinary human's ability to adapt to life and have a sense of control. The loss of control and the inability to adapt from damage to the executive functions of the brain related to emotions and behavior, predisposes the child to physical and mental health issues later in life (Herman, 1992). In the aftermath of child abuse, the basic sense of self is broken, leading to destruction of intrapersonal and interpersonal capacities (Courtois, 2008; Herman, 1992). Emotional numbing and the inability to emotionally regulate one's responses as an adult may explain avoidance of health-related behaviors such as diabetes self-management among those who had experienced higher levels of physical neglect and emotional abuse.

Most of the research on childhood trauma and adverse childhood experiences has focused on children who are exposed to traumatic life events and the increased risk for developing health conditions across multiple areas of development. These repeated traumas release adrenaline at times when it is not needed. This constant release is what causes inflammation and sets the body up for chronic illness and disease later in life (Sherin et al., 2011). When adult victims of childhood trauma encounter an overwhelming situation, survivors may re-experience their unresolved feelings of helplessness. These feelings of helplessness resulting from childhood physical neglect and emotional abuse may overwhelm diabetics, impeding effective self-management by impairing their ability to understand the complexities of diabetes, carbohydrate and sugar

equivalents, operation of medical equipment, etc. The current research extends the literature regarding the specific types of childhood trauma (i.e., physical neglect and emotional abuse) that leads to poorer diabetes self-management. These results support the assumptions of contemporary trauma theory that suggest that childhood trauma results in a variety of mental health problems. I propose that one or more of those mental health problems resulting from childhood trauma may be the factor(s) that leads to an inability to successfully self-manage diabetes.

Limitations of Study

There may be limits in generalizing the results to all diabetics due to not using a random sample. Random sampling enhances the ability to generalize results because it helps ensure that the sample is unbiased and representative of the population. Since I used nonprobability convenience sampling it is possible that the sample does not represent the population of Type 1 and Type 2 diabetics (Tabachnick & Fidell, 2013). The diabetics who volunteered to participate were in a pool of participants with specific health conditions and paid a nominal fee to complete surveys via Survey Monkey. In addition, the average time it took participants to complete the survey was 8 minutes. This may indicate that little time or thought was given to questions or responses. There were also no assessments to verify whether participants had any other mental or physical conditions that could impact self-management behavior. In addition, the severity of their diabetes was not assessed or whether participants received any education related to diabetes self-management. This would be important because diabetics with more severe comorbidities would by necessity need to engage in greater self-management (ADA,

2020). It is also likely that participants that receive diabetes education are more likely to engage in diabetes self-management. Similarly, data that addressed any treatment for childhood trauma participants may have experienced were not collected. These factors may have influenced self-management results. Finally, components of the Diabetes Self-Management Questionnaire (DSMQ) tool (dietary control, healthcare use, physical activity) had low internal consistency (Cronbach's alpha). Low internal consistency means that the DSMQ may have been measuring other constructs besides diabetes self-management (Meyers et al., 2017). However, the other components of diabetes self-management (glucose control, total self-management), adverse childhood experience, and components of childhood trauma had satisfactory levels of internal consistency.

Recommendations

Previous researchers have provided evidence that childhood trauma and adverse childhood experiences are associated with poor coping skills, illness, and disease. The results from this study demonstrated that some forms of childhood trauma (physical neglect and emotional abuse) significantly predicted poorer diabetes self-management. Because childhood trauma affects the executive functioning part of the brain responsible for emotions, planning, reasoning, and problem-solving, future researchers should examine how mental health issues and coping styles associated with different types of trauma impact diabetes self-management.

Future research could also examine other self-management behaviors related to diseases that have been associated with childhood trauma, for example, cardio-metabolic outcomes such as high blood pressure and elevated cholesterol levels in adults. Suglia et

al. (2018) concluded that cardio-metabolic outcomes do not necessarily come from childhood trauma, per se, but rather from the stress that those traumatic events cause. Asthma is another trauma-related disease that requires self-management (Remigio-Baker, 2015). Moderate to severe asthma involves underlying inflammation called Type 2 inflammation (i.e., environmentally induced). Asthma caused by Type 2 inflammation occurs when a patient's immune system overreacts to environmental exposures such as traumatic experiences, leading to increases in blood eosinophils (a type of white blood cell) and inflammation in the lungs that trigger asthma attacks. Asthmatics should have an asthma action plan for self-management that is strictly followed and self-directed by peak flow (an instrument to measure air in the lungs) numbers. Asthmatics should not smoke, should be aware of triggers, take medications as directed, and know how and when to use an inhaler versus a nebulizer (Remigio-Baker, 2015).

Implications

The current study extended previous knowledge by determining the extent to which specific childhood traumas predict components of diabetes self-management. Childhood trauma victims who may not have the ability to regulate moods and emotional responses are prone to develop risky behaviors, including alcoholism, substance abuse, (including food), or self-injury as coping mechanisms. Some of these behaviors can increase the risk for developing diabetes or increase complications after diagnosis (van der Kolk, 2014). Screening for these traumatic events and coping mechanisms may lead to improved self-management strategies. According to Herman's (1992) theory, individuals who are provided the opportunity to receive therapy to address traumatic and

adverse experiences that negatively impact cognitive processes (e.g., memory, planning, reasoning, and problem-solving) may exhibit improved self-efficacy. According to Herman, one of the central aspects of individual self-efficacy is the belief that it is possible to influence the outcome of events in one's life by building resilience. The results from this study may be used to improve diabetes education programs for those individuals who have experienced childhood trauma. This could have further social change implications that result in decreases in healthcare costs, reduced co-morbidities, improved quality and quantity of life, and improved coping skills required to successfully manage diabetes. Diabetes education classes were created out of the shear need for the extra time and approaches required to address the multi-faceted complexities of diabetes, including diabetes self-management. However, these education classes focus on how sugar is used in the body, problems with high blood sugar, symptoms of low blood sugar, exercise, medication, stress and stress management, foot care, blood sugar testing, and the importance of regular checkups. According to the American Diabetes Association of Diabetes Educators (2020), diabetes education classes do discuss changing behaviors and help to set new goals. However, they do not screen for trauma, depression, anxiety, or other mental health issues that may be a barrier to diabetes self-management. Implementing trauma screenings would add an additional component in understanding diabetes self-management.

Conclusion

Diabetes is one of the costliest diseases to healthcare and to the patient. Self-management is important to control costs, co-morbidities, and extend quality of life. My

results confirm and extend the literature by demonstrating that specific traumas (physical neglect and emotional abuse) are associated with poorer diabetes self-management. My research supports Herman's (1992) contemporary trauma theory by identifying those factors that lead to poor coping mechanisms. The development of effective self-management skills and empowering diabetics to use them will contribute to successful diabetes outcomes.

References

Adu, M., Malabu, H., Malau-Aduli, A., & Malau-Aduli, B. (2019). Enablers and barriers to effective diabetes self-management: A multi-national investigation. *PloS One, 14*(6), 1–22. https://doi.org/10.1371/journal.pone.0217771

Afifi, O., MacMillan, L., Boyle, M., Cheung, K., Taillieu, T., Turner, S., & Sareen, J. (2016). Child abuse and physical health in adulthood. *Health Reports, 27*, 10–18.

American Association of Diabetes Educators. (2020). An effective model of diabetes care and education: Revising the AADE7 Self-Care Behaviors. *Diabetes Education, 46*, 39–60.

American Diabetes Association. (2020). Standards of medical care in diabetes: Abridged for primary care providers. *Clinical Diabetes, 38*(1), 10–38 https://doi.org/10.2337/cd20-as01

American Diabetes Association. (2022). Facilitating behavior change and well-being to improve health outcomes: Standards of medical care in diabetes. *Diabetes Care, 45*(Suppl), S60–S82.

Bernstein, D., Fink, L., Handelsman, L., & Foote, J. (1994). Childhood Trauma Questionnaire (CTQ) [Database record]. APA PsycTests. https://doi.org/10.1037/t02080

Bernstein, D. P., Fink, L., Handelsman, L., Foote, J., Lovejoy, M., Wenzel, K., Sapareto, E., & Ruggiero, J. (1994). Initial reliability and validity of a new retrospective measure of child abuse and neglect. *The American Journal of Psychiatry, 151*(8), 1132–1136. https://doi.org/10.1176/ajp.151.8.1132

Bethell, C. D., Carle, A., Hudziak, J., Gombojav, N., Powers, K., Wade, R., & Braveman, P. (2017). Methods to assess adverse childhood experiences of children and families: Toward approaches to promote child well-being in policy and practice. *Academic Pediatrics, 17*(7S), S51–S71. https://doi.org/10.1016/j.acap.2017.04.161

Bick, J., & Nelson, A. (2016). Early adverse experiences and the developing brain. *Neuropsychopharmacology, 41*, 177–196. https://doi.org/10.1038/npp.2015.25

Bryant, A., O'Donnell, L., Creamer, M., McFarlane, C., Clark, R., & Silove, D. (2010). The psychiatric sequalae of traumatic injury. *American Journal of Psychology 167*(3), 312–320. https://doi.org/10.1176/appi.ajp.2009.09050617

Casqueiro, J., Casqueiro, J., & Alves, C. (2012). Infections in patients with diabetes mellitus: A review of pathogenesis. *Indian Journal of Endocrinology and Metabolism*, *16* (Suppl1), S27–S36. https://doi.org/10.4103/2230-8210.94253

Centers for Disease Control and Prevention. (2020a). Adverse childhood experiences: Looking at how ACEs affect our lives and society.

Centers for Disease Control and Prevention. (2020b). National Diabetes Statistics Report, 2020.

Center for Substance Abuse Treatment. (2014). Trauma-informed care in behavioral health services. Treatment Improvement Protocol No. 57. Substance Abuse and Mental Health Services Administration.

Cheong, E. V, Sinnott, C., Dahly, D., & Kearney, P. M. (2017). Adverse childhood experiences (ACEs) and later-life depression*: Perceived Social Support as a*

Potential Protective Factor. BMJ Open, 7(9), e013228–e013239. https://doi.org/10.1136/bmjopen-2016-013228

Chou, K. L. (2012). Childhood sexual abuse and psychiatric disorders in middle-aged and older adults: Evidence from the 2007 Adult Psychiatric Morbidity Survey. *The Journal of Clinical Psychiatry,73*(11), e1365–e1371. https://doi.org/10.4088/JCP.12m07946

Courtois, C. A., & Ford, J. D. (Eds.). (2009). *Treating complex traumatic stress disorders: An evidence-based guide.* The Guilford Press.

Cresswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches.* Sage Ellis.

Deschene, S., Graham, E., Kivimäki, M., & Schmitz, N. (2018). Adverse childhood experiences and the risk of diabetes: Examining the roles of depressive Symptoms and cardiometabolic dysregulations in the Whitehall II cohort study. *Diabetes Care 41*(10), 2120–2126. https://doi.org/10.2337/dc18-0932

DeQuattro, K., Trupin, L., Li, J., Katz, P., Murphy, B., Yelin, H., & Yazdany, J. (2019). Relationships between adverse childhood experiences and health status in systemic lupus erythematosus. *Arthritis Care and Research, 72*(4), 525–533. https://doi.org/10.1002/acr.23878

Durai, V., Samya, V., Akila, V., Shriraam, V., Jasmine, A., Muthuthandavan, R., Gayathri, T., & Mahadevan, S. (2021). Self-care practices and factors influencing self-care among type 2 diabetes mellitus patients in a rural health center in South India. *Journal of Education and Health Promotion, 10*,151–166.

https://doi.org/10.4103/jehp.jehp_269_20

Egle, U. T., Franz, M., Joraschky, P., Lampe, A., Seiffge-Krenke, I., & Cierpka, M. (2016). Health-related long-term effects of adverse childhood experiences G*undesgesundheitsblatt, Gesundheitsforschung, Gesundheitsschutz*, *59*(10),1247–1254. https://doi.org/10.1007/s00103-016-2421-9

Ernawati, U., Wihastuti, A., & Utami, W. (2021). Effectiveness of diabetes self-management education (DSME) in type 2 diabetes mellitus (T2DM) patients: Systematic literature review. *Journal of Public Health Research*, *1* (2), 2240-2245

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175-191.https://doi.org/10.3758/bf03193146

Felitti, V. J., Anda, R. F., Nordenberg, D., et al. (1998). The Relationship of childhood abuse and household dysfunction too many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, *14*(4), 245–258.

Field, A. 2013. *Discovering Statistics Using SPSS* (4th ed.).: Sage

Ford, E. S., Anda, R. F., Edwards, V. J., Perry, G. S., Zhao, G., Li, C., & Croft, J. B. (2011). Adverse childhood experiences and smoking status in five states. *Preventive Medicine*, 53(3), 188–193. https://doi.org/10.1016/j.ypmed.2011.06.015

Frankfort-Nachmias, C., & Nachmias, D. (2008). *Research methods in the social*

sciences. (7th ed.).: Worth Publisher.

Goodman, R. (2017). Trauma theory and trauma-informed care in substance use disorders: A conceptual model for integrating coping and resilience. *Advances in Social Work, 18*(1)186-201. doi: 10.18060/21312

Hagborg, M., Kalin, T. & Gerdner, A. (2022). The Childhood Trauma Questionnaire-Short Form (CTQ-SF) used with adolescents – methodological report from clinical and community samples. *Journal of Child and Adolescent Trauma* retrieved from: https://doi.org/10.1007/s40653-022-00443-8

Herman, J. L. (1992). *Trauma and recovery.* Basic Books/Hachette Book Group.

Hillis, S., Anda, R., Dube, S., Marchbanks, P., & Marks, J., (2004). The association between adverse childhood experiences and adolescent pregnancy, long-term psychosocial consequences, and fetal death. *Academic Journal of Pediatrics, 113*(2), 320-327; DOI: https://doi.org/10.1542/peds.113.2.320

Huffhines, L., Noser, A., & Patton, S. R. (2016). The link between adverse childhood experiences and diabetes. *Current Diabetes Reports*, *16*(6), 5 https://doi.org/10.1007/s11892-016-0740-8

Jolley, D. 2020. (Doctoral dissertation Walden University). *Historical Trauma, Contemporary Trauma, and Type-2 Diabetes Self-Management Among American Indian/Alaska Native Women*

Karavanaki K., Tsoka E., Liacopoulou M., et al. (2014). Psychological stress as a factor potentially contributing to the pathogenesis of type 1 diabetes mellitus. *Endocrinology Investment, 31*, 406–415.

Leung, J. P., Britton, A., & Bell, S. (2016). Adverse childhood experiences and alcohol consumption in midlife and early old age. *Alcohol and Alcoholism (Oxford Oxfordshire), 51*(3), 331–338. https://doi.org/10.1093/alcalc/agv125

Liu, N. F., Brown, A. S., Folias, A. E., Younge, M. F., Guzman, S. J., Close, K. L., & Wood, R.(2017). Stigma in people with type 1 or type 2 diabetes. *Clinical Diabetes: A Publication of the American Diabetes Association, 35*(1), 27–34.https://doi.org/10.2337/cd16-0020

Loudermilk, E., Loudermilk, K., Obenauer, J., & Quinn, M. (2018). Impact of adverse childhood experiences (ACEs) on adult alcohol consumption behaviors. *Child Abuse & Neglect, 86,* 368–374.

Lukaschek, K., Baumert, J., Kruse, J., Thwing, R., Emeny, & Heinz- Ladwig, K. (2013). Relationship between posttraumatic stress disorder and type 2 diabetes. *Journal of Psychosomatic Research, 74* (4), 340-345.

(Mayo Clinic, 2020). Type 1 diabetes - Symptoms and causes - Mayo Clinic https://www.mayoclinic.org

McNutt, L-A., Carlson, B.E., Persaud, M., Postmus, J. (2002). Cumulative abuse experiences on physical health and health behaviors. *Annals of Epidemiology, 12*(2), 123–130.

Meadows, A. L., & Marsac, M. L. (2020). Early-life trauma and diabetes management: an under-recognized phenomenon in transition-aged youth. *The American Diabetes Association, 38* (1), 93–95. ttps://doi.org/10.2337/cd19-0012

Meyers, L. S., Gamst, G., & Guarino, A. J. (2017). Applied Multivariate Research:

Design and Interpretation. Sage.

Moffitt, D., Harrington, H. (2009). adverse childhood experiences and adult risk factors for age-related disease: Depression, inflammation, and clustering of metabolic risk markers. *Archive. Pediatric Adolescent Medicine, 163*(12), 1135–1143.

Mulligan, K., McBain, H., Lamontagne-Godwin, F., Chapman, J., Haddad, M., Jones, J., Flood, C., Thomas, D., & Simpson, A. (2017). Barriers and enablers of type 2 diabetes self-management in people with severe mental illness. *Health Expectations: An International Journal of Public Participation in Health Care and Health Policy*, *20*(5), 1020–1030 https://doi.org/10.1111/hex.12543

Nurius, P. S., Uehara, E., & Zatzick, D. F. (2013). Intersection of stress, social disadvantage, and life course processes: Reframing trauma and mental health. *American Journal of Psychiatric Rehabilitation*, *16*(2), 91–114.

Nygren, M., Carstensen, J., Koch, F., Ludvigsson, J., & Frostell, A. (2015). Experience of a serious life event increases the risk for childhood type 1 diabetes: The ABIS population-based prospective cohort study. *Diabetologia*, *58*, 1188–1197.https://doi.org/10.1007/s00125-015-3555-2

Ockleford, E., Shaw, R. L., Willars, J., & Dixon-Woods, M. (2008). Education and self-management for people newly diagnosed with type 2 diabetes: a qualitative study of patients' views. *Chronic illness*, *4*(1), 28–37. https://doi.org/10.1177/1742395307086673

Piers, C. (1998). Contemporary trauma theory and its relation to character. *Psychoanalytic Psychology, 15*(1), 14–33. doi:10.1037/0736-9735.15.1.14

Ports, A., Holman, M., Guinn, S., Pampati, S., Dyer, E., Merrick, T., & Metzler, M. (2019). Adverse childhood experiences and the presence of cancer risk factors in adulthood: A scoping review of the literature from 2005 to 2015. *Journal of Pediatric Nursing*, *44*, 81-96

Rasoul, A. M., Jalali, R., Abdi, A. (2019). The effect of self-management education through weblogs on the quality of life of diabetic patients. *BMC Medical Informed Decision Making 19*, **(**205-217). https://doi.org/10.1186/s12911-019-0941-6

Remigio-Baker, R. A., Hayes, D. K., & Reyes-Salvail, F., (2015). Adverse childhood events are related to the prevalence of asthma and chronic obstructive pulmonary disorder among adult women in Hawaii. *Lung*, *193*(6), 885–891. https://doi.org/10.1007/s00408-015-9777-8

Sabri B. (2012). Severity of victimization and co-occurring mental health disorders among substance using adolescents. *Child &Youth Care Forum*, *41*(1), 37–55.

Schmitt, A., Gahr, A., Hermanns, N., Kulzer, B., Huber, J., & Haak, T. (2013). The Diabetes Self-Management Questionnaire (DSMQ): Development and evaluation of an instrument to assess diabetes self-care activities associated with glycemic control. *Health and Quality of Life Outcomes*, *11*(1), 138. doi: 10.1186/1477-7525-11-138

Schmitt, A., Reimer, A., Hermanns, N., Huber, J., Ehrmann, D., Schall, S., Kulzer, B. (2016). Assessing diabetes self-management with the Diabetes Self-Management Questionnaire (DSMQ): Can help analyze behavioral problems related to reduced

glycemic control. *PLOS ONE 11*(3): e0150774. doi. 0.1371/journal.pone.0150774

Schmitt, A., Reimer, A., Hermanns, N., Kulzer, B., Ehrmann, D., Krichbaum, M. & Haak, T. (2017). Depression is linked to hyperglycemia via suboptimal diabetes self-management: A cross-sectional mediation analysis. *Journal of Psychosomatic Research, 94*, 17-23. doi: 10.1016/j.jpsychores.2016.12.015

Sechrest L. (2005). Validity of measures is no simple matter. *Health Services Research*, *40*(5 Pt 2), 1584–1604. https://doi.org/10.1111/j.1475-6773.2005.00443.x

Simon, M. K. (2010). *Dissertation and scholarly research: Recipes for success*. Dissertation Success, LLC. Retrieved from www.dissertationrecipes.com

Sherin, J. E., & Nemeroff, C. B. (2011). Post-traumatic stress disorder: the neurobiological impact of psychological trauma. *Dialogues in Clinical Neuroscience*, *13*(3), 263–278.https://doi.org/10.31887/DCNS.2011.13.2/jsherin

Shi, C., Zhu, H., Liu, J., Zhou, J., & Tang, W. (2020). Barriers to self-management of type 2 diabetes during COVID-19 medical isolation: A Qualitative Study. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy, 13*, 3713–3725. https://doi.org/10.2147/DMSO.S268481

Shrivastava, R., Shrivastava, S., & Ramasamy, J. (2013). Role of self-care in management of diabetes mellitus. *Journal of Diabetes and Metabolic Disorders, 12*(1), 14-19. https://doi.org/10.1186/2251-6581-12-14

Singh, R., Teel, C., Sabus, C., McGinnis, P., & Kluding, P. (2016). Fatigue in type 2 diabetes: Impact on quality of life and predictors. *PloS One*, *11*(11), 1-13.

e0165652.https://doi.org/10.1371/journal.pone.016565

Spratt, E. G., Back, S. E., Yeatts, S. D., Simpson, A. N., McRae-Clark, A., Moran-Santa Maria, M. M., Price, K. L., Hartwell, K. T., & Brady, K. T. (2009). Relationship between child abuse and adult smoking. *International Journal of Psychiatry in Medicine*, *39*(4), 417–426. https://doi.org/10.2190/PM.39.4.f

Substance Abuse and Mental Health Services Administration. Department of Health and Human Services (2022). *SAMHSA's Trauma and Violence / SAMHSA SECURE* retrieved from:www.samhsa.gov/trauma-Violence Last Updated: 03/22/2022 Substance Abuse and Mental Health Services Administration. *SAMHSA's concept of trauma and guidance for a trauma-informed approach.* Rockville: HHS Publication No. (SMA) 14–4884; 2014. https://doi.org/10.1007/s10566-011-9151-9

Suglia, F., Koenen, C., Boynton-Jarrett, R., Chan, S., Clark, J., Danese, A., Zachariah, P. (2018). Childhood and adolescent adversity and cardiometabolic outcomes*: A scientific Statement from the American Heart Association Circulation, 137*(5), 137:e15–137:e28. Accessed August 13, 2019. doi: 10.1161

Suleiman, S. (2008). Judith Herman and Contemporary Trauma Theory, *Women's Studies Quarterly; Spring 2008; 36*, 1/2; ProQuest Central pg. 276NCBI Bookshelf. A service of The National Library of Medicine, National Institutes of Health.

Tabachnick, B. G., & Fidell, L. S. (2013). Using multivariate statistics. Pearson.

United States Census Bureau (2018). National Diabetes Statistics Report Diabetes CDC retrieved from: // *Centers for Disease Control and Prevention*. National Diabetes

Statistics Report. https://www.cdc.gov/diabetes/data/statistics-

Van der Kolk, A. (2014). The body keeps the score: *Brain, Mind, and Body in the Healing of Trauma*. Penguin Group, LLC.

Van Duin, L., Bevaart, F., Zijlmans, J., Luijks, A., Doreleijers, T., Wierdsma, I. Oldehinkel, J., Marhe, R., & Popma, A. (2019). The role of adverse childhood experiences and mental health care use in psychological dysfunction of male multi-problem young adults. *European Child & Adolescent Psychiatry, 28*(8), 1065–1078 https://doi.org/10.1007/s00787-018-1263-4

Villodas, M., Litrownik, A., Thompson, R., Roesch, S., English, D., Dubowitz, H., Kotch, J., Runyan, D. (2012). Changes in youth's experiences of child maltreatment across developmental periods in the LONGSCAN Consortium. *Psychology of Violence 2*(4), 325–338.10.1037/a0029829.

Wegman, H. & Stetler, C. (2019). Meta-analytic review of the effects of childhood abuse on medical outcomes in adulthood. *Psychosomatic Medicine, 71*(8), 805-812.

Widom C.S., Czaja S.J., Bentley T., & Johnson M.S. (2012). A prospective investigation of physical health outcomes in abused and neglected children: new findings from a 30-year follow-up. *American Journal of Public Health, 102*(6), 1135–1144.

World Health Organization (2020). Improving health outcomes of people with diabetes mellitus: Target setting to reduce the global burden of diabetes mellitus by 2030 Retrieved from https://www.who.int health topics

Zimmet, P. Z. (2017). Diabetes and its drivers: the largest epidemic in human history? *Clinical Diabetes Endocrinology 3*(1), 1-8.

https://doi.org/10.1186/s40842-016-0039-3

Appendix A: Permission to use CTQ-SF

RE: Regarding my inquiry into the CTQ-SF

From: Deserie Otoole
Sent: Monday, September 12, 2022 3:20 PM
To: Sarah Gardineer
Subject: RE: Regarding your inquiry into the CTQ-SF

Oh perfect, I will not be making any adaptations, revisions, or anything else. I will use the CTQ-SF in its original form, from Bernstein & Fink and give proper credit. Thank you. I will continue with the purchase
Sent from Mail for Windows

From: Sarah Gardineer
Sent: Monday, September 12, 2022 1:07 PM
To: Deserie Otoole
Subject: RE: Regarding your inquiry into the CTQ-SF

Good morning, Deserie,

If you are not planning on making adaptations to the CTQ, no license or permissions contract is needed, and you can go ahead and purchase.

If you are looking to adapt this assessment permissions are reviewed and approved by our licensing team. I can check on the status of your request if you need to go this route.

Thank you!
Sarah
From: Deserie Otoole <[redacted]
Sent: Sunday, September 11, 2022 1:38 PM
To: Sarah Gardineer <[redacted]>
Subject: FW: Regarding your inquiry into the CTQ-SF

In addition, I forgot to answer your question about the research assistance program. I do not need them at this time thank you. Deserie

Sent from Mail for Windows
From: Deserie Otoole
Sent: Friday, September 9, 2022 2:10 PM
To: Sarah Gardineer
Subject: RE: Regarding your inquiry into the CTQ-SF

Thank you, Sarah, for getting back to me so quickly. I filled out two forms. One was for

permission to use, (I have not heard back) and one was for my qualifications to use. After submitting a copy of my qualifications (I qualified for a B status) I have the 28 CTQ in my cart but I do not want to purchase without some sort of permission to use in my study. Paper form is fine, I can scan it in. I have a Masters in Psych and also my Chair is overseeing the entire research project for my doctorate. I really am looking for a letter of permission from Pearson and then I will purchase from your site.

Deserie

Sent from Mail for Windows

From: Sarah Gardineer
Sent: Friday, September 9, 2022 2:05 PM
To: Deserie Otoole
Subject: Regarding your inquiry into the CTQ-SF

Hi Deserie,

I wanted to reach out to you in regards to you inquiry about the CTQ-SF. I want to clarify that Pearson only distributes to the CTQ, a 28 item questionnaire. If this is the product you are looking for? The CTQ is also only available in paper format at this time.

Additionally, are you looking to take advantage of our research assistance program?

Let me know what your needs are, and I'll put together some options that might be helpful!
Sarah Gardineer (she/her/hers)
Pearson Clinical Assessment
Healthcare Assessment Consultant
Western US

Appendix B: CTQ-SF

When I was growing up ...	Never True	Rarely True	Sometimes True	Often True	Very Often True
1. I didn't have enough to eat.	•	•	•	•	•
2. I knew that there was someone to take care of me and protect me.	•	•	•	•	•
3. People in my family called me things like "stupid," "lazy," or "ugly."	•	•	•	•	•
4. My parents were too drunk or high to take care of the family.	•	•	•	•	•
5. There was someone in my family who helped me feel that I was important or special.	•	•	•	•	•
6. I had to wear dirty clothes.	•	•	•	•	•
7. I felt loved.	•	•	•	•	•
8. I thought that my parents wished I had never been born.	•	•	•	•	•
9. I got hit so hard by someone in my family that I had to see a doctor or go to the hospital.	•	•	•	•	•
10. There was nothing I wanted to change about my famil			•	•	•
11. People in my family hit me so hard that it left me with			•	•	•
12. I was punished with a belt, a board, a cord, or some ot			•	•	•
13. People in my family looked out for each other.			•	•	•
14. People in my family said hurtful or insulting things to me.			•	•	•
15. I believe that I was physically abused.	•	•	•	•	•
16. I had the perfect childhood.	•	•	•	•	•
17. I got hit or beaten so badly that it was noticed by someone like a teacher, neighbor, or doctor.	•	•	•	•	•
18. I felt that someone in my family hated me.	•	•	•	•	•
19. People in my family felt close to each other.	•	•	•	•	•
20. Someone tried to touch me in a sexual way, or tried to make me touch them.	•	•	•	•	•
21. Someone threatened to hurt me or tell lies about me unless I did something sexual with them.	•	•	•	•	•
22. I had the best family in the world.	•	•	•	•	•
23. Someone tried to make me do sexual things or watch sexual things.	•	•	•	•	•
24. Someone molested me.	•	•	•	•	•
25. I believe that I was emotionally abused.	•	•	•	•	•
26. There was someone to take me to the doctor if I needed it.	•	•	•	•	•
27. I believe that I was sexually abused.	•	•	•	•	•
28. My family was a source of strength and support.	•	•	•	•	•

Appendix C: Permission to use the ACE Questionnaire

Sent from Mail for Windows

From: Deserie Otoole
Sent: Thursday, June 23, 2022 9:56 AM
To: Deserie O'Toole
Subject: FW: permission to use the ACE Questionnaire

Sent from Mail for Windows

From: DVP Inquiries (CDC)
Sent: Wednesday, June 22, 2022 3:52 PM
To: Deserie Otoole
Subject: RE: permission to use the ACE Questionnaire

Thank you for your inquiry.
General text information, publications available for download, and graphs developed by CDC and presented on CDC's website are works of the United States Government and are in the public domain. This means that they are meant for public use and are not subject to copyright law protections. Permission is not required for the use of public domain items. But we do ask that you credit CDC as the original source whenever the items are used in any publicly distributed media.

The Family Health History and Health Appraisal questionnaires were used to collect information on child abuse and neglect, household challenges, and other socio-behavioral factors in the original CDC-Kaiser ACE Study. The questionnaires are not copyrighted, and there are no fees for their use. You can download them as pdfs using the following links.
Family Health History Questionnaires:
Male Version:
http://www.cdc.gov/violenceprevention/acestudy/pdf/fhhmlorna.pdf
Female Version:
http://www.cdc.gov/violenceprevention/acestudy/pdf/fhhflorna.pdf

Health Appraisal Questionnaire
Male Version:
http://www.cdc.gov/violenceprevention/acestudy/pdf/haqmweb.pdf
Female Version:
http://www.cdc.gov/violenceprevention/acestudy/pdf/haqfweb.pdf

Additionally, it is important to note that while the original ACEs questions (referenced above) were used in the 1998 CDC-Kaiser ACEs study, this study is not ongoing. There

are similar ACEs questions in the ACEs module of the Behavioral Risk Factor Surveillance Surveys (BRFSS). The BRFSS ACE module was adapted from the original CDC-Kaiser ACE Study and is used to collect information on child abuse and neglect and household challenges. Please see the BRFSS Questionnaires website for the most up-to-date versions of the BRFSS ACE Modules.

It is also important to note that CDC does not endorse the use of the ACE score in any sort of diagnosis process. Many organizations use ACE study questions and other screening tools at their discretion.

Again, thank you for your inquiry and we hope you find this information helpful

From: Deserie Otoole <[redacted]
Sent: Wednesday, June 22, 2022 11:45 AM
To: DVP Inquiries (CDC) <[redacted]
Subject: permission to use the ACE Questionnaire

I am a doctoral student wanting to use the ACE questionnaire in my research for dissertation. I am writing to you to ask permission to use the Adverse Childhood Questionnaire form.

Respectfully,
Deserie O'Toole

Appendix D: Adverse Childhood Questionnaire (ACE)

1.Did a parent or other adult in the household often … Swear at you, insult you, put you down, or humiliate you? or Act in a way that made you afraid that you might be physically hurt?

Yes No

2.Did a parent or other adult in the household often … Push, grab, slap, or throw something at you? or Ever hit you so hard that you had marks or were injured?

Yes No

3 Did an adult or person at least 5 years older than you ever… Touch or fondle you or have you touch their body in a sexual way? or Try to or actually have oral, anal, or vaginal sex with you?

Yes No

4.Did you often feel that no one in your family loved you or thought you were important or special? or Your family didn't look out for each other, feel close to each other, or support each other?

Yes No

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

Yes No

6.Were your parents ever separated or divorced

Yes No

7.Was your mother or stepmother: Often pushed, grabbed, slapped, or had something thrown at her? or Sometimes or often kicked, bitten, hit with a fist, or hit with something hard? or Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?

Yes No

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

Yes No

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

Yes No

10. Did a household member go to prison?

Yes No

Appendix E: Permission to use DSMQ

Diabetes Self-Management Questionnaire

 Authors of Article:

- Andreas Schmitt
- Annika Gahr,
- Norbert Hermanns,
- Bernhard Kulzer,
- Jörg Huber and
- Thomas Haak

Appendix F: Diabetes Self-Management Questionnaire

The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the last 8 weeks, please specify the extent to which each statement applies to you.		Applies to me very much	Applies to me to a consider-able degree	Applies to me to some degree	Does not apply to me
1.	I check my blood sugar levels with care and attention. ☐ Blood sugar measurement is not required as a part of my treatment.	☐3	☐2	☐1	☐0
2.	The food I choose to eat makes it easy to achieve optimal blood sugar levels.	☐3	☐2	☐1	☐0
3.	I keep all doctors' appointments recommended for my diabetes treatment.	☐3	☐2	☐1	☐0
4.	I take my diabetes medication (e. g. insulin, tablets) as prescribed. ☐ Diabetes medication / insulin is not required as a part of my treatment.	☐3	☐2	☐1	☐0
5.	Occasionally I eat lots of sweets or other foods rich in carbohydrates.	☐3	☐2	☐1	☐0
6.	I record my blood sugar levels regularly (or analyze the value chart with my blood glucose meter). ☐ Blood sugar measurement is not required as a part of my treatment.	☐3	☐2	☐1	☐0
7.	I tend to avoid diabetes-related doctors' appointments.	☐3	☐2	☐1	☐0
8.	I do regular physical activity to achieve optimal blood sugar levels.	☐3	☐2	☐1	☐0
9.	I strictly follow the dietary recommendations given by my doctor or diabetes specialist.	☐3	☐2	☐1	☐0
10.	I do not check my blood sugar levels frequently enough as would be required for achieving good blood glucose control. ☐ Blood sugar measurement is not required as a part of my treatment.	☐3	☐2	☐1	☐0

The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the last 8 weeks, please specify the extent to which each statement applies to you.		Applies to me very much	Applies to me to a consider-able degree	Applies to me to some degree	Does not apply to me
11.	I avoid physical activity, although it would improve my diabetes.	☐3	☐2	☐1	☐0
12.	I tend to forget to take or skip my diabetes medication (e. g. insulin, tablets). ☐ Diabetes medication / insulin is not required as a part of my treatment.	☐3	☐2	☐1	☐0
13.	Sometimes I have real 'food binges' (not triggered by hypoglycemia).	☐3	☐2	☐1	☐0
14.	Regarding my diabetes care, I should see my medical practitioner(s) more often.	☐3	☐2	☐1	☐0
15.	I tend to skip planned physical activity.	☐3	☐2	☐1	☐0
16.	My diabetes self-care is poor.	☐3	☐2	☐1	☐0