

The Influence of Psychosocial Adjustment on Medication Adherence among Uninsured
Hispanic Immigrants Aged 40 to 64 Years-Old with a Type-2 Diabetes Diagnosis

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DEDICATION

I dedicate this grand endeavor to my deceased parents, Robert Louis Douglas and Barbara Jean Douglas, my loving husband and Rock of Gibraltar, Walter Benson Williams, and my three beautiful and brilliant daughters, Brianna, Ashlee, and Cayla.

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ABSTRACT

THE INFLUENCE OF PSYCHOSOCIAL ADJUSTMENT ON MEDICATION ADHERENCE AMONG UNINSURED HISPANIC IMMIGRANTS AGED 40 TO 64 YEARS-OLD WITH A TYPE-2 DIABETES DIAGNOSIS

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The Hispanic population in the United States increased from 35.5 million in 2000 to 50.5 million in 2010 (U.S. Census Bureau, 2011). The type-2 diabetes prevalence rate for Hispanics is 12.8%. Their non-Hispanic White counterparts have a prevalence rate of 7.6% (American Diabetes Association, 2014). There are effective methods to control this disease. Individuals do not receive these health benefits because they do not adhere to their prescribed medication regimens. Medication nonadherence leads to increased hospitalizations because of disability and morbidity in individuals with type-2 diabetes (Brown & Bussell, 2011). There is also an increased mortality associated with medication nonadherence in individuals with type-2 diabetes (Brown & Bussell, 2011). The purpose of this study was to examine the influence of psychosocial adjustment on medication adherence in uninsured Hispanic Immigrants aged 40 to 64 years old diagnosed with type-2 diabetes.

The primary hypothesis was that the greater the individual's psychosocial adjustment, the more likely he or she will adhere to his or her prescribed medication regimen.

This study used a predictive correlational design. The participants were a convenience sample ($N = 70$) of Hispanic immigrants 40 to 64 years old diagnosed with type-2 diabetes who sought medical care at the five clinics associated with an academic institution in Northern Virginia. Stepwise Multinomial logistic regression was used to answer the primary research question: What are the psychosocial adjustment predictors of medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes?

The life course factors which were significant predictors of medication adherence in this targeted population were: (a) $\text{paisHealth } p = .016, p < 0.05$; (b) $\text{paisVocational } p = .008, p < 0.05$; (c) $\text{paisExtended Family } p = .011, p < 0.05$; (d) $\text{paisSexual } p = .033, p < 0.05$; and (e) $\text{paisPsychological } p = .033, p < 0.05$. The variables $\text{paisDomestic } (p = .086, p > 0.05)$ and $\text{paisSocial } (p = .602, p > 0.05)$ were not significant predictors of medication adherence in this study population.

Psychosocial adjustment affects how well individuals adhere to their diabetes self-management regimens. Therefore, when providing healthcare to diverse populations, healthcare providers should utilize risk reduction and health promotion strategies tailored specifically for these populations in order to optimize healthcare outcomes.

1. INTRODUCTION TO THE STUDY

Overview of Diabetes

Diabetes is a chronic illness which results in high blood glucose levels that affect the body's metabolism of carbohydrates, fats, and protein. A high blood glucose level is termed hyperglycemia. High glucose levels from a diabetes diagnosis can be controlled well with a prescribed treatment regimen and individuals can lead healthy lives (American Diabetes Association [ADA], 2014). Diabetes is classified as type-1 or type-2 depending on the physiological cause for the rise in the blood glucose level (ADA, 2014).

Type-2 diabetes (adult-onset diabetes) usually develops later in life. Recently, more adolescents and young adults are being diagnosed with this form of diabetes, which accounts for 90-95% of all diagnosed cases (ADA, 2014). Risk factors for type-2 diabetes includes physical inactivity, a poor diet, morbid obesity, and people living longer (Barag, 2011). In type-2 diabetes, the body does not produce enough insulin to keep the body functioning normally. First, there is an overproduction of insulin, but as the disease progresses less insulin is produced. Type-2 diabetes results from pancreatic beta cell destruction, insulin resistance, gestational diabetes, and genetic or environmental causes (ADA, 2014). Controlling type-2 diabetes requires a lifestyle change related to diet, exercise, and medication administration (ADA, 2014; Bhattacharya, 2012). Effectively controlling this disease leads to fewer hospitalizations and delayed disability, morbidity, and mortality.

Individuals with type-2 diabetes must control their disease with a prescribed treatment regimen which includes diet, exercise, and insulin or oral hypoglycemic medications. This will reduce the frequency of high and low blood glucose levels that affect normal body functioning and it will decrease cellular damage (ADA, 2014; Bhattacharya, 2012). The United Kingdom Prospective Diabetes Study (UKPDS) (UKPDS Group, 1998) found that a 1% decline in HbA1c levels resulted in a 35% decline in microvascular damage.

Medication management is the most important factor to consider in controlling type-2 diabetes because these medications act quickly to reduce high blood glucose levels. Individuals should use them as prescribed to promote health and prevent injury (Bhattacharya, 2012). Most individuals will have some form of medication management, whether insulin or an oral hypoglycemic. Adhering to a prescribed medication regimen is important to promote one's physical well-being (ADA, 2014; Bhattacharya, 2012).

Significance and Background of the Diabetes Epidemic

Type-2 diabetes is an epidemic in the United States (Barag, 2011). According to the American Diabetes Association (2014), diabetes is the seventh leading cause of death nationally. In the United States, there are 29.1 million children and adults living with some form of diabetes; this number represents 9.3% of the U.S. population (ADA, 2014). There are about 21.0 million Americans with diabetes (ADA, 2014). It is estimated there are 8.1 million Americans who are undiagnosed, and another 86 million Americans are at risk for developing this disease (ADA, 2014). Presently, there are 13.4 million middle-aged adults from 45 to 64 years old who have type-2 diabetes (ADA, 2014). This statistic surpasses other age groups. By 2050, it is projected that 15/1000 adults will have type-2 diabetes (Boyle, Thompson, Gregg, Barker, & Williamson, 2010). Hispanics

have a type-2 diabetes prevalence rate of 12.8%. Their non-Hispanic White counterparts have a prevalence rate of 7.6% (ADA, 2014). The prevalence rate for type-2 diabetes is predicted to be 25% to 33% by 2050 due to an increased proportion of high-risk minority populations, an aging society, and more individuals living with type-2 diabetes (Boyle et al., 2010). Minorities, middle-aged adults, and the disadvantaged members of our society are disproportionately affected by type-2 diabetes and its complications (Centers for Disease Control [CDC], 2011). Increasing disability, morbidity, and mortality will add to the financial burden of individuals, families, and the United States healthcare system.

Burden of Disease

There is significant disability, morbidity, and mortality associated with type-2 diabetes which includes the leading cause of kidney failure, atraumatic lower limb amputation, adult onset blindness, heart disease, and stroke (ADA, 2014). Furthermore, type-2 diabetes is costly. In 2012, the total direct and indirect cost for treating individuals with this disease and related disabilities was 245 billion dollars (ADA, 2014). The medical cost for treating individuals with type-2 diabetes is 2.3 times more than treating an individual without the disease (ADA, 2014). Lost productivity in the workforce is estimated to be 69 billion dollars (ADA, 2014). Thus, effective management of type-2 diabetes will increase individuals' healthcare outcomes and reduce associated healthcare costs.

Prevalence of Type-2 Diabetes

Middle-Aged Adults with Type-2 Diabetes

Adults aged 45 to 64 years old represent the age group with the highest incidence and prevalence of type-2 diabetes compared to other age groups. There are 13.4 million middle-aged adults (45 to 64 years) who have type-2 diabetes (ADA, 2014).

From 2010 to 2012, there were 892,000 new cases of adults aged 45 to 64 diagnosed with type-2 diabetes (ADA, 2014). This number more than doubles that of any other age group (ADA, 2014). Middle-aged adults account for most of the country's workforce and represent the leaders of the community who hold the most power and responsibility (Atkinson & Hilgard, 1990). More wage earners in the United States are being diagnosed with type-2 diabetes (Davila et al., 2011). If a wage earner is not feeling well due to a diagnosis of type-2 diabetes, productivity is affected. Hispanics are joining the workforce in growing numbers, which only adds to this increasing rate of U.S. wage earners diagnosed with type-2 diabetes.

Hispanics with Type-2 Diabetes

Compared to their non-Hispanic White counterparts, Mexican Americans have a higher prevalence of type-2 diabetes and associated disability, morbidity, and mortality (Cowie et al., 2010). A cross-sectional study ($N = 7,239$) done by Lopez, Bailey, Rupnow, and Annunziata (2014) found that Hispanics had the poorest glycemic control and highest rate of nonadherence among all racial groups. Thus, minorities, middle-aged adults, and the disadvantaged (CDC, 2011) have a higher burden of disease than other groups. Effective management of type-2 diabetes will increase patient healthcare outcomes and reduce healthcare costs (CDC, 2011).

In order to manage this disease effectively, risk reduction and health promotion strategies have to be developed for the ethnic/racial groups disproportionately affected. The Hispanic population is the fastest growing ethnic/racial group in the United States.

Hispanics in the United States

The demographics of the United States are quickly changing and this is reflected in the healthcare system. In 2000 there were an estimated 35.5 million Hispanics (U.S.

Census Bureau, 2011). By 2010, this number increased to 50.5 million Hispanics (U.S. Census Bureau, 2011). From 2000 to 2010, this segment of the population grew 43% (U.S. Census Bureau, 2011). They now account for 16% of the population, and this rate is steadily increasing (U.S. Census Bureau, 2011). The Hispanic population includes individuals originating from Cuba, Mexico, Puerto Rico, and South/Central America. The Hispanic population in the United States has grown exponentially within the last 14 years.

The Hispanic population represents 8.6% of the residents in Virginia; this represents a 92% population growth since 2000 (U.S. Census Bureau, 2011). Northern Virginia is home to 62% of the state's Hispanic population (U.S. Census Bureau, 2011). Of the 113,000 new residents in Virginia, one-third were identified as Hispanic (U.S. Census Bureau, 2011). Recent Hispanic immigrants settling in the Northeastern regions of the United States have typically originated from Central America (U.S. Census Bureau, 2011). The Hispanic population is disproportionately affected by poverty and poor education. This further affects their ability to adhere to their medication regimens (CDC, 2011). Thus, type-2 diabetes is causing a substantial burden on some of the most vulnerable members of our society.

Medication Adherence in Hispanics

Hispanics have higher disability, morbidity, and mortality rates associated with type-2 diabetes because they often do not adhere to their medication regimens and they are typically sicker when they initially seek healthcare services (Cowie et al., 2010). A cross-sectional study ($N = 7,239$) done by Lopez et al. (2014) found that Hispanics had a medication adherence rate of 57.4% compared to 65% in non-Hispanic Whites and 63% in African Americans. Another cross-sectional study ($N = 59$, 85% Hispanic) done by

Bailey et al. (2012) found that 56% of the participants reported they did not adhere to their medication regimens. A randomized controlled trial ($N = 302$) by Parada, Horton, Cherrington, Ibarra, and Ayala (2012) found that 60% of the Hispanic participants did not adhere to their medication regimens. Thus, Hispanics have a higher burden of disease because they often do not adhere to their medication regimens and have limited resources.

Uninsured Hispanics

Hispanics are disproportionately affected by poverty and the lack of health insurance coverage. Thirty percent of Hispanics are without some form of health insurance (CDC, 2013). This is higher than their non-Hispanic White and African American counterparts. In the latter, the uninsured rates are 12.7% and 17.8%, respectively (CDC, 2013). The uninsured rates of Hispanics by subgroup are as follows: Cubans 24.3%, Mexicans 33.2%, Puerto Ricans 14.4%, and other Hispanic cultures 30.1% (CDC, 2013). They often receive low levels of Medicare coverage because of their immigration or citizenship status. Hispanics are more likely to have low-paying jobs that do not offer health insurance coverage. Because Hispanics are disproportionately affected by type-2 diabetes, not having health insurance adds to their burden of disease and negatively affects their ability to be healthy, productive members of society (Iannotta, 2002).

Access to Healthcare

Hispanics are the largest and fastest growing minority group in the United States. However, when compared to their White and Black counterparts, Hispanics received fewer recommended healthcare services (Chan, Gaskin, Dinwiddie, & McCleary, 2012). A study done by Kang-Kim et al. (2008) found that being uninsured and having a low

educational background were the main variables contributing to the disparity in access to healthcare services seen in this population. Their study further concluded that variables such as age, gender, and level of health contributed little to the participants' health disparity. The researchers also concluded that since they did not examine other possible variables which could contribute to healthcare access disparity such as immigration status and English fluency, the influence of insurance and educational background may have depicted an exaggerated effect on access to healthcare (Kang-Kim et al., 2008).

Another study done by Chan et al. (2012) found that even when Blacks and Hispanics had comparable access to healthcare services as their White counterparts, they received fewer recommended healthcare services. Additionally, this study concluded that not only did Hispanics receive less healthcare services than their Black counterparts, but they also received a poorer quality of care. This study further noted that Hispanics had a higher rate of diabetes-related healthcare visits than their Black counterparts, but their healthcare outcomes were worse. The researchers surmised that the poorer quality of care could be related to language barriers and/or shorter length of visits.

Many factors can affect a population's access to healthcare. These factors can be either intrinsic or extrinsic to a particular population such as educational background, age, gender, residence, immigration status, and/or socioeconomic status.

Significance of Study

Hispanics have a higher prevalence of type-2 diabetes compared to their non-Hispanic White counterparts. A cross-sectional study ($N = 7,239$) done by Lopez et al. (2014) found that Hispanics had the poorest glycemic control and the highest rate of nonadherence among all racial groups. They have higher disability, morbidity, and

mortality rates associated with type-2 diabetes because they have lower rates of medication adherence and they are sicker when they initially seek healthcare services (Cowie et al., 2010). There is a need for future studies to focus on ways to improve patients' adherence to their medication regimens (Odegard & Capoccia, 2007). But first, healthcare providers need to understand the contributions of psychosocial adjustment in order to design appropriate future risk reduction and health promotion strategies.

The diagnosis of type-2 diabetes is related to physical inactivity, a poor diet, morbid obesity, and people living longer (Barag, 2011). Because diabetes leads to physical disability, morbidity, and eventually death, the impact of this disease on an individual should be lessened. Being diagnosed with type-2 diabetes requires individuals to make lifestyle changes. This could cause them to go through a period of unhealthy adjustment. They must adjust to having type-2 diabetes in order to manage it correctly. Most individuals achieve psychological well-being and a healthy adjustment to type-2 diabetes. However, some individuals have a prolonged adjustment period and an unhealthy adjustment to type-2 diabetes (de Ridder, Geenen, Kuijer, & Middendorp, 2008). Peyrot et al. (2005) found that patients with type-2 diabetes were prone to psychosocial issues. Kent et al. (2010) concluded that research focused on healthy coping to a diagnosis of type-2 diabetes should be supported because of the harmful effects this disease has on individuals' psychosocial well-being.

Middle-aged adults are in the psychosocial developmental stage of Generativity versus Stagnation (Atkinson & Hilgard, 1990). During this stage, individuals are taking care of their families, volunteering with various help organizations, and being productive members of society. If adults are not successful in this developmental stage, they become stagnant and nonproductive. They focus on themselves and do not display

concern for the well-being of others, which negatively affects families, society, and the workforce. There are many modifiable interpersonal/intrapersonal risk factors associated with psychosocial adjustment in individuals diagnosed with type-2 diabetes.

Modifiable risk factors which affect psychosocial adjustment in individuals diagnosed with type-2 diabetes are related to the lack of social resources, financial hardships, poor education, life stressors, and limited access to healthcare (Brown & Bussell, 2011). Life course factors such as (a) health care orientation, (b) vocational environment, (c) domestic environment, (d) sexual relationships, (e) extended family relationships, (f) social environment, and (g) psychological distress (Derogatis, n.d.) should be explored because many factors can affect medication adherence. Regular patient education is often not effective with helping patients achieve and maintain good glycemic control (Peyrot et al., 2005; Thorpe et al., 2012). Individuals are social beings and they cannot live in isolation. According to the World Health Organization (WHO) (1948), health is not only being free of physical illness, but total biological, physiological, psychological, and sociological well-being. Thus, providing effective risk reduction and health promotion strategies to help patients with their psychosocial adjustment could improve their healthcare outcomes. To affect change in uninsured Hispanic immigrants diagnosed with type-2 diabetes, researchers have to examine life course factors in order to create risk reduction and health promotion strategies to help with their psychosocial adjustment. This help could decrease hospital readmissions and healthcare costs related to disability, morbidity, and mortality.

Middle-aged Hispanics and their families are disproportionately affected by type-2 diabetes and its complications. Hispanics come from different cultural and racial backgrounds. It is important that this population and its subgroups are studied in order to

determine what specific risk reduction and health promotion strategies are needed to assist them in becoming healthy and productive members of society. Studies done on this segment of the population are often comprised of Mexican Americans. However, the more recent subgroups of Hispanics to migrate to the United States are from Central America (U.S. Census Bureau, 2011). This population has not been examined in regard to how psychosocial adjustment influences medication adherence. Different racial and ethnic groups have different psychosocial needs (Gomes-Villas Boas, Foss, Freitas, & Pace, 2012; Schoenthaler, Schwartz, Wood, & Steward, 2012). Therefore, this predictive correlational study was undertaken in the target population to examine how psychosocial adjustment predicts medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes.

Purpose

The purpose of this study was to examine whether psychosocial adjustment predicts medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes.

Research Questions

There was one primary research question: What are the psychosocial adjustment predictors of medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes?

Four secondary research questions were developed based on life course factors:

1. Is there a difference in medication adherence (low, medium, high) in uninsured Hispanic immigrants aged 40 to 64 years old based on gender?
2. Is there a difference in medication adherence (low, medium, high) in uninsured Hispanic immigrants aged 40 to 64 years old based on age?

3. Is there a difference in medication adherence (low, medium, high) based on disease duration?
4. Do men and women have a difference in medication adherence scores based on education?

Hypothesis

The primary hypothesis was that the greater the individual's psychosocial adjustment, the more likely he or she will adhere to his or her prescribed medication regimen.

Life Course Health Development Conceptual Framework

The Life Course Health Development (LCHD) Framework was developed in the 1950s to explain the health disparities in different populations. This framework first sought to explain the differences in health outcomes across the lifespan between African American and White American children. According to this framework, health outcomes are the cumulative impact of biological, environmental, and behavioral interactions throughout the lifespan. Halfon, Inkelas, and Hochstein state that health risks and health promotions have to balance each other in order for individuals and populations to reach their ideal health potential or trajectory. When health risks outweigh health promotions, individuals and populations do not reach their ideal health potential or trajectory. This is manifested by biological, physiological, psychological, and/or sociological dysfunction. Thus, health outcomes are the dynamic interactions of genetics, environmental factors, and behaviors/experiences throughout the lifespan. There are no definitive constructs of this framework, however, there are eight focal concepts: (a) Environment is the internal or external conditions of the person such as biological, social, physical, and economical factors which affect health outcomes; (b) Protective factors are factors that promote

positive health outcomes; (c) Risk factors are factors that negatively affect health outcomes; (d) Health promotion strategies are interventions that promote positive health outcomes; (e) Risk reduction strategies are interventions aimed at reducing risks associated with negative health outcomes; (f) Critical or sensitive periods (timing) are times during the lifespan when individuals are particularly vulnerable to stressors; (g) Life/Developmental stages are times during the life cycle when important developmental growth occurs; and (h) Optimal trajectory is the ideal health outcome for an individual or population (Halfon & Hochstein, 2002).

The LCHD framework (Figure 1) states that during the lifespan there are critical or sensitive periods in the various life/developmental stages when stressors are more harmful to health outcomes. During these critical or sensitive periods, risk reduction and health promotion strategies are most effective. Stressors occurring during less critical or sensitive periods do not have the same impact. Thus, intervening during critical or sensitive periods would optimize health outcomes for individuals and populations. Health is the cumulative impact of biological, environmental, and behavioral interactions over a lifespan. Therefore, prevention should start at birth to optimize health outcomes by intervening throughout the lifespan during the critical or sensitive periods. Understanding how biological, environmental, and behavioral interactions affect the health outcomes of individuals and populations across the lifespan can lead to tailored interventions that optimize health outcomes in the target population (Halfon & Hochstein, 2002).

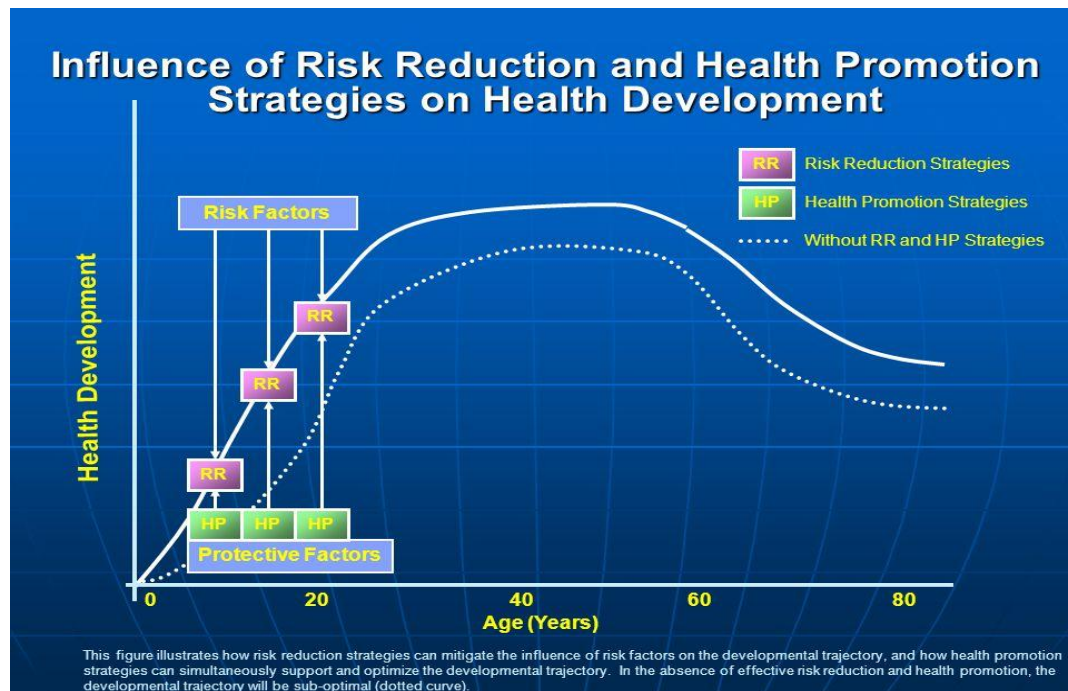


Figure 1. Influence of risk reduction and health promotion strategies on health development. From “The Health Development Organization: An Organizational Approach to Achieving Child Health Development” by N. Halfon, M. Inkelas, and M. Hochstein, 2000, *The Millbank Quarterly*, 78(3), 447-497. Used with permission (see Appendix A).

More cases of young adults being diagnosed with type-2 diabetes are occurring, but a type-2 diabetes diagnosis is still seen as a middle-aged disease category. During this psychosocial developmental stage (Generativity versus Stagnation), adults are usually providing for their families. A diagnosis such as type-2 diabetes could affect their ability to do so. This could interfere with their ability to adjust to their illness and lead to a further decline in their health status and productivity. If risk reduction and health

promotion strategies are in place to help uninsured Hispanic immigrants with their type-2 diabetes, they can effectively adjust to their illness (Halfon & Hochstein, 2002).

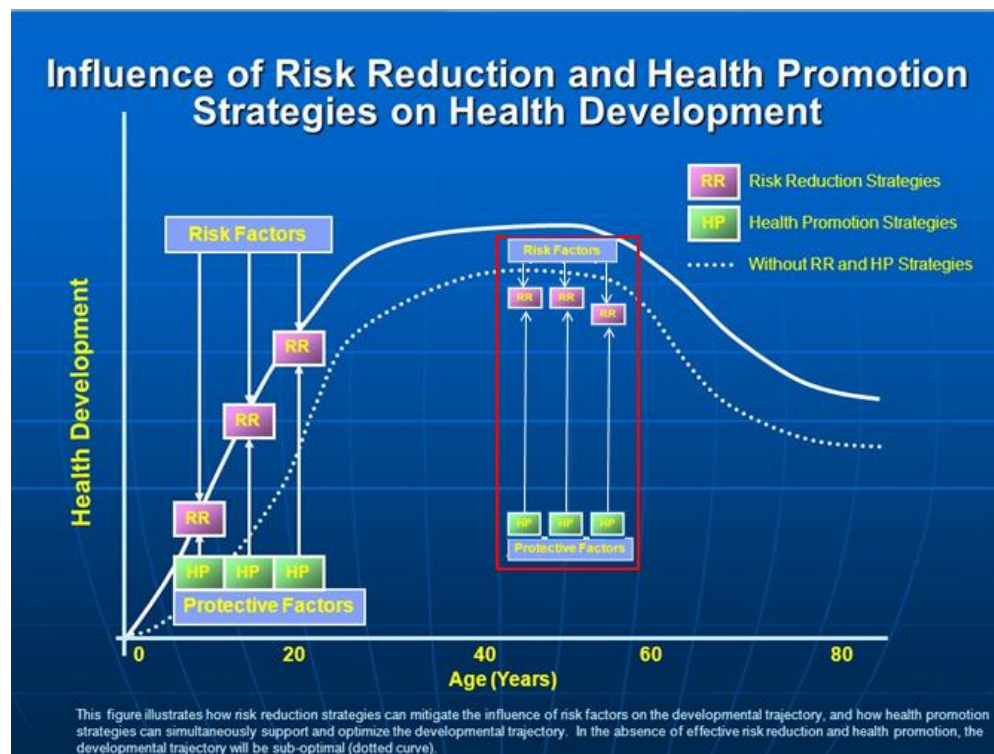


Figure 2. Influence of risk reduction and health promotion strategies on health development: Health trajectory that can be applied to risk reduction for Hispanic immigrants with type-2 diabetes. From “The Health Development Organization: An Organizational Approach to Achieving Child Health Development” by N. Halfon, M. Inkelas, and M. Hochstein, 2000, *The Millbank Quarterly*, 78(3), 447-497. Used with permission (see Appendix A).

These concepts are congruent with the concept of psychosocial adjustment to a type-2 diabetes diagnosis and its influence on medication adherence. Being diagnosed

with type-2 diabetes can be an overwhelming experience. When type-2 diabetes occurs during the Generativity versus Stagnation developmental stage, individuals may not handle this situation well. Risk reduction and health promotion strategies such as support groups, health education, and focus groups should be in place to help them adjust to their type-2 diabetes. If they do not have these strategies in place, it may lead to an unhealthy adjustment. When individuals display unhealthy adjustment behaviors such as prolonged shock (denial), depression, and anger, they do not make the lifestyle changes that are necessary for them to effectively control their type-2 diabetes. Therefore, in a vulnerable Hispanic population, protective factors that promote positive health outcomes should counterbalance risk factors such as lack of social resources, financial burdens, poor education, life stressors, and limited access to care which negatively affect health outcomes (see Figure 2). This framework states that optimal health outcomes occur when risk reduction and health promotion strategies occur during the critical or sensitive periods (timing). When risk reduction and health promotion strategies do not occur during the life/developmental stage of Generativity versus Stagnation, individuals will not achieve their optimal health trajectory. Since the interaction of genetics, environmental factors, and behaviors/experiences has a cumulative impact on optimal health outcomes, negative health outcomes will result in biological, sociological, physiological, and/or psychological dysfunction if risk factors are not reduced. Hence, individuals will not be able to reach their optimal health trajectory (see Figure 2). However, if risk reduction and health promotion strategies are in place during critical or sensitive periods to assist individuals with their psychosocial adjustment, they can effectively adjust and manage their type-2 diabetes. They can begin to recognize the reality of the situation and become proactive in their treatment

regimens (Dutta & Kundu, n.d.; Livneh & Antonak, 2005). How well they adjust to their illness will determine how well they adhere to their medication regimens.

As mentioned earlier, psychosocial adjustment requires healthcare providers to develop risk reduction and health promotion strategies aimed at the following life course factors: (a) healthcare orientation, (b) vocational environment, (c) domestic environment, (d) sexual relationships, (e) extended family relationships, (f) social environment, and (g) psychological distress (Derogatis, n.d.). Effective psychosocial adjustment can delay disability, morbidity, and mortality of individuals associated with a type-2 diabetes diagnosis. This would lead to decreased hospital readmissions and associated healthcare cost.

Table 1 presents this study's conceptual/operational definitions.

Table 1

Conceptual/Operational Definitions

Variable	Conceptual Definitions	Operational Definitions
<u>Dependent Variable</u> Medication Adherence	The extent an individual self-reports adherence to his or her prescribed medication regimen (Morisky, Ang, Krousel-Wood, & Ward, 2008).	Morisky 8-item Medication Adherence Scale (MMAS) was developed to assess how well individuals adhered to their medication regimen (Morisky, Green, & Levine, 1986).
<u>Independent Variable</u> Psychosocial Adjustment	Measurement of an individual's psychosocial adjustment to type-2 diabetes which focuses on the following life course factors: (a) healthcare orientation, (b) vocational environment, (c) domestic environment, (d) sexual relationships, (e) extended family relationships, (f) social environment, and (g) psychological distress (Derogatis, n.d.).	Psychosocial Adjustment to Illness Scale-Self Report (PAIS-SR) consists of 46 items and 7 domains which measure an individual's psychosocial adjustment to his or her chronic illness (Derogatis, n.d.). The domains will be summed for a total score reflective of psychosocial adjustment. The higher score depicts a lower level of psychosocial adjustment (Derogatis, n.d.).
<u>Independent Variable</u> Healthcare Orientation	An individual's attitude toward their health, health information, and treatment information and expected treatment outcomes (Rodrigue, Kanasky, Jackson, & Perri, 2000).	PAIS-SR
<u>Independent Variable</u> Vocational Environment	The individual's problems at work, sick days taken, job performance, and future job-related goals (Rodrigue et al., 2000).	PAIS-SR
<u>Independent Variable</u> Domestic Environment	The extent to which individuals need help from others related to their illness such as financial support, chores, and changes in family roles (Merluzzi & Sanchez, 1997).	PAIS-SR
<u>Independent Variable</u> Sexual Relationship	The extent of intimacy with an individual's significant other (Rodrigue et al., 2000).	PAIS-SR

Variable	Conceptual Definitions	Operational Definitions
<u>Independent Variable</u> Extended Family Relationship	The individual's interaction and communication with family members and spouse (Rodrigue et al., 2000).	PAIS-SR
<u>Independent Variable</u> Social Environment	The individual's interest in individual and group social activities (Rodrigue et al., 2000).	PAIS-SR
<u>Independent Variable</u> Psychological Distress	Negative feelings related to disease process such as depression, anxiety, anger, guilt/self-blame, and worry (Rodrigue et al., 2000).	PAIS-SR
<u>Operational Definitions</u> Healthy Adjustment	When individuals easily adjust to the changes in their lives, in the literature it is termed effective or adaptive (Dutta & Kundu, n.d.).	
Unhealthy Adjustment	When individuals do not easily adjust to the changes in their lives, in the literature it is termed ineffective or maladaptive (Dutta & Kundu, n.d.).	
Middle-aged	Adults aged about 40 to 60 years old ("Middle-aged," 2014).	Measured using the researcher-developed Demographic Survey.
Glycosylated hemoglobin (HbA1c)	This is the standard measurement used to assess medication adherence in patients with type-2 diabetes (Trouilloud & Regnier, 2013).	
Acculturation	Adaptation of an individual, group, and/or population to a particular culture over time ("Acculturation," 2014).	
Hispanic Immigrants	Individuals who self-identify as being of Hispanic descent.	

2. REVIEW OF THE LITERATURE

The purpose of this chapter is to present studies on medication adherence, psychosocial adjustment, and how life course factors of psychosocial adjustment affect medication adherence in individuals diagnosed with type-2 diabetes. There will be a discussion of how demographic variables and acculturation affect medication adherence, and a look at studies which focus on the Life Course Health Development (LCHD) conceptual framework which guided this study. Lastly, this chapter will be summarized.

Search Strategy

A search for primary research journals was conducted using the following electronic databases: Psychinfo, Medline, Web of Science, and CINAHL for the years 2004-2014. The search was limited to human studies in the English language on adults 18 and older. The studies were included if the independent variable (IV) was psychosocial adjustment, the dependent variable (DV) was medication adherence, and if the participants were adults aged 18 and older who were previously diagnosed with type-2 diabetes.

The following key words and MESH terms were used for this search: "Diabetes Mellitus Type 2" AND "medication adherence" AND "Adaptation," "psychological" or "social adjustment" or "psychosocial adjustment" or "emotional adjustment," "middle-aged adult," "type-2 diabetes," diabetes mellitus," "medication adherence," and "treatment adherence," "health literacy," "job performance," "job productivity," "family relationship," "intimacy," "social interaction," "psychological distress," "job," "sexual

relationship,” “work,” “intercourse,” and “sex,” including searches of the references of each article for additional articles.

Medication Adherence

The term “adherence” describes how well individuals follow their prescribed treatment regimens. Previously, the term “compliance” was used, but using “compliance” had negative implications. Individuals were not allowed to alter their medication regimens despite their lifestyle, socioeconomic status, or educational background. Using “adherence” allows individuals to be active participants in their medication regimens (Lutfey & Wishner, 1999).

Quantitative measures to examine medication adherence are self-report instruments (such as the Morisky Medication Adherence Scale (MMAS)), pill counting, electronic monitoring devices (such as medication event monitoring systems (MEMS)), and/or pharmacy refill records (such as medication pill ratio (MPR)) (Bailey et al., 2012). For the purposes of this study, *medication adherence* will be defined as the extent an individual self-reports adherence to his or her prescribed medication regimen (Morisky et al., 2008). The WHO (2003) defines adherence as the degree to which an individual follows a diet plan, medication regimen, and/or recommended lifestyle changes prescribed by his or her healthcare provider. A quantitative method to assess medication adherence is to measure the HbA1c level, also called the glycosylated hemoglobin level, which is the standard measurement used to assess medication adherence in patients with type-2 diabetes. The HbA1c shows how well a patient’s blood glucose level has been controlled over the last three months. The normal reference range is 4.0-6.0% (Trouilloud & Regnier, 2013). Poor blood glucose control will be defined as HbA1c > 7.0% (Trouilloud & Regnier, 2013). However, individuals without type-2 diabetes who

belong to the following racial and ethnic groups have higher HbA1c levels when compared to their non-Hispanic White counterparts: African Americans, Asians, Hispanics, and American Indians (Herman & Cohen, 2012). Therefore, other tests are considered before making a type-2 diabetes diagnosis (Herman & Cohen, 2012).

Medication adherence is an important intervention to manage diabetes. Eventually, most individuals will have some form of medication management, either insulin or an oral hypoglycemic. These medications act quickly to reduce high blood glucose levels. Individuals should use them as prescribed by their healthcare providers to promote health and prevent cellular damage (Bhattacharya, 2012). Brown and Bussell (2011) found that if individuals with hypertension, high cholesterol, and diabetes adhered to their medication regimens, this would reduce hospital readmissions and the financial strain on the healthcare system. One-third to two-thirds of all medication-related hospitalizations in America are related to nonadherence (Brown & Bussell, 2011). Individuals with a type-2 diabetes diagnosis are often readmitted to the hospital for uncontrolled blood glucose levels, high blood pressures, pain, or to manage other symptoms (Brown & Bussell, 2011). Many factors contribute to patients not adhering to their medication regimens. These factors are complex and the experts do not fully understand them. Therefore, more studies should focus on ways to improve patients' adherence to their medication regimens (Bogner, Morales, de Vries, & Cappola, 2012; Odegard & Capoccia, 2007). Retrospective studies have associated medication adherence with healthcare utilization; therefore, lower levels of adherence with antihypertensive and antihyperlipidemic medications are associated with increased hospital readmissions (Rane, Wajngot, Wändell, & Gåfväls, 2011). If individuals adhered to their prescribed medication regimens, they could reduce the frequency of their

hospital readmissions. Patients with a type-2 diabetes diagnosis may have psychosocial problems related to their disease which can affect medication adherence (Peyrot et al., 2005). Further, there are effective methods for treating the side effects of a type-2 diabetes diagnosis. Some patients do not have these health benefits because they do not adhere to their medication regimens (Brown & Bussell, 2011).

A randomized cross-sectional study done by Tiv et al. (2012) found that only 39% of study participants ($N = 3,637$ French adults) reported good adherence to their prescribed medication regimen. This study further found that participants with poor medication adherence (12%) had higher levels of morbidity (Tiv et al., 2012). Another nonrandomized cross-sectional study done by Sultana, Kapur, Aqil, Alam, and Pillai (2010) found that 47.7% of the participants ($N = 218$ Indian adults) did not adhere to their medication regimen. In both of these studies medication adherence was based on number of doses taken as prescribed by the participants' physicians. These studies may not be generalizable to other populations because the study samples were not diverse. Self-reported instruments were used in both studies and information may be biased. However, these findings are congruent with what researchers found in similar studies. Individuals should not be blamed for not adhering to their medication regimens or failing medication regimens (Brown & Bussell, 2011). There is a need for healthcare providers to examine modifiable patient risk factors which affect medication adherence so they can develop individualized risk reduction and health promotion strategies to improve medication adherence.

Modifiable patient risk factors which would enable an individual to seek and use healthcare are: healthcare literacy, involvement in developing the medication regimen, and understanding the medication regimen (Bogner et al., 2012; Brown & Bussell, 2011).

Healthcare providers underestimate the significance of a trusting provider–patient relationship. When this relationship is mutual, it can be productive for both the patient and the provider (McDowell, McPhail, Halyburton, Brown, & Lindsay, 2009). An environment which improves open communication is helpful for the provider and the individual. Treatment needs can be communicated so an effective treatment regimen can be developed (Shah, Gupchup, Borrego, Raisch, & Knapp, 2012). Brown and Bussell (2011) found that providers are often unaware of how they contribute to a patient's nonadherence when they do not consider an individual's socioeconomic status and they prescribe complex treatments which further burden the individual. Other ways providers unknowingly contribute to nonadherence center around not communicating effectively with other providers involved in the care of the individual, not thoroughly explaining the purpose of the medication and the side effects, and not encouraging patients to become actively involved in their care (Brown & Bussell, 2011). When healthcare providers listen to the needs and concerns of their patients, an effective medication regimen can be developed which meets the individual's specific needs and lifestyle (Hansen, Landstad, Hellzén, & Svebak, 2011; Shah et al., 2012).

Many factors can affect medication adherence. These factors can range from the lack of social resources such as limited access to care and low social support to life stressors such as financial constraints, poor education, health literacy (Brown & Bussell, 2011) and other psychosocial issues (Peyrot et al., 2005).

Psychosocial Adjustment

Psychosocial adjustment will be defined as a measurement of an individual's adjustment to his or her type-2 diabetes diagnosis related to the following life course factors: (a) health care orientation, (b) vocational environment, (c) domestic

environment, (d) sexual relationships, (e) extended family relationships, (f) social environment, and (g) psychological distress (Derogatis, n.d.). Patients diagnosed with type-2 diabetes may have life course psychosocial factors related to their disease which affect medication adherence (Peyrot et al., 2005). Psychosocial adjustment is how well an individual uses problem-solving skills to manage resources in order to optimize his or her healthcare outcomes (Chan, Da Silva Cardoso, & Chronister, 2009).

Individuals with type-2 diabetes cannot thrive when their medication regimen does not embrace the social, emotional, cultural, and psychological characteristics of their life (Richmond, 1998). Psychosocial adaptation and psychosocial adjustment are used interchangeably in the literature. However, adaptation is the process an individual goes through to achieve maximal adjustment to his or her illness (Chan et al., 2009). When an individual easily adjusts to the changes in his or her life, it is termed effective or adaptive. When an individual does not easily adjust to the changes in his or her life, it is termed ineffective or maladaptive (Dutta & Kundu, n.d.). If this adjustment phase is prolonged or unsuccessful, it can negatively affect an individual's quality of life and his or her physical or psychological well-being (Lazarus, 1993). Thus, psychosocial adjustment to illness is a process (Dutta & Kundu, n.d.). When individuals have adjusted to their illness, they can perform the tasks necessary for them to improve their health status. This does not mean they are content with their circumstances; however, they have accepted their limitations and can successfully perform the activities of daily living. These individuals have a positive self-concept and can use environmental resources (healthcare providers, support groups, pharmacy, etc.) to have their needs met (Chan et al., 2009). Patient behaviors are observed to determine if an individual is adjusting to his or her type-2 diabetes (de Ridder et al., 2008; Stanton, Revenson, & Tennen, 2007).

Life Course Factors of Psychosocial Adjustment

Health is not just the absence of physical illness, but total biological, physiological, psychological, and sociological well-being (WHO, 1948). Individuals are social beings who thrive in communities and group settings. They cannot thrive alone. On reviewing the literature, there are few studies which explore the relationship between psychosocial adjustment and medication adherence in individuals with type-2 diabetes. Studies exploring this relationship have increased within the last few years (Thorpe et al., 2012). Psychosocial adjustment includes the following life course factors: (a) health care orientation, (b) vocational environment, (c) domestic environment, (d) sexual relationships, (e) extended family relationships, (f) social environment, and (g) psychological distress (Derogatis, n.d.). To affect change in uninsured Hispanic immigrants diagnosed with type-2 diabetes, researchers have to examine life course factors in order to create risk reduction and health promotion strategies. This may help them with their psychosocial adjustment and potentially improve their healthcare outcomes.

Healthcare Orientation and Medication Adherence

In this study, *healthcare orientation* is defined as an individual's attitude toward his or her health, health information, treatment information, and expected treatment outcomes (Rodrigue et al., 2000). Many studies have associated healthcare orientation with medication adherence. An intervention study done by Bogner et al. (2012) and a systematic review done by Brown and Bussell (2011) found if patients were involved in their treatment regimens, had healthcare literacy, and understood their medication regimens they had better medication adherence. A cross-sectional study ($N = 54$) done by Kheir, Greer, Yousif, Al Geed, and Al Okkah (2011) in Qatar aimed to examine how

knowledge, view of illness, and attitude affected self-care practices in adults diagnosed with type-2 diabetes. The researchers used the Knowledge, Attitude, Practice (KAP) and the Diabetes Habits and Beliefs Questionnaire (DHBQ). Both questionnaires were self-report. This study found that education had a significant effect on attitude and knowledge related to medication adherence and type-2 diabetes. This study further found there was a positive correlation between knowledge, attitude, and psychological well-being of the participants. Overall, participants were found to have poor adherence to their prescribed medication regimens. This study concluded there should be individualized treatment plans for those with type-2 diabetes. These findings are congruent with other research done in this area. The strength of this study was that it focused on the needs of Qatari residents with a type-2 diabetes diagnosis; therefore, culturally relevant risk reduction and health promotion strategies could be developed. The limitations of this study were as follows: small sample size, participants were not diverse, measurement instruments were self-report, validity and reliability information on the tools used in this study were not provided, and this was not a randomized controlled trial. Although the findings from this study are not generalizable to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes, they do support the team of this research.

An observational prospective study ($N = 141$) done by Parchman, Zeber, and Palmer (2010) aimed to examine how participatory decision making affected clinical outcomes in adults with type-2 diabetes. Participants were recruited from five physician clinics in South Texas. The DVs were patient activation, medication adherence, HbA1c level, lipid panel, and blood pressure readings. The IV was participatory decision making. This study used a Participatory Decision Making questionnaire developed by Kaplan. Patient Activation was operationalized using the Lorig Communication Scale.

Medication adherence was operationalized using the 4-item Morisky Medication Adherence Scale (MMAS). This study found that participants had improved HbA1c levels, lipid panels, and medication adherence when patient activation improved. The strengths of this study were the high questionnaire response rate and the relevance of the study. However, there were several limitations to this study: sample size was small and not diverse, power analysis was not used, and this was not a randomized study. Further, self-report measurements were used and the reliability and validity of the measurements were not reported. The findings from this study may not be generalizable to uninsured Hispanic immigrants because of the above limitations, so the current research will add to the science by examining how patients' involvement in their treatment plans, in the targeted population, affected clinical outcomes. Further, the 8-item MMAS was used in the current study instead of the 4-item MMAS due to its greater rigor.

A prevalence study ($N = 128$, 46.9% South Asian) done in London by Khan, Lasker, and Chowdhury (2011) aimed to examine the prevalence and factors related to HbA1c levels in disadvantaged urban adults (aged 24 to 89) with type-2 diabetes. The DV was glycemic control. The IVs were factors associated with glycemic control such as patients not being involved, health literacy issues, psychosocial issues, mental health issues, and work-related issues. This study was not guided by a theoretical or conceptual framework. The researchers found that patient involvement, health literacy, psychosocial issues, and mental health and work-related issues were associated with poor glycemic control. They further found that a longer duration of type-2 diabetes was correlated with poorer glycemic control. At a 6-month follow-up interview, 75.8% of study participants had improved HbA1c levels. This study also found that participants had a

10% increase in their HbA1c levels if they were not actively involved in their plan of care. This study concluded there are many factors which affect glycemic control in individuals with type-2 diabetes, and involving them in their plan of care may improve their glycemic control. However, before individualized risk reduction and health promotion strategies can be developed, a prevalence study should be done to determine some of the contributing factors of medication nonadherence in the targeted population. The strength of this study was its relevance related to examining factors which influenced HbA1c levels. The researchers did not mention whether they got study approval from an institutional review board (IRB) and whether consent forms were signed by study participants. There were several limitations to this study such as a small sample size, no power analysis, this was not a randomized control trial, and no interview guidelines or measurement instruments were described. The researchers reported the sample as being diverse, but 46.9% of the participants were South Asians. Thus, these findings may not be generalizable to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes.

There are many factors which affect glycemic control in individuals with type-2 diabetes. According to the literature, healthcare orientation is associated with medication adherence, therefore, healthcare providers should develop individualized treatment plans to help with medication adherence. This would improve healthcare outcomes in individuals with type-2 diabetes. In the three studies above, the study participants were culturally different from the participants in this current study. There have been few cross-sectional studies examining healthcare orientation in Hispanic immigrants with type-2 diabetes. This study will add to the science by examining factors which affect self-care

practices in uninsured Hispanic immigrants with type-2 diabetes in order to design appropriate future risk reduction and health promotion strategies for them.

Vocational Environment and Medication Adherence

In this current study, *vocational environment* is defined as the individual's problems at work, sick days taken, job performance, and future job-related goals (Rodrigue et al., 2000). There were few studies found in the literature which explored the association between vocational environment and medication adherence in individuals with a type-2 diabetes diagnosis. A retrospective cross-sectional study ($N = 369$) done by Davila et al. (2011) aimed to explore if the number of hours worked per week and type of employment were associated with poor glycemic control in adults (20 years and older) with type-2 diabetes. Glycemic control (DV) was operationalized using the HbA1c level. The IVs were employment type and hours worked per week. Employment type was operationalized using the Standard Occupational Classification (SOC), and hours worked per week were operationalized using a questionnaire. The researchers found there was an association between the work environment and glycemic control. Participants who worked more than 40 hours each week were five times more likely to have poor glycemic control compared to participants who worked less than 20 hours each week. The study further found that agricultural workers were more likely to have poor glycemic control when compared to white collar and blue collar workers. This study should be described as a retrospective–prospective study. The strength of this study was that it asked a relevant question about how work conditions were related to glycemic control. There were many limitations to this study such as having a cross-sectional design and a small sample size, self-report questionnaires were used, there was only one HbA1c result, and no medication adherence questionnaire was used in this

study. Since this was not a randomized control trial, a causal relationship could not be determined. The findings from this study cannot be generalized to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes because of the above limitations but they support the team of this research.

There were other studies in the literature which found an association between job strain and the risk of developing type-2 diabetes. A prospective cross-sectional study ($N = 5,337$) done by Huth et al. (2014) aimed to determine if participants with high job strain had an increased risk of developing type-2 diabetes. This study found that participants (29 to 66 years old) who had job strain were 43% more likely to develop type-2 diabetes than participants with low job strain. Type-2 diabetes was measured based on having a diagnosis. Job strain (IV) was measured using the Kuraseck Job Content Questionnaire. High job strain was conceptualized using the quadrant approach. This study concluded that the work environment is associated with an increased risk of type-2 diabetes. The findings from this study were congruent with a study in this area done by Heraclides, Chandola, Witte, and Brunner (2012). The strengths of this study were the high response rate and the research question was relevant to the current study. There were many limitations, though: a prospective design, job strain was measured at one point in time, and the sample size was small. This study used self-report measurement instruments; however, the authors did not mention the validity and reliability of these instruments. This study did not include race/ethnicity or gender characteristics of the sample. Thus the findings from this study may not be generalizable to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes.

According to the three studies above, there is an association between vocational environment and medication adherence. However, there is a lack of literature examining

the association between vocational environment and medication adherence. More studies should examine this relationship in different racial and ethnic groups. This current study will add to the state of the science by examining if vocational environment is associated with medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes.

Domestic Environment and Medication Adherence

In this current study, *domestic environment* is defined as the extent that individuals need help from others because of their illness such as financial support, chores, and changes in family roles (Merluzzi & Sanchez, 1997). There were no studies found in the literature which explored the association between domestic environment and medication adherence. However, this life course factor is similar to the extended family life course factor and the Social Support life course factor. It is difficult to separate these life course factors based on the literature because there is overlap. A systematic review ($N = 29$) done by Stopford, Winkley, and Ismail (2013) found that support was associated with medication adherence in participants with type-2 diabetes. Social support (IV) was defined as family/community involvement, marital status, and social involvement (perceived, actual or emotional). Glycemic control (IV) was measured using the HbA1c level. This study found there were no standard methods to measure social support and glycemic control. This study further found that the study populations and settings varied as well. The researchers concluded there should be more studies to examine how different types of social support are associated with medication adherence or glycemic control and the measurement of these variables should be standardized. A strength of this systematic review was that the research question was relevant to understanding how various types of social support affect medication adherence in

individuals with type-2 diabetes. Another strength of this study was that it included a broad database search as well as time period search. Limitations to this study include the lack of demographic information, inconsistencies in the way HbA1c levels were collected, and how social support was defined.

There are many factors which affect medication adherence in individuals with type-2 diabetes. Throughout the literature, there are inconsistencies in how social support is defined. The above study found that the literature has yet to examine how the domestic environment specifically (type of social support) affects medication adherence in individuals with type-2 diabetes. In this current study, the researcher will add to the state of the science by examining the association between domestic environment and medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes.

Sexual Relationship and Medication Adherence

In this current study, *sexual relationship* is defined as the extent of intimacy with an individual's significant other (Rodrigue et al., 2000). There were few studies found in the literature which explored the association between sexual relationship and medication adherence. A cross-sectional prospective study ($N = 78$) done by Trief, Ploutz-Snyder, Britton, and Weinstock (2004) aimed to explore the association between marital quality and treatment adherence in participants with type-1 and type-2 diabetes. Marital quality (IV) was operationalized using the Spanier Dyadic Adjustment Scale (DAS) and the Personal Assessment of Intimacy in Relationship Inventory (PAIR). Medication adherence (DV) and treatment adherence (DV) were measured using the HbA1c level and the Summary of Diabetes Self-Care Activities (SDSCA) instrument, respectively. This study found the quality of a participant's marriage was associated with how well he

or she adhered to his or her treatment regimen (diet, follow-up appointments, exercise, and medication adherence). This study further found the frequency of blood glucose monitoring and glycemic levels were not related to the quality of the marriage. This study concluded that marital quality is associated with certain aspects of diabetes self-care. The strength of this study was that the research question was relevant to the current study. However, there were many limitations as follows: sample size was small, there was no power analysis information, no information on race/ethnicity, and there was a 23% attrition rate. This study may not be generalizable to uninsured Hispanic immigrants with type-2 diabetes because of the above limitations and because the study included participants with both type-1 and type-2 diabetes.

The above study found there is an association between sexual relationships and diabetes self-care behaviors in individuals with type-2 diabetes, and few studies in the literature examine this association. Future studies should explore how the quality of one's sexual relationship affects medication adherence in individuals with type-2 diabetes. This current study will add to the state of the science by exploring how sexual relationships are associated with medication adherence in uninsured Hispanic immigrants with type-2 diabetes.

Extended Family Relationship and Medication Adherence

In this study, *extended family relationship* is defined as the individual's interaction and communication with family members (Rodrigue et al., 2000). A cross-sectional study ($N = 399$) done by Mier, Bocanegra-Alonso, Zhan, Zuniga, and Acosta (2008) aimed to determine how Health Related Quality of Life (HRQL) was different between two populations (Rio Grande Valley ($n = 199$) and ($n = 200$) Reynosa, Tamaulipas, Mexico) living on the Texas--Mexico Border. The DV HRQL was measured using the Medical

Outcomes Short Study Form instrument. The IVs gender, age, marital status, education, and socioeconomic status were measured using a demographic survey. Depression was measured using the Center for Epidemiological Studies Depression Scale (CES-D). This study found that Mexican Americans with type-2 diabetes who perceived their family members were knowledgeable and supportive of their disease had better healthcare outcomes than participants who felt their family members were not knowledgeable and supportive of their disease. This finding was congruent with other researchers who found that family support improved treatment adherence (Al-Qazaz et al., 2012; Bhattacharya, 2012; Mayberry & Osborn, 2012; Wen, Parchman, & Shepherd, 2004). This study further found that participants with symptoms of depression reported a decrease in HRQOL compared to participants without symptoms of depression. Participants from the Rio Grande Valley who reported a low socioeconomic status and perceived low family support had a decrease in overall HRQL. In the Reynosa group, low HRQL was associated with insulin dependence and disease duration. This study found there was an association between family support and medication adherence in participants with type-2 diabetes. A strength of this study was that the research question was relevant to this current study and sought to determine what factors influenced diabetes outcomes in two different study populations. However, the limitations to this study were that it utilized a convenience sample, the study size was small, and it had a cross-sectional design. Therefore, a causal relationship cannot be determined. Findings from this study may be generalized to the Mexican American population, but not to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes because of cultural and racial differences.

Cross-sectional studies have associated family support with healthcare outcomes in individuals with acute and/or chronic illnesses such as type-2 diabetes. However, there are few studies exploring this association in Hispanic immigrants. The above study used Mexican American participants, but that population does not represent the entire Hispanic population. This current study will add to the state of the science by exploring how extended family relationships are associated with medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes.

A mixed methods study (focus group $n = 45$, survey $n = 61$) done by Mayberry and Osborn (2012) aimed to explore how participants' (aged 40 to 78) view of family support related to diabetes knowledge and adherence to their treatment regimen and HbA1c levels. The study participants were 57.1% female and 28% of the participants were African American. Medication adherence was measured using the 12-item Adherence to Refills and Medication Scale (ARMS). Demographic variables were measured using a survey. Glycemic control (DV) was measured using the HbA1c level. Family support (IV) was measured using the Diabetes Family Behavior Checklist (DFBC). Family knowledge (IV) was measured using a questionnaire. This study found that the participant's view of his or her family's increased knowledge about type-2 diabetes was associated with more supportive behaviors exhibited by the family but was not associated with decreased nonsupportive behaviors exhibited by the family. Supportive and nonsupportive behaviors occurred at the same time. However, when a participant viewed his or her family as being nonsupportive, this was found to be associated with medication nonadherence and poor glycemic control. This study found an association between perceived family support and medication adherence, and concluded there should be more family interventions for adults with type-2 diabetes. The

strength of this study was that it explored a relevant topic to this current study. The limitations to this study are as follows: the sample size was small and nondiverse, a convenience sample was used from one clinical setting, and the parent study had a different purpose. Further, this was not a randomized control trial; therefore cause and effect cannot be determined. The findings from this study may not be generalizable to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes because of the above limitations.

The two studies above have shown that family support is associated with medication adherence in individuals with type-2 diabetes. However, there have been limited studies comprised of adults which focus on family support. Therefore, more studies should focus on family dynamics (support and function) to develop culturally appropriate risk reduction and health promotion strategies to promote medication adherence. This current study will add to the state of the science by examining if extended family relationships are associated with medication adherence in uninsured Hispanic immigrants.

Social Environment and Medication Adherence

In this current study, *social environment* is defined as the individual's interest in individual and group activities (Rodrigue et al., 2000). In the literature, social resources are associated with medication adherence. Cross-sectional studies have positively correlated social support with medication adherence. A cross-sectional study ($N = 1,484$) done by Kaplan, Billimek, Sorkin, Ngo-Metzger, and Greenfield (2013) aimed to examine factors associated with health disparities in Mexican Americans and Vietnamese Americans compared to non-Hispanic Whites. This study was guided by a comprehensive health disparity conceptual framework. Participants had access to care

and were recruited from seven outpatient clinics. The researchers used a psychosocial assessment instrument to measure social resources. Medication adherence was measured using the mean HbA1c level. This study found that Mexican Americans had an 8.3% higher prevalence of uncontrolled diabetes compared to non-Hispanic Whites. However, there were no significant differences found between Vietnamese Americans and non-Hispanic Whites. The researchers were not able to explain why Mexican American participants still had significantly poorer HbA1c levels compared to other study participants, after controlling for factors known to contribute to health disparity. This study further concluded that interventions should be culturally relevant and individualized to address the psychosocial needs of each racial/ethnic group. The findings from this study are congruent with other studies done in this area (Fortmann, Gallo, & Philis-Tsimikas, 2011; Misra & Lager, 2009). The strengths of this study were its relevance to the current study, large sample size, and it was guided by a conceptual framework. A limitation to this study was that certain minority groups were excluded. Other limitations were that participants had access to care, and the study had a cross-sectional design (no causal relationship can be determined). This study may be generalizable to certain segments of the Mexican American and Vietnamese American populations. However, these findings may not be generalizable to uninsured Hispanic immigrants, and other minority groups with or without insurance, because of differences in culture and access to care.

Another cross-sectional study ($N = 162$) done by Gomes-Villas Boas et al. (2012) aimed to examine the effect of social support and treatment adherence on metabolic control in Brazilian adults with type-2 diabetes. The participants were 58% women and 42% men. This study was not guided by a theoretical or conceptual framework.

Treatment adherence (DV) was measured using the HbA1c level, 8-item Morisky Medication Adherence Scale, and the Diabetes Self-Care Activities Questionnaire. Social support (IV) was measured using the Social Support Network Inventory. This study found that social support was positively associated with treatment/medication adherence. Diet and physical exercise were associated with body mass index (BMI). Medication adherence was positively associated with controlling diastolic blood pressure. No correlations were found between social support and metabolic control. This study concluded further research should focus on social support while using different designs and diverse populations. The strength of this study was the relevance of the research question to the current study and the use of validated and reliable measurement instruments. However, this was not a randomized study; therefore a causal relationship cannot be determined. Other limitations to this study include the small sample size, variables were tested once, and self-report instruments were utilized. The participants were Brazilian, so the findings from this study cannot be generalized to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes because of cultural differences.

Another cross-sectional study ($N = 608$) done by Schoenthaler et al. (2012) aimed to examine how patient/physician psychosocial factors, sociodemographic, and disease-related factors influenced medication adherence in adults with type-2 diabetes. Participants were 68% White, 45% were retired, and the mean age was 62.1. Medication adherence (DV) was measured using the Medication Possession Ratio (MPR). The IVs associated with patient/physician interaction were measured using validated self-report questionnaires for the patient and the physician. This study found that physician satisfaction, patients' beliefs about need for medication, and less diabetes education

were related to better medication adherence. This study also found there was an association between positive patient/physician interactions and lower HbA1c levels. This study concluded there should be interventions to improve physician/patient relationships because there is a positive association with medication adherence. The strength of this study was that it examined a relevant question to the current study, and measurement instruments were validated. Study limitations are noted as follows: 68% of the participants were White with healthcare insurance; this study used MPR which did not account for changes in medications; and the study had a cross-sectional design. The findings from this study are not generalizable to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes due to the above limitations.

The three cross-sectional studies above found there was an association between social environment and medication adherence. These studies also concluded health disparities will continue to widen in minority groups if causes for this disparity are not identified and targeted for improvement. Minority groups should be studied for psychosocial needs and culturally relevant risk reduction and health promotion strategies should be developed to help decrease health disparities. This current study will examine factors which affect medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes. This study will add to the state of the science by determining what factors affect medication adherence in the target population and making recommendations based on these findings.

Psychological Distress and Medication Adherence

In this current study, *psychological distress* is defined as negative feelings related to type-2 diabetes such as depression, anxiety, anger, guilt/self-blame, and worry (Rodrigue et al., 2000). In the literature psychological well-being is associated with

medication adherence. A multinational cross-sectional study ($N = 3,827$) done by Peyrot et al. (2005) aimed to examine how patient/physician psychosocial factors affect medication adherence in adults with type-1 or type-2 diabetes. Treatment adherence (DV) was measured using a face-to-face interview or via telephone questionnaire. IVs associated with patient/physician psychosocial factors were also measured using face-to-face interview or via telephone questionnaires. This study found that participants did not adhere to their treatment regimens because of poor psychosocial well-being, an ineffective physician/patient relationship, and the differences between the physician's perception of the participant's illness and the participant's perception of his or her illness. This study further found that 41% of participants with type-1 or type-2 diabetes had a tendency toward psychosocial issues. The findings from this study were consistent with other studies done in this area (Anders et al., 2008; Davey, Kissel, Niño, & Tubbs, 2010; de Ridder et al., 2008; Lazarus, 1993). There were several strengths as the sample size was large and diverse and it was a multinational study relevant to this current study. The limitations included cultural differences, confounding variables, differences in how researchers gathered data, and no demographic data sampling techniques were used. These findings may not be generalizable to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes because of the above limitations.

Another cross-sectional study ($N = 1,199$) done by Caldwell, Baxter, Mitchell, Shetterly, and Hamman (1988) aimed to determine if there was a difference in the quality of life in Hispanic (San Luis Valley area) and non-Hispanic White participants with noninsulin dependent diabetes mellitus (NIDDM) ($n = 223$) and participants without diabetes ($n = 776$). Perceived quality (DV) of life was measured using the Perceived Quality of Life Questionnaire (PQOL). The IVs related to health, diabetes, and

demographic data were measured using questionnaires. This study found that Hispanic participants with type-2 diabetes reported a significantly lower quality of life score than Hispanic participants without type-2 diabetes. This study further found there were no differences in PQOL between Hispanic and non-Hispanic Whites. This study concluded that interventions should focus on the psychosocial impact of the disease. The strength of this study was that it was relevant to the current research. However, a limitation to this study was that the sample size was not diverse. This study is congruent with other studies done in this area (Anders et al., 2008; Davey et al., 2010; de Ridder et al., 2008; Lazarus, 1993). Yet findings from these studies may not be generalizable to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes because of the above limitations and cultural differences.

The aim of a cross-sectional study ($N = 378$) done by Smalls et al. (2012) was to examine the relationship between coping, diabetes, knowledge, medication adherence, and self-care behaviors in adults (18 to 64 years) diagnosed with type-2 diabetes. Participants were 83% Black and 69% female. This study was not guided by a theoretical or conceptual framework. All measurement instruments were self-report questionnaires. The DVs were: coping, diabetes knowledge, and medication adherence. The IVs were self-care behaviors such as: diet, foot care, checking blood glucose levels, and physical activity. They found that emotional coping was positively associated with type-2 diabetes outcomes. This study concluded interventions should be developed which focus on improving emotional coping skills in individuals with type-2 diabetes. The strengths of this study were that it was relevant to the current research and had a large sample size. However, limitations to this study were that it utilized a nonrandomized convenience sample and the participants were 83% Black and 69% female; this sample

does not represent the general population and cannot be generalized to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes. However, the findings from this study contradict other studies' findings which suggest that emotional coping strategies are associated with maladaptive adjustment. This was not an experimental study; therefore, causal relationships cannot be made.

A preintervention assessment study ($N = 463$) done by Fisher, Glasgow, and Strycker (2010) aimed to examine the relationship between diabetes distress and clinical depression and the effect they had on HbA1c in adults (average age 58.8) with type-2 diabetes. Participants were 51.5% female and 28% minority. The DVs were HbA1c, diet, physical activity, and medication adherence. The IVs were diabetes distress, clinical depression, and demographic variables. Diet was measured using the 7-item Starting the Conversation Scale. Physical activity was measured using the Community Activities Model Program for Seniors Scale (CHAMPS). Medication adherence was measured using the Hill-Bone Compliance Scale. This study found that diabetes distress was positively associated with HbA1c, and negatively associated with physical activity. According to this study, major depressive disorder was not associated with glycemic control. The Diabetes Distress Scale and Major Depressive Disorder were associated with medication adherence. This study further concluded there should be more screenings for diabetes distress and clinical depression in individuals with type-2 diabetes. The strengths of this study were its relevance to the current study and large sample size. However, this study had limitations as follows: a nonrandomized convenience sample, sample too small to examine the variations within groups, sample lacked diversity, and participants had access to care. These study findings are not

generalizable to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes because of the above limitations.

It is well documented in the literature that psychological well-being is associated with medication adherence. In the four studies above, psychological well-being was positively associated with medication adherence. There is a need for healthcare providers to assess the psychosocial needs of their patients in order to develop individualized, culturally relevant risk reduction and health promotion strategies. In this current study, the researcher examined the psychosocial needs of uninsured Hispanic immigrants aged 40 to 64 years old with type-2 diabetes to make recommendations for culturally relevant risk reduction and health promotion strategies.

Sociodemographic Variables and Medication Adherence

Many factors affect how well an individual adjusts to his or her illness such as lack of social resources, financial burdens, life stressors, poor education, and limited access to healthcare (Kent et al., 2010). Other variables which affect medication adherence include race/ethnicity, socioeconomic status, educational level, gender, and age. The following studies focused on these demographics.

A five-year longitudinal cohort study ($N = 629,563$ adults) by Egede et al. (2013) aimed to examine how medication nonadherence was associated with mortality rate in various ethnic groups. Mortality (DV) was based on the electronic medical record (EMR) notation of death. The IVs were medication nonadherence, race, and demographic data. Medication nonadherence was measured using the Medication Possession Ratio (MPR). Race and demographic data were taken from the EMRs. This study found that medication nonadherence was more prevalent in non-Hispanic Blacks (NHB) compared to non-Hispanic Whites (NHW). Medication Possession Rates (MPR) were 12.21 in

NHW, 10.01 in NHB, 12.65 in Hispanics, and 10.41 for all other ethnicities. However, the mortality rate was greater in NHW compared to NHB. Researchers were not clear why this finding occurred. This study also found that Hispanics had a higher mortality rate when using only insulin. This study associated the type of insulin therapy and medication adherence with mortality which varied based on race/ethnicity. The strengths of this study include a large sample size, its five-year longitudinal design, and use of EMRs. The limitations were as follows: women not well represented, MPRs were not validated, there was no information on socioeconomic status, participants had access to care, and there were missing racial/ethnic data. The findings from this study were consistent with other studies on medication adherence. However, the findings from this study are not generalizable to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes because of the above limitations.

A randomized cross-sectional study ($N = 3,637$ French adults) by Tiv et al. (2012) aimed to examine factors which influenced medication adherence in French nationals. This study was not guided by a theoretical or conceptual framework. Medication adherence (DV) was measured using a 6-item questionnaire. IVs associated with demographic, type-2 diabetes diagnosis, and treatment modalities were measured using questionnaires. This study found that financial issues ($OR = -1.7$), age ($OR = -5.2$), and race/ethnicity ($OR = -2.6$) significantly affected medication adherence. This study also found that gender ($p = .93$) and duration of illness ($p = .90$) did not affect medication adherence. Education was not determined to affect medication adherence in this study. The strengths of this study include the large sample size and the relevance of the study to the current research. The limitations of the study include the homogeneity of the sample, self-report measurement instruments were used, and the study was not guided

by a theoretical or conceptual framework. The findings from this study are not generalizable to uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes because of the above limitations.

As described in the two studies above and throughout the literature, sociodemographic variables such as race/ethnicity, socioeconomic status, educational level, gender, and age affect how well individuals adhere to their medication regimens. Acculturation is another factor which can affect medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes.

Acculturation and Medication Adherence

Throughout the literature, acculturation has been associated with medication adherence in immigrants. Few studies have explored this association within the Hispanic population in the United States. A randomized four-stage cluster design study done by Anders et al. (2008) aimed to explore the prevalence of type-2 diabetes and treatment adherence in Mexican participants living on the West Texas–Mexico border of the United States. Treatment adherence (DV) was measured using the Behavioral Risk Factor Surveillance System (BRFSS) instrument. Socioeconomic status (SES) (IV) was measured using a demographic survey. Acculturation (IV) was measured using the Short Acculturation Scale for Hispanics (SASH). Health status (mental and physical) (IV) was measured using the Short Form (SF)-36 instrument. This study found the prevalence rate of type-2 diabetes in Mexican participants was two times the rate of Texas participants. The overall acculturation scores of the study participants were low. However, this score was lower in participants with type-2 diabetes who had lived in the United States for more than 10 years. They further concluded that participants with type-2 diabetes had lower acculturation scores (19.1) compared to participants without

diabetes (24.2). Overall treatment adherence was similar for both groups. However, when study findings were compared to Texas residents, treatment adherence was lower among study participants. The strength of this study was its relevance to the current research. The limitations to this study were as follows: the sample size was small and nondiverse, measurement instruments were self-report, and the HbA1c level was not collected.

Another randomized control trial (RCT) ($N = 144$) done by Rothschild et al. (2012) aimed to explore how two different educational interventions influenced healthcare outcomes in Mexican Americans with type-2 diabetes. This study was guided by Glacier's Conceptual Framework. Medication adherence (DV) was measured using an electronic pill monitoring device, the 4-item Morisky Medication Adherence Scale (MMAS), and the HbA1c level. The IVs sociodemographics, comorbidities, acculturation, health utilization, social support, perceived discrimination, perceived stress, anxiety, empowerment, self-care, and depression were measured using self-report questionnaires. This study found that participants had low acculturation scores, low medication adherence scores, and low socioeconomic status. The strengths of this study were the RCT design, Community Health Workers (CHWs) intervention, and the relevance of the research question to the current study. However, the limitations were as follows: small and nondiverse sample size, participants were recruited from one clinical site, participants were insured, self-report instruments were used, and insulin-dependent participants were excluded.

The two RCTs above concluded that participants with low acculturation scores also had low medication adherence scores and/or HbA1c levels. As stated previously, the literature has associated acculturation and medication adherence, but this current

study will assess acculturation in uninsured Hispanic immigrants. This relationship can be further explored using the Life Course Health Development Framework (LCHD).

Conceptual Framework

The Life Course Health Development (LCHD) Framework was developed in the 1950s to explain the health disparities in different populations (Halfon & Hochstein, 2002). This framework is referred to as a perspective, model, or framework, and is referred to as a framework in this paper. The LCHD first sought to explain the differences in health outcomes across the lifespan between populations, starting from birth. According to the LCHD, health outcomes are the cumulative impact of biological, environmental, and behavioral interactions throughout the lifespan. Theorists state that health risks and health promotions have to balance each other for individuals and populations to reach their ideal health potential or trajectory. When health risks outweigh health promotions, individuals and populations do not reach their ideal health potential or trajectory. This is manifested by biological, physiological, psychological, or sociological dysfunction. Thus, health outcomes are the dynamic interactions of genetics, environmental factors, and behaviors/experiences throughout the lifespan.

The LCHD has been used to explain health disparities among different maternal-child populations (Halfon & Hochstein, 2002), adult mental health changes over the lifespan (Clarke, Marshall, House, & Lantz, 2011), educational disparity and illness over the lifespan (Dupre, 2008), obesity and effect of hospitalizations over the lifespan (Schafer & Ferraro, 2007), urban Blacks across life stages (Brunswick & Merzel, 1988), and racial/ethnic health trajectories in different populations (Brown, O'Rand, & Adkins, 2012). However, this framework has not been used to explore how risk reduction and

health promotions affect the health trajectories of uninsured middle-aged Hispanic immigrants diagnosed with type-2 diabetes.

The LCHD can be used to explore how psychosocial adjustment influences medication adherence in uninsured Hispanic immigrants who are diagnosed with type-2 diabetes. Individuals cannot thrive when they are socially isolated: How well they interact with and adjust to their environment affects their health outcomes. The LCHD examines the cumulative impact of individuals' or populations' biological, environmental, and behavioral interactions throughout the lifespan.

Summary

Type-2 diabetes is a preventable disease which leads to disability, morbidity, and mortality. This disease is a burden to families, the United States' economy, and the healthcare system. Middle-aged adults and Hispanics are disproportionately affected by a type-2 diabetes diagnosis and its associated complications. Type-2 diabetes is managed with diet, exercise, and medication. Methods to treat type-2 diabetes are effective; however, individuals often do not adhere to their medication regimens. Therefore, the regimens' health benefits are not reflected in these individuals. Routine patient education is also often not effective. Within the last few years, researchers have explored the psychosocial aspects of medication adherence (Thorpe et al., 2013).

There are many gaps in the literature regarding individuals' and populations' psychosocial adjustment and medication adherence. The Hispanic population in the United States has increased over 43% in the past decade, and represents individuals from Central/South America, Cuba, Mexico, Puerto Rico, and other Spanish cultures. These groups represent the largest minority population in the country and they are disproportionately affected by this disease. As shown in this literature review, all of the

studies in this area are comprised of Mexican American participants, which only represents a subgroup of the United States' Hispanic population. Future studies should include Hispanic participants from other Spanish cultures. Individuals with type-2 diabetes cannot thrive when their treatment regimen does not embrace the social, emotional, cultural, and psychological aspects of their existence (Richmond, 1998).

According to the LCHD, health outcomes are the cumulative impact of biological, environmental, and behavioral interactions throughout the lifespan. If risk reduction and health promotion strategies are in place to help individuals with their psychosocial adjustment, they can effectively adjust to their type-2 diabetes diagnosis (Halfon & Hochstein, 2002). Risk reduction and health promotion strategies should focus on improving the social, emotional, cultural, and psychological interactions which affect health outcomes. Effective psychosocial adjustment can delay disability, morbidity, and mortality rates associated with type-2 diabetes.

This study used the LCHD framework to examine if psychosocial adjustment predicts medication adherence in uninsured Hispanic immigrants who are diagnosed with type-2 diabetes. Effective psychosocial adjustment can lead to decreased hospital readmissions and associated healthcare costs. This could improve healthcare outcomes in Hispanic immigrants diagnosed with type-2 diabetes and ease the financial burden on their families and the U.S. economy. The purpose of this study, then, is to examine if psychosocial adjustment predicts medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes.

3. METHODOLOGY

This chapter describes the (a) research design, (b) population/sample/sample size, (c) data collection procedure, (d) instrumentation/measurements, (e) plan for data management/analysis, and (f) human subjects. This study used a predictive correlational design to answer the following research question: What are the psychosocial adjustment (IV) predictors of medication adherence (DV) in uninsured Hispanic immigrants aged 40 to 64 years old (population) diagnosed with type-2 diabetes? Permission to conduct this study was received from the Human Subjects Review Board (HSRB) associated with an academic institution (Appendix B).

Purpose

The purpose of this study was to examine if psychosocial adjustment predicted medication adherence in uninsured Hispanic immigrants aged 40 to 64 years diagnosed with type-2 diabetes.

Research Design

A predictive correlational design was chosen for this study because it is known that psychosocial adjustment affects how an individual deals with his or her illness, but the exact characteristics of this relationship are unknown. A predictive correlational design is useful to explain the nature or magnitude of the problem (who is affected; how the affected behave; what they know, believe, and think about the problem) and can study factors associated with the problem. In this study, it was hypothesized that the

greater the individual's psychosocial adjustment, the more likely he or she would adhere to his or her medication regimen.

According to the literature, the covariates associated with type-2 diabetes are: gender, age, race and ethnicity, family income, employment status, length of diagnosis, age at diagnosis, severity of illness, education level, insurance, religion, and marital status (D'Eramo Melkus et al., 2010; Tang, Funnell, Noorulla, Oh, & Brown, 2012; Welch, Zagarins, Feinberg, & Garb, 2011). The researcher used Stepwise Multinomial Logistic Regression to predict if there was a relationship between psychosocial adjustment and medication adherence. Pearson's Chi square was used to find differences among participants.

Setting

This study was conducted at five clinics associated with an academic institution in Northern Virginia. These facilities provide free healthcare services to uninsured Hispanic immigrants with a type-2 diabetes diagnosis and other acute and chronic illnesses. Nurse practitioners who run the clinics strive to provide quality healthcare services in community settings such as the local community recreation center, family resource centers, a local church, and a free standing clinic. These clinics collaborate with community social service agencies to provide culturally competent community-based healthcare to low-income and uninsured Hispanic immigrants. These are rotating clinics which open on different days of the week (Tuesday, Wednesday, or Thursday) and are in different areas of the county. They also provide bridge care to Hispanic individuals and families awaiting placement within a medical home. By providing culturally competent community-based care, health education, and health promotion strategies, these clinics strive to reduce health risks and risk behaviors associated with

acute and chronic illnesses. These clinics aim to promote a healthy lifestyle within these underserved and vulnerable communities (personal communication, C. Sutter, November 18, 2014).

Population/Sample/Sample Size

The participants were a convenience sample of uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes who sought medical care at one or more of the five clinics associated with an academic institution in Northern Virginia. Participants were identified by the staff and asked if they would participate in this research study. The inclusion criteria were: adults aged 40 to 64 years old who were diagnosed with type-2 diabetes, were of Hispanic ethnicity, were able to give consent, and were free of major psychiatric illnesses as evidenced by a PHQ-9 score less than 10. Sample size was calculated based on four factors: desired power, desired effect size, number of IVs, and the alpha level. Considering these factors, the sample size should be a minimum of 70 participants, and the final sample size was $N = 70$. The power for the study was set at .80 based upon a Type 1 error level set at 0.05 and a medium effect of 0.5 (Mertler & Vannatta, 2010; Polit & Beck, 2011; Tabachnick & Fidell, 2006).

Data Collection/Procedure

Potential participants were identified by the staff. The primary investigator asked the staff at the five clinics if they would ask patients to participate in the study. Recruitment began soon after the researcher received approval from the institution's HSRB. The study began on February 4, 2015 and lasted until January 7, 2016. After the staff identified potential study participants, the researcher asked each participant if he or she would participate in the research study. If the participant met the eligibility screening,

informed consent (Appendix C) was obtained from each participant when he or she decided to participate in the study. There was not any identifiable personal information on the measurement instruments. The participant was taken to a quiet area to conduct the study in order to maintain confidentiality. Participants were given a subject number from 001 to 070 which was the same on all forms for each participant. The key linking the participant to his or her subject number was kept confidential and in a secured lockbox separately from the data collection measurement tools. All measures were on paper in English or Spanish. A Spanish interpreter was present to read questions if subjects had difficulty reading on their own. Fasting blood glucose results were taken from the medical record. Participants were told they could stop study participation at any time. The participants were compensated for their time with a five dollar Wal-Mart gift card. They were thanked for their cooperation and for taking time out their day to participate in this study.

Instrumentation/Measurements

The researcher utilized the following measurement instruments to gather the data necessary to conduct this study as follows: the Demographic Questionnaire, Psychosocial Adjustment to Illness Scale-Self Report (PAIS-SR), and the Morisky 8-item Medication Adherence Scale (MMAS). Psychosocial adjustment was operationalized using the PAIS-SR. Medication adherence was operationalized using the Morisky 8-item Medication Adherence Scale (MMAS). A fasting blood sugar (FBS) lab value was operationalized using a glucometer (see Table 2).

Demographic questionnaire. The researcher-designed Demographic Questionnaire (Appendix D) included: gender, age, race and ethnicity, employment status, length of diagnosis, age at diagnosis, severity of illness, education level, housing,

and marital status (D'Eramo Melkus et al., 2010; Tang et al., 2012; Welch et al., 2011). This questionnaire also included acculturation information: country of origin, language spoken and read, and years in the US (Norris, Ford, & Bova, 1996; Wallen, Feldman, & Anliker, 2002). According to the literature, these are the covariates associated with having type-2 diabetes.

PAIS-SR. The Psychosocial Adjustment to Illness Scale (PAIS) and the PAIS-SR were developed in 1975 and 1978, respectively, by Leonard R. Derogatis (see Appendix E for PAIS-SR). The PAIS is for interviewing, and the PAIS-SR is for self-reporting. The self-report version was developed to match the domains of the PAIS. This instrument has been widely used, takes an average of 20 to 25 minutes to complete, and is available in 15 different languages. The PAIS was developed to assess adjustment to chronic illnesses such as heterogeneous cancer, cardiomyopathies, diabetes, and multiple sclerosis. The PAIS-SR consists of 46 items and 7 domains which measure an individual's psychosocial adjustment to his or her chronic illness: (a) health care orientation, (b) vocational environment, (c) domestic environment, (d) sexual relationships, (e) extended family relationships, (f) social environment, and (g) psychological distress. These items are rated on a 4-point Likert Scale of 0 to 3. The higher rating shows the individual has a lower level of psychosocial adjustment. To reduce position response bias, the directions are alternated for every other item.

There has been extensive validation of the PAIS which includes studies of convergent, predictive, and construct validity. Dimensional structure has also been confirmed. This instrument has been fully reviewed in Derogatis and Derogatis. In three published studies, the internal reliability estimates for the domain scores of the PAIS-SR are as follows: .63-.80, .68-.93, and .47-.83 (Derogatis, n.d.). The Cronbach's alpha

coefficients for six of the domains are as follows: (a) health care orientation: .50, (b) vocational environment: .79, (c) domestic environment (not given), (d) sexual relationships: .86, (e) extended family relationships: .64, (f) social environment: .83, and (g) psychological distress: .81 (Rodrigue et al., 2000).

A study done by Dirksen and Erickson (2002) utilized the Spanish version of the PAIS-SR. The participants were Hispanic ($n = 50$) and non-Hispanic White ($n = 50$) females with breast cancer. The Cronbach's alpha for the PAIS-SR was 0.72 (Dirksen & Erickson, 2002). Another study ($N = 111$) done by Herranz and Gavilan (1999) also utilized the Spanish version of the PAIS-SR. They found that participants in the functional surgery group ($n = 69$) and the radical surgery group ($n = 30$) had similar global PAIS-SR scores (functional = 56.44, radical = 56.92). However, both groups had *T*-scores worse than that of the reference group ($n = 114$, *T*-score = 50) (Herranz & Gavilan, 1999). The benefit of utilizing the PAIS-SR is that it has been used in many studies, so the study results can be compared to the literature. The limitation of utilizing this measurement instrument is that it is a self-report measure and may be subject to social desirability bias.

MMAS. The MMAS (Appendix F) was developed in 1986 by Morisky et al. (1986) to assess how well individuals adhered to their medication regimen (primary outcome). The MMAS has been used in various populations to assess adherence which can be categorized into three different levels: low, medium, and high. A study done by de Oliverira-Filho, Morisky, Neves, Costa, and Junior (2013) found the Brazilian version to have a Cronbach's alpha of 0.682 and test-retest reliability of 0.928, $p < 0.001$. Another study by Al-Qazaz et al. (2010) had a Cronbach's alpha of 0.675, and the test-retest reliability was 0.816. A study done by Morisky et al. (2008) had a Cronbach's alpha of

.083. The eight questions are simple and easy to understand. Sample dichotomous questions are: “Do you sometimes forget to take your medicine?”, or “Did you take your medicine yesterday?” “Yes” responses are given a score of 1 and “No” responses are given a score of 0. A score of 2 or more shows low adherence. A score of 1 to 2 shows medium adherence and a score of 0 shows high adherence. The last question focuses on difficulty remembering to take medications. Responses to this question range from “never” to “all the time” (Morisky et al., 1986). This instrument is good to use because it has been used in many studies that assessed medication adherence. A longitudinal study done by Aikens and Piette (2013) found there was an association between increased HbA1c levels and increased MMAS total scores. For every 1% increase in the total score, there was a 0.16% increase in the HbA1c levels of study participants at their 6-month follow-ups (Aiken & Piette, 2013). A limitation of this measure is that it is a self-report instrument and may be subject to social desirability bias.

FBS. This lab value was extracted from the participant’s medical record. This is usually the first test done to determine if an individual is at risk for developing type-2 diabetes (ADA, 2014). It measures the amount of glucose that is in the blood after the participant has not eaten for at least 8 hours prior to the test. A FBS 100 mg/dl or less is considered normal, 100-126 mg/dl is indicative of prediabetes, and greater than 126mg/dl is indicative of diabetes (ADA, 2014).

Table 2

Summary of Variables and Measures

Variable	Measure
Demographic Data	Demographic
Psychosocial Adjustment (IV)	Psychosocial Adjustment to Illness Scale-Self Report (PAIS-SR)
Medication Adherence (DV)	Morisky 8-Item Medication Adherence Scale (MMAS)
Fasting Blood Sugar (FBS)	Glucometer
Acculturation	Demographic

Data Management/Analysis

The researcher used descriptive statistics to summarize the following demographic data: gender, age, race and ethnicity, employment status, length of diagnosis, age at diagnosis, severity of illness, education level, and marital status. Descriptive statistics were also used to summarize psychosocial adjustment and medication adherence. The following descriptive statistics were used: mean, median, mode, range, standard deviation, variance, frequencies, and percentages. One primary and four secondary research questions (RQ) were answered.

Primary Research Question. What are the psychosocial adjustment (IV) predictors of medication adherence (DV) in uninsured Hispanic immigrants aged 40 to 64 years old (population) diagnosed with type-2 diabetes?

Stepwise Multinomial Logistic Regression was used to answer this primary research question. Medication adherence (DV) was categorical in the analysis (low, medium, high). The seven domains of psychosocial adjustment were continuous variables (IVs). Stepwise Multinomial Logistic Regression was used to predict the odds

of medication adherence in uninsured Hispanic immigrants based on the degree of psychosocial adjustment. Each domain of psychosocial adjustment was examined for the likelihood of medication adherence based on participants' responses of low, medium, or high (Mertler & Vannatta, 2010).

Secondary research questions. For all four secondary research questions were Pearson's chi-square was used to determine if there were group differences in medication adherence based on gender. The chi-square statistic is used to determine if two variables are related or different (Mertler & Vannatta, 2010). If there is a significant difference found between the two variables, this difference is because of the changes in the other variable. They are considered to be related to one another. If there is not a significant difference found between the two variables, they are considered to be independent or different from one another.

1. Is there a difference in medication adherence (low, medium, high) in uninsured Hispanic immigrants aged 40 to 64 years old based on gender?
2. Is there a difference in medication adherence (low, medium, high) in uninsured Hispanic immigrants aged 40 to 64 years old based on age?
3. Is there a difference in medication adherence (low, medium, high) based on disease duration?
4. Do men and women have a difference in medication adherence scores based on education?

All information was entered in a code-protected computer spreadsheet. Data cleaning, checking, and quality assurance were done before analyzing the data. A statistician was consulted during study development to assist with data analysis. Quantitative data were analyzed using windows SPSS 22.0 statistical software (Mertler

& Vannatta, 2010). It is anticipated that all findings will be disseminated in peer-reviewed nursing journals such as *The Diabetes Educator* and *Diabetes Research and Clinical Practice*.

Human Subjects

Permission to conduct this study was sought from the HSRB associated with an academic institution. Participants were identified with the assistance of healthcare team members from five clinics associated with that institution. Informed consent was obtained from each participant when he or she decided to participate in the research study. Participants were recruited after their clinic appointment. Participants were informed that there were no known direct benefits to them; however, their input will contribute to healthcare knowledge and lead to improvement for future patients seeking diabetes care from the five clinics. The participants of this study were compensated with a five dollar Wal-Mart gift card for their time. They were thanked for their cooperation and for taking time out their day to participate in this study solely for altruistic reasons. There were no known potential physical, psychological, social, or legal risks to participation. Participants were asked demographic questions, and answered questions on the PAIS-SR and the MMAS.

All participant information will be kept confidential under the Health Insurance Portability and Accountability Act (HIPAA) of 1996. Participants were given full disclosure before and while participating in this research study. They were told they could stop study participation at any time. Confidentiality was maintained between the researcher and the participants. There were no identifiable personal information on the measurement instruments, and participation was kept confidential. Participants were assigned a subject number from 001 to 070 which was on all forms for each participant.

The key which linked the participant to his or her subject number was kept confidential and in a secured lockbox separately from the data collection instruments.

Questionnaires were used for this study. Only the researcher had access to the questionnaires, which were kept in a locked drawer in a locked room that only the researcher had access to. Participants may receive a copy of the completed study. The researcher will properly dispose of questionnaires three years after the study is completed.

4. RESULTS

This chapter presents the study results. Initially, the sample demographics will be discussed followed by results of the MMAS and the PAIS-SR using Stepwise Multinomial Regression Analysis. Next, the primary research question will be answered: What are the psychosocial adjustment (IV) predictors of medication adherence (DV) in uninsured Hispanic immigrants aged 40 to 64 years old (population) diagnosed with type-2 diabetes? Lastly, the secondary research questions will be answered and this section will be summarized.

Sample Demographics

This study was conducted between February 4, 2015 and January 7, 2016 at the five clinic sites associated with an academic institution. This sample was $N = 70$ exclusively Spanish speaking Hispanic participants aged 40 to 64 who frequented one or more of the five clinics. Females represented 68.6% ($n = 46$) of the sample. A majority of the participants, $n = 39$ (55.7%), were married. Of this sample, $n = 37$ (52.9%) reported having some grammar school education. A majority $n = 60$ (85.7%) of the participants reported living with others. Participants originated mostly from El Salvador $n = 23$ (32.9%), Guatemala $n = 9$ (12.9%), and Honduras $n = 9$ (12.9%). In total $n = 41$ (58.7%) of the participants originated from these Central American countries. At least $n = 31$ (44.3%) of the study participants were employed at the time of this study (Table 3).

As depicted in Table 4, the study participants' BMIs ranged from 18.55 to 56.10. The mean BMI was 32.9977. The standard deviation was 7.75587 and the variance was

60.153. The study participants' FBSs ranged from 67 to 509. The mean blood sugar was 182.19. The standard deviation was 75.55 and the variance was 5708.588. The study participants' ages ranged from 40 to 64. The mean age was 53.43. The standard deviation was 7.842 and the variance was 61.495.

Table 3

Demographics

Demographic	Detail	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Age	40	4	5.7	5.7	5.7
	41	4	5.7	5.7	5.7
	42	4	5.7	5.7	17.1
	43	1	1.4	1.4	18.6
	44	1	1.4	1.4	20.0
	45	2	2.9	2.9	22.9
	46	1	1.4	1.4	24.3
	47	1	1.4	1.4	25.7
	48	1	1.4	1.4	27.1
	49	4	5.7	5.7	32.9
	50	1	1.4	1.4	34.3
	51	1	1.4	1.4	35.7
	52	2	2.9	2.9	38.6
	53	1	1.4	1.4	40.0
	54	5	7.1	7.1	47.1
	55	6	8.6	8.6	55.7
	56	3	4.3	4.3	60.0
	57	2	2.9	2.9	62.9
	58	4	5.7	5.7	68.6
	59	4	5.7	5.7	74.3
	60	4	5.7	5.7	80.0
	61	1	1.4	1.4	81.4
	62	2	2.9	2.9	84.3
	63	3	4.3	4.3	88.6
	64	8	11.4	11.4	100.0
	Total	70	100.0	100.0	
Gender	Male	22	31.4	31.4	31.4
	Female	48	68.6	68.6	100.0
Marital Status	Single	19	27.1	27.1	27.1
	Married	39	55.7	55.7	82.9
	Divorced	7	10.0	10.0	92.9
	Separated	4	5.7	5.7	98.6
	Widowed	1	1.4	1.4	100.0
Education	Grammar School	37	52.9	52.9	52.9
	High School	17	24.3	24.3	77.1
	Vocational School	6	8.6	8.6	85.7
	Some College	6	8.6	8.6	94.3
	Bachelor's Degree	4	5.7	5.7	100.0
Years in US	1	2	2.9	2.9	2.9
	2	1	1.4	1.4	4.3
	3	1	1.4	1.4	5.7
	5	2	2.9	2.9	8.6

Demographic	Detail	Frequency	Percentage	Valid Percentage	Cumulative Percentage
	6	1	1.4	1.4	10.0
	9	5	7.1	7.1	17.1
	10	3	4.3	4.3	21.4
	11	2	2.9	2.9	24.3
	12	1	1.4	1.4	25.7
	13	2	2.9	2.9	28.6
	14	3	4.3	4.3	32.9
	15	8	11.4	11.4	44.3
	16	3	4.3	4.3	48.6
	17	1	1.4	1.4	50.0
	18	1	1.4	1.4	51.4
	19	1	1.4	1.4	52.9
	20	6	8.6	8.6	61.4
	22	1	1.4	1.4	62.9
	23	2	2.9	2.9	65.7
	24	2	2.9	2.9	68.6
	25	6	8.6	8.6	77.1
	26	3	4.3	4.3	81.4
	29	1	1.4	1.4	82.9
	30	3	4.3	4.3	87.1
	31	3	4.3	4.3	91.4
	36	1	1.4	1.4	92.9
	38	1	1.4	1.4	94.3
	39	1	1.4	1.4	95.7
	40	1	1.4	1.4	97.1
	45	1	1.4	1.4	98.6
	59	1	1.4	1.4	100.0
	Total	70	100.0	100.0	
Housing	Live With Others	60	85.7	85.7	85.7
	Live Alone	10	14.3	14.3	100.0
Country of Origin	America	1	1.4	1.4	1.4
	Argentina	1	1.4	1.4	2.9
	Bolivia	5	7.1	7.1	10.0
	Colombia	1	1.4	1.4	11.4
	Ecuador	3	4.3	4.3	15.7
	El Salvador	23	32.9	32.9	48.6
	Guatemala	9	12.9	12.9	61.4
	Honduras	9	12.9	12.9	74.3
	Lima-Peru	1	1.4	1.4	75.7
	Mexico	12	17.1	17.1	92.9
	Nicaragua	1	1.4	1.4	94.3
	Peru	3	4.3	4.3	98.6
	Puerto Rico	1	1.4	1.4	100.0
Employment Status	Presently Employed	31	44.3	44.3	44.3
	Presently Unemployed	31	44.3	44.3	88.6
	Never Employed	8	11.4	11.4	100.0

Demographic	Detail	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Medication	Insulin	3	4.3	4.3	4.3
	Metformin	54	77.1	77.1	81.4
	Metformin+	13	18.6	18.6	100.0
Duration of Illness	< 1 year	10			
	> 1 year	60			

Table 4

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
BMI	70	37.55	18.55	56.10	32.9977	7.75587	60.153
FBS	70	442.00	67.00	509.00	182.1900	75.55500	5708.588
Age	70	24.00	40.00	64.00	53.4300	7.84200	61.495
MMAStotal	70	7.00	.00	7.00	2.3571	2.02188	4.088
paisTotal	70	63.00	39.00	102.00	52.8714	10.10656	102.143
Valid N (listwise)	70						

Stepwise Multinomial Logistic Regression

Stepwise Multinomial Logistic Regression was used to examine how psychosocial adjustment (IV) influenced medication adherence (DV) in the study population. Psychosocial adjustment is comprised of seven IVs: (a) health care orientation, (b) vocational environment, (c) domestic environment, (d) sexual relationships, (e) extended family relationships, (f) social environment, and (g) psychological distress. This analysis was done using SPSS 22. The power for the study was set at .80 based upon a Type 1 error level set at 0.05 and a medium effect of 0.5.

MMAS

The MMAS (DV) operationalized medication adherence in the study participants. The scores ranged from 0 to 7 (as shown above in Table 4). The mean score was 2.3571 with a standard deviation of 2.02188 and a variance of 4.088. The MMAS has 3 levels of adherence as follows: high adherence (score = 0), medium adherence (score = 1-2) and low adherence (score > 2). When examining the frequency of each level (Table 5), $n = 15$ (21.4%) had high adherence, $n = 26$ (37.1%) had medium adherence, and $n = 29$ (41.4%) had low adherence. There were 70 valid participants in this study which had a subpopulation of 70 because there was only one DV.

Table 5

Case Processing Summary

		<i>n</i>	Marginal Percentage
transform MMAS total into AdherenceScore	high adherence	15	21.4%
	medium adherence	26	37.1%
	low adherence	29	41.4%
Valid		70	100.0%
Missing		0	
Total		70	
Subpopulation		70 ^a	

^aThis study had a subpopulation of 70 because there was only one DV.

Table 6 shows the model fitting information. The chi-square is 41.122, $p = .000$. This supports the existence of a relationship between the DV and the IVs (Mertler & Vannatta, 2010).

Table 6

Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	148.824			
Final	107.702	41.122	14	.000

Regarding goodness-of-fit (Table 7), the Pearson chi-square is 106.391 and the p -value is .871 (ns). The Deviance chi-square is 107.702 and the p -value is .851 (ns). The lack of significance is indicative of a good fit (Mertler & Vannatta, 2010).

Table 7

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	106.391	124	.871
Deviance	107.702	124	.851

Table 8, Pseudo R-Square, the Cox and Snell value is .444. The Nagelkerke value is .504 and the McFadden value is .276. When these values are high, they are indicative of a better fit (Mertler & Vannatta, 2010).

Table 8

Pseudo R-Square

Cox and Snell	.444
Nagelkerke	.504
McFadden	.276

PAIS-SR

The PAIS-SR operationalized psychosocial adjustment (IV) in the study participants. The PAIS-SR scores ranged from 39 to 102. The mean was 52.8714. The standard deviation was 10.10656 and the variance was 102.143. According to Derogatis, a raw score or *T*-score exceeding 62 is indicative of maladjustment. Of the study participants, 59 participants scored less than 62 on the PAIS-SR and 11 participants scored 62 or above. The PAIS-SR measures psychosocial adjustment which includes the following life course factors: (a) health care orientation, (b) vocational environment, (c) domestic environment, (d) sexual relationships, (e) extended family relationships, (f) social environment, and (g) psychological distress (Derogatis, n.d.).

Table 9

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	114.831	7.129	2	.028
paisHealth	116.114	8.412	2	.015
paisVocational	120.446	12.744	2	.002
paisDomestic	113.151	5.449	2	.066
paisSexual	116.755	9.053	2	.011
paisExtendedfamily	121.687	13.985	2	.001
paisSocial	108.422	.720	2	.698
paisPsychological	115.497	7.795	2	.020

Table 9, Likelihood Ratio Tests, shows how each IV contributes to the model.

The paisHealth has a p -value of .015 ($p < 0.05$). The paisVocational has a p -value of .002 ($p < 0.05$). The paisDomestic has a p -value of .066 (ns). The paisSexual has a p -value of .011 ($p < 0.05$). The paisExtended family has a p -value of .001 ($p < 0.05$). The paisSocial has a p -value of .698 (ns), and the paisPsychological has a p -value of .020 ($p < 0.05$).

In Table 10, Parameter Estimates, the reference category was the low adherence medication group because it was the largest group ($n = 29$). The following information is for the high adherence medication group as compared to the low adherence medication group. For the high adherence medication group ($n = 26$) the intercept p -value is .047 ($p < 0.05$). The paisHealth p -value is .016 ($p < 0.05$), Exp(B) is .632, and the CI is .436 to .918. The paisVocational p -value is .008 ($p < 0.05$), Exp(B) is 1.686, and the CI is 1.145 to 2.482. The paisDomestic p -value is .086 (ns), Exp(B) is .679, and the CI is .437 to 1.056. The paisSexual p -value is .263 (ns), Exp(B) is .776, and the CI is .497 to 1.210.

The paisExtended family p -value is .011 ($p < 0.05$), Exp(B) is .225, and the CI is .071 to .713. The paisSocial p -value is .602 (ns), Exp(B) is .891, and the CI is .578 to 1.374. The paisPsychological p -value is .033 ($p < 0.05$), Exp(B) is .629, and the CI is .411 to .963.

Also shown in Table 10 is the medium adherence group as compared to the low adherence medication group. For the medium adherence medication group ($n = 26$) the intercept p -value is .342 (ns). The paisHealth p -value is .473 (ns), Exp(B) is .935, and the CI is .780 to 1.122. The paisVocational p -value is .949 (ns), Exp(B) is 1.008, and the CI is .799 to 1.271. The paisDomestic p -value is .447 (ns), Exp(B) is 1.096, and the CI is .865 to 1.388. The paisSexual p -value is .033 ($p < 0.05$), Exp(B) is 1.236, and the CI is 1.017 to 1.501. The paisExtended family p -value is .201 (ns), Exp(B) is .820, and the CI is .606 to 1.111. The paisSocial p -value is .593 (ns), Exp(B) is 1.048, and the CI is .882 to 1.245. The paisPsychological p -value is .551 (ns), Exp(B) is 1.065, and the CI is .866 to 1.309.

Table 10

Parameter Estimates

							95% Confidence Interval for Exp(B)		
AdherenceScore transform MMAS total into AdherenceScore ^a		B	Std. Error	Wald	df	Sig.	Exp(B)	Lower Bound	Upper Bound
.00 high adherence	Intercept	13.736	6.907	3.955	1	.047			
	paisHealth	-.458	.190	5.798	1	.016	.632	.436	.918
	paisVocational	.522	.197	6.993	1	.008	1.686	1.145	2.482
	paisDomestic	-.387	.225	2.954	1	.086	.679	.437	1.056
	paisSexual	-.254	.227	1.255	1	.263	.776	.497	1.210
	paisExtendedfamily	-1.491	.588	6.425	1	.011	.225	.071	.713
	paisSocial	-.115	.221	.272	1	.602	.891	.578	1.374
	paisPsychological	-.463	.217	4.556	1	.033	.629	.411	.963
1.00 medium adherence	Intercept	-2.381	2.508	.902	1	.342			
	paisHealth	-.067	.093	.515	1	.473	.935	.780	1.122
	paisVocational	.008	.118	.004	1	.949	1.008	.799	1.271
	paisDomestic	.092	.121	.579	1	.447	1.096	.865	1.388
	paisSexual	.212	.099	4.548	1	.033	1.236	1.017	1.501
	paisExtendedfamily	-.198	.155	1.632	1	.201	.820	.606	1.111
	paisSocial	.047	.088	.285	1	.593	1.048	.882	1.245
	paisPsychological	.063	.105	.356	1	.551	1.065	.866	1.309

^aThe reference category is low adherence.

Table 11, Classification, shows the model accurately predicted a group inclusion of 66.7% for the high adherence medication group, accurately predicted a group inclusion of 50% for the medium adherence medication group, and it also accurately predicted a group inclusion of 58.6% for the low adherence medication group. Overall accuracy for the model was 57.1%. When paisDomestic and paisSexual were deleted from the model, the overall percentage of classification increased to 58.6%.

Table 11

Classification

Observed	Predicted			Percentage Correct
	.00 high adherence	1.00 medium adherence	2.00 low adherence	
.00 high adherence	10	3	2	66.7%
1.00 medium adherence	1	13	12	50.0%
2.00 low adherence	3	9	17	58.6%
Overall Percentage	20.0%	35.7%	44.3%	57.1%

Pearson's Chi-Square

Pearson's chi-square was used to determine if there were group differences in medication adherence (among the participants) based on gender, age, disease duration, and education. For gender, $\chi^2 (2, N = 70) = .29, p = .866$ (Table 12).

Table 12

Chi-Square Tests for Gender

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.289 ^a	2	.866
Likelihood Ratio	.291	2	.864
Linear-by-Linear Association	.284	1	.594
N of Valid Cases	70		

^a 1 cells (16.6%) have expected count less than 5. The minimum expected count is 4.71.

For age, $\chi^2(48, N = 70) = 48.35, p = .459$ (Table 13).

Table 13

Chi-Square Tests for Age

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	48.346 ^a	48	.459
Likelihood Ratio	54.730	48	.234
Linear-by-Linear Association	.209	1	.648
N of Valid Cases	70		

^a 75 cells (100%) have expected count of less than 5. The minimum expected count is .21.

For duration of illness, $\chi^2(38, N = 70) = 42.34, p = .289$ (Table 14).

Table 14

Duration of Illness Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	42.341 ^a	38	.289
Likelihood Ratio	50.289	38	.088
Linear-by-Linear Association	.034	1	.853
N of Valid Cases	70		

^a 60 cells (100%) have expected count less than 5. The minimum expected count is .21

For education, $\chi^2(2, N = 70) = .20, p = .904$ (Table 15).

Table 15

Education Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.201 ^a	2	.904
Likelihood Ratio	.199	2	.905
Linear-by-Linear Association	.195	1	.658
N of Valid Cases	70		

^a1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.43.

Analysis

A Stepwise Multinomial Logistic Regression analysis was done to examine how psychosocial adjustment influenced medication adherence in uninsured Hispanic immigrants aged 40 to 64 who were diagnosed with type-2 diabetes. Medication adherence (DV) has three levels: high, medium, and low. Psychosocial Adjustment (IV) is comprised of seven life course factors: (a) healthcare orientation, (b) vocational environment, (c) domestic environment, (d) sexual relationship, (e) extended family relationships, (f) social environment, and (g) psychological distress. The *p*-values for interaction among the IVs were not significant. The standard error for each of the IVs was less than 2, which indicates there is no multicollinearity among the IVs.

A test of the full model and the intercept was $p = .000$ ($p < 0.05$). This indicates there is a relationship between the IV and the DV. This model was able to correctly classify 57.1% of the participants into the high, medium, or low medication adherence category. Therefore, the null hypothesis that there is no relationship between the IV and the DV is rejected. Table 7, Likelihood Ratio Tests, shows how each variable contributes

to the model. All of the the variables except *paisDomestic* ($p = .086, p > 0.05$) and *paisSocial* ($p = .602, p > 0.05$) contributed significantly to the model. This was determined because their p -values were significant: (a) *paisHealth* $p = .016, p < 0.05$; (b) *paisVocational* $p = .008, p < 0.05$; (c) *paisExtended Family* $p = .011, p < 0.05$; (d) *paisSexual* $p = .033, p < 0.05$; and (e) *paisPsychological* $p = .033, p < 0.05$.

Healthcare orientation is an individual's attitude toward their health, health information, treatment information, and expected treatment outcomes (Rodrigue et al., 2000). For every one unit change in this IV, *paisHealth* score, the odds of a participant being in the high adherence medication group was less likely to occur by a factor of .632 or 36.8% as compared to the low adherence medication group.

Vocational environment is the individual's problems at work, sick days taken, job performance, and future job-related goals (Rodrigue et al., 2000). This definition was extended to include activities of daily living and school participation, as permitted by the PAIS-SR, because not all participants were employed. For every one unit change in this IV, *paisVocational* score, the odds of a participant being in the high adherence medication group increased by a factor of 1.68 or 68% as compared to the low adherence medication group.

Extended family relationships means the individual's interaction and communication with family members (Rodrigue et al., 2000). For every one unit change in this IV, *paisExtended family* score, the odds of a participant being in the high adherence medication group was less likely to occur by a factor of .225 or 77.5% as compared to the low adherence medication group.

Sexual relationship is the extent of intimacy with an individual's significant other (Rodrigue et al., 2000). For every one unit change in this IV, *paisSexual* score, the odds

of being in the medium adherence medication group was increased by a factor 1.236 or 23.6% as compared to the low adherence medication group.

Psychological distress is negative feelings related to type-2 diabetes such as depression, anxiety, anger, guilt/self-blame, and worry (Rodrigue et al., 2000). For every one unit change in this IV, the odds of a participant being in the high adherence medication group was less likely to occur by a factor of .629 or 37.1% as compared to the low adherence medication group.

Pearson's chi-square tests were done to determine if there were group differences in medication adherence among the participants based on gender, age, disease duration, and education. There were no significant linear relationships in medication adherence found based on gender $\chi^2 (2, N = 70) = .29, p = .866$; age $\chi^2 (48, N = 70) = 48.35, p = .459$; disease duration $\chi^2 (38, N = 70) = 42.34, p = .289$; and education $\chi^2 (2, N = 70) = .20, p = .904$.

Summary

The researcher hypothesized that the greater the individual's psychosocial adjustment, the more likely he or she would adhere to his or her prescribed medication regimen. The purpose of this study was to examine whether psychosocial adjustment predicted medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes. Furthermore, if psychosocial adjustment does predict medication adherence, what are the significant predictors in uninsured Hispanic immigrants diagnosed with type-2 diabetes?

The primary research question was: What are the psychosocial adjustment (IV) predictors of medication adherence (DV) in uninsured Hispanic immigrants aged 40 to 64 years old (population) diagnosed with type-2 diabetes?

Based on the results of the Stepwise Multinomial Logistic Regression Analysis, psychosocial adjustment has a positive influence on medication adherence in the targeted population. The full model was correct at predicting medication adherence 57.1% of the time. The variables which predicted medication adherence were: (a) $\text{paisHealth } p = .016, p < 0.05$; (b) $\text{paisVocational } p = .008, p < 0.05$; (c) $\text{paisExtended Family } p = .011, p < 0.05$; (d) $\text{paisSexual } p = .033, p < 0.05$; and (e) $\text{paisPsychological } p = .033, p < 0.05$. The variables $\text{paisDomestic } (p = .086, p > 0.05)$ and $\text{paisSocial } (p = .602, p > 0.05)$ were not significant predictors of medication adherence in this study population.

For the four secondary research questions, there was no significant difference in medication adherence based on gender, age, disease duration, or education.

1. Is there a difference in medication adherence (low, medium, high) in uninsured Hispanic immigrants aged 40 to 64 years old based on gender?
2. Is there a difference in medication adherence (low, medium, high) in uninsured Hispanic immigrants aged 40 to 64 years old based on age?
3. Is there a difference in medication adherence (low, medium, high) based on disease duration?
4. Do men and women have a difference in medication adherence scores based on education?

Null Hypotheses

Reject 1.) There is no significant relationship between psychosocial adjustment and medication adherence.

$H_01: R = 0 \quad p\text{-value} = .000 \quad p\text{-value} < 0.05$

Accept 2.) There is no significant relationship between gender and medication adherence.

$$H_02 = 0 \quad p\text{-value} = .866 \quad p\text{-value} > 0.05$$

Accept 3.) There is no significant relationship between age and medication adherence.

$$H_03 = 0 \quad p\text{-value} = .459 \quad p\text{-value} > 0.05$$

Accept 4.) There is no significant relationship between disease duration and medication adherence.

$$H_04 = 0 \quad p\text{-value} = .289 \quad p\text{-value} > 0.05$$

Accept 5.) There is no significant relationship between education and medication adherence.

$$H_05 = 0 \quad p\text{-value} = .904 \quad p\text{-value} > 0.05$$

5. CONCLUSIONS

This chapter begins by examining literature which explores medication adherence and the influence of psychosocial adjustment on medication adherence in individuals diagnosed with type-2 diabetes. The researcher will use the LCHD Framework as a theoretical lens to discuss and analyze the findings. Additionally, the researcher will address the limitations and implications of this study related to the targeted population. Lastly, the researcher will discuss how this study contributes to nursing literature and its body of knowledge.

Literature Examining Medication Adherence

This study found that medication adherence was influenced by psychosocial adjustment. For the purposes of this study, medication adherence was defined as the extent an individual self-reports adherence to his or her prescribed medication regimen (Morisky et al., 2008). This study found that $n = 15$ (21.4%) participants were in the high adherence medication group, $n = 26$ (37.1%) participants were in the medium adherence medication group, and $n = 29$ (41.4%) participants were in the low adherence medication group. This finding is congruent with what other research done in this area has found (Bailey et al., 2012; Cowie et al., 2010; Lopez et al., 2014, Parada et al., 2012). It is noted throughout the literature that Hispanic individuals with type-2 diabetes often do not adhere to their medication regimens. Thus, they are usually sicker when they seek healthcare services compared to their non-Hispanic White counterparts (Cowie et al., 2010; Parada et al., 2012).

One of the questions on the MMAS asked participants, “Did you take all your medication yesterday?” Seventy-three percent ($n = 51$) of the participants answered “yes” to this question. When participants answered “no” to this question, they would further state they did not take their medication because they did not have any medication to take and that was why they were being seen in the clinic. This finding aligns with a recent retrospective pre–post exploratory study ($N = 65$) done by Toulouse and Kodadek (2015) who found that uninsured adults diagnosed with type-2 diabetes and other comorbidities who had access to cheaper medications showed improved healthcare outcomes. These healthcare outcomes were measured based on improvements in the study participants’ baseline HbA1c levels, lipid levels, and systolic blood pressures after a pharmaceutical procurement intervention.

The healthcare providers at the clinics in this current study supplied the study participants with medications if the healthcare providers had the medications on hand. Otherwise, the healthcare providers would prescribe affordable medications believed to work just as well as the more expensive form of the medication. Participants were also given discount pharmacy cards to help them pay for their prescribed medications. They were further told which pharmacies stocked the more affordable medications.

If healthcare providers want to improve medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes, they should assess the financial needs of their patients in order to provide them with affordable alternatives for seeking healthcare services and acquiring medication. This assessment could improve patients’ medication adherence and healthcare outcomes.

Literature Examining Psychosocial Adjustment and Medication Adherence

This study found there is an association between psychosocial adjustment and medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes. Psychosocial adjustment is defined, in this study, as how well an individual adjusts to his or her type-2 diabetes as related to the following life course factors: (a) healthcare orientation, (b) vocational environment, (c) domestic environment, (d) sexual relationship, (e) extended family relationships, (f) social environment, and (g) psychological distress. The findings in this study are congruent with the findings in the literature. Until recently, there were few studies examining the influence of psychosocial adjustment on medication adherence in individuals diagnosed with type-2 diabetes, but these recent studies suggest there is a relationship between psychosocial adjustment and medication adherence (Bhattacharya, 2012; Peyrot et al., 2005; Rane et al., 2011). According to an international study done by Peyrot et al. (2005), patients with type-2 diabetes have a propensity toward psychosocial issues related to their disease process. This current study further adds that if individuals are treated for their psychosocial issues, medication adherence would likely improve which could result in improved healthcare outcomes for individuals diagnosed with type-2 diabetes.

In this current study, $n = 59$ (84.2%) of the participants can be identified as being well adjusted because they scored less than 62 on the PAIS-SR, and a score of 62 or above is indicative of maladjustment (Derogatis, n. d.). This study found that medication adherence was influenced by psychosocial adjustment. The life course factors healthcare orientation, vocational environment, extended family, sexual relationship, and psychological distress influenced medication adherence in the targeted population. The

life course factors domestic environment and social environment were found not to influence medication adherence in the targeted population.

When individuals' psychosocial needs are not properly assessed and addressed by their healthcare providers, this could negatively affect their ability to perform diabetes self-management behaviors. Thus, providing risk reduction and health promotion strategies for these individuals could potentially improve their psychosocial well-being and healthcare outcomes. Additionally, these strategies could further reduce the disability, morbidity, and mortality rates associated with a type-2 diabetes diagnosis.

Literature Examining Healthcare Orientation and Medication Adherence

This study found there is an association between healthcare orientation and medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes. Healthcare orientation, in this study, is defined as an individual's attitude toward their health, health information, and expected treatment outcomes (Rodrigue et al., 2000). The findings in this study are congruent with the findings in the literature, which contains numerous studies which found there is an association between healthcare orientation and medication adherence. It is well documented that the knowledge individuals have about their disease process is associated with medication adherence (Bogner et al., 2012; Brown & Bussell, 2011; Kheir et al., 2011; Mantwill & Schulz, 2015; Marzec & Maddox, 2013; Sweileh et al., 2014). A longitudinal study ($N = 73$) done by Hu, Wallace, McCoy, and Amirehsani (2013) found that poor, middle-aged, and uninsured Hispanic immigrants as well as their family members benefited from a diabetes education intervention. These participants exhibited improvement in diabetes self-care behaviors, diabetes knowledge, and disease management.

A recent secondary analysis of a control trial ($N = 154$) done by Al Sayah, Majumdar, and Johnson (2012) found that low health literacy did not negatively impact the healthcare outcomes of their study population within a 12-month period. The researchers hypothesized that this outcome was possibly due to their study population being sicker and utilizing more social support and healthcare resources which compensated for the participants' low health literacy. The findings from this Canadian study does not reflect what previous researchers have found regarding health literacy and healthcare outcomes.

Health literacy was an issue with the current study's Hispanic participants at the clinics because most of them had either poor reading skills or were illiterate in both English and Spanish. Once this was realized, the healthcare providers began using cards with pictures of activities of daily living in order to effectively communicate with the study participants. Interpreters were already being utilized at this time. Both provisions enabled the providers to have all their healthcare information simultaneously translated into Spanish as they were assessing the individuals. The study's participants were asked to repeat all healthcare information, as they understood it, to ensure they understood their diet, exercise routines, medication regimens, and follow-up appointments. Demonstrations of exercises and blood glucose checks were routinely done to ensure participants understood how to check their blood sugar levels at home.

The literature makes it clear that providing individuals with knowledge about their type-2 diabetes diagnosis could lead to improved healthcare outcomes and diabetes self-management behaviors in this population. Therefore, healthcare providers should assess the knowledge levels of their patients diagnosed with type-2 diabetes in order to tailor patient education specifically to the needs of each individual (Hearnshaw et al.,

2006; Mantwill & Schulz, 2015; Morris, MacLean, & Littenberg, 2013; Negarandeh, Mahmoodi, Noktehdan, Heshmat, & Shakibazadeh, 2013; Sweileh et al., 2014). If individuals do not have the knowledge they need to manage their type-2 diabetes, this will likely have a negative effect on their healthcare outcomes.

Literature Examining Vocational Environment and Medication Adherence

This study found there is an association between vocational environment and medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes. In this study, vocational environment is defined as the individual's problems at work, sick days taken, job performance, and future job-related goals (Rodrigue et al., 2000). This definition was extended to include activities of daily living and school participation, as permitted by the PAIS-SR, because not all participants were employed. Some of the findings in the literature are congruent with the findings in this study. There were few studies found in the literature which explored the association between vocational environment and medication adherence in individuals with type-2 diabetes. The definition of vocational environment is not congruent throughout the literature, as it is defined in each study as follows: as work hours and occupation type (Davila et al., 2011), work stress (Heraclides et al., 2012), job strain (Huth et al., 2014), employee support and management (Munir, Randall, Yarker, & Nielsen, 2009), work-related psychosocial stress (Annor, Roblin, Okosun, & Goodman, 2015), and hours worked and job stress (Trief, Aquillino, Paradies, & Weinstock, 1999). However, of the studies found in the literature, there is agreement that glycemic control is associated with the vocational environment as defined in their studies (Davila et al., 2011; Heraclides et al., 2012; Huth et al., 2014, Munir et al., 2009), and there is agreement that the vocational environment as defined in their studies is not associated with glycemic control

(Annor et al., 2015; Trief et al., 1999). A study done by Munir et al. (2009) found that the work environment is associated with disease self-management behaviors in individuals diagnosed with a chronic disease such as type-2 diabetes. That study defined vocational environment as employee support and management when examining disease self-management behaviors in the study participants.

Conversely, a recent study done by Annor et al. (2015) found that the vocational environment was not significantly associated with glycemic control in individuals diagnosed with type-2 diabetes. These researchers defined vocational environment as work-related psychosocial stress and examined its influence on glycemic control in the study population. The researchers further hypothesized that these findings were possibly due to the sample characteristics. The participants were described as being Black or White, young, insured, and without any notable microvascular or macrovascular damage. This finding is consistent with a previous study done by Trief et al. (1999). The researchers in that study defined vocational environment as work-related factors such as hours worked and job stress when examining glycemic control in individuals diagnosed with type-2 diabetes.

In this current study, $n = 31$ (44.3%) of the participants reported being employed outside their home. Participants reporting issues about managing their blood glucose levels while at work was not an issue routinely noted at these clinics. However, a nutritionist/healthcare provider gave each participant diabetes-specific dietary education such as information on portion control, dietary substitutions, and healthy eating. This information was given verbally and supplemented with hands-on demonstrations and pictures. Participants were also given information on managing their blood sugar levels throughout the day in order to prevent large fluctuations in blood glucose levels.

The definition of vocational environment is incongruent throughout the literature. While some researchers found that the vocational environment is associated with glycemic control and diabetes self-management behaviors, other researchers have not found this association. However, healthcare providers should assess the vocational environment of individuals diagnosed with type-2 diabetes in order to develop risk reduction and health promotion strategies to promote medication adherence and improve healthcare outcomes in the targeted population.

Literature Examining Domestic Environment and Medication Adherence

This study found there is not an association between the domestic environment and medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes. In this study, domestic environment is defined as the extent to which individuals need help from others because of their illness such as financial support, chores, and changes in family roles (Merluzzi & Sanchez, 1997). The findings in the literature are not congruent with the findings in this study. There were no studies found in the literature which explored the association between domestic environment (as defined in this study) and medication adherence. However, this life course factor is similar to the extended family life course factor and the social support life course factor. It is difficult to separate these life course factors based on the literature because there is overlap. It is well documented in the literature that one's social support is associated with medication adherence and improved healthcare outcomes in individuals diagnosed with type-2 diabetes. A systematic review done by Stopford et al. (2013) found that social support was associated with medication adherence in individuals diagnosed with type-2 diabetes. Another study done by Misra and Lager (2009) found that individuals who reported a high level of social support had better

glycemic control than those reporting lower levels of social support, although the researchers did not define social support. Another study done by Wen et al. (2004) found that perceived family support was associated with increased diabetes self-management behaviors.

In this current study, $n = 60$ (85.7%) of the participants reported living with others. Sometimes participants were accompanied by family members who reportedly participated in the participants' diabetes self-management regimen. Therefore, the patients as well as the family members were provided diabetes-specific education. The healthcare providers encouraged the family members to be supportive of the individual. The family members were also encouraged to ask questions as needed and to return during follow-up appointments.

In an effort to promote medication adherence in Hispanic adults diagnosed with type-2 diabetes, healthcare providers should assess the domestic environment of individuals and develop risk reduction and health promotion strategies geared toward enhancing the family structure and the level of family support, which would likely have a positive influence on medication adherence in this targeted population.

Literature Examining Sexual Relationship and Medication Adherence

This study found there is an association between sexual relationship and medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes. In this study, sexual relationship is the extent of intimacy with an individual's significant other (Rodrigue et al., 2000). This finding was consistent with previous research done in this area. There were few studies found in the literature which explored the association between sexual relationship and medication adherence. However, of the studies found, there was a positive correlation associated with

medication adherence in individuals with type-2 diabetes. A study done by Trief et al. (2004) found there was an association between the quality of one's marriage and medication adherence. Another study done by Beverly and Penrod (2007) found that there was an association between the spouse's beliefs about diabetes and medication adherence. Additionally, a cross-sectional study ($N= 387$) done by Pereira, Pedras, and Machado (2014) found that spousal support was correlated with medication adherence in individuals with type-2 diabetes. Unlike other studies in the literature, that study further found that negative spousal support was as beneficial as positive spousal support. The researchers hypothesized that due to their culture, the Portuguese participants may have perceived all spousal support as positive, thereby improving adherence to their diabetes self-management regimen, regardless of the type of spousal support.

In this current study, $n = 39$ (55.7%) of the participants reported being married. Sometimes the study participant was accompanied by his or her spouse. The healthcare providers encouraged the spouse to participate in the diabetes-specific patient education. In some cases, it was noted that the spouse was very involved in the diabetes self-management regimen of the participant.

If healthcare providers developed and implemented strategies which promoted spousal involvement in diabetes management, this could promote medication adherence in the targeted population. Developing and implementing risk reduction and health promotion strategies geared toward spousal support could lead to improved healthcare outcomes in uninsured Hispanics immigrants who are diagnosed with type-2 diabetes and are struggling with their self-care management behaviors.

Literature Examining Extended Family Relationships and Medication Adherence

This study found there is an association between extended family relationships and medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes. In this study, extended family relationship is defined as the individual's interaction and communication with family members (Rodrigue et al., 2000). This finding is consistent with previous research done in this area. Most of the studies in the literature which examines the influence of family support on medication adherence are comprised of children; few studies in the literature examine how family support influences medication adherence in adults. Of the studies found, positive family support is associated with medication adherence in adults diagnosed with type-2 diabetes (Karlsen, Oftedal, & Bru, 2012; Rosland, Heister, & Piette, 2012; Scheurer, Choudhry, Swanton, Matlin, & Shrank, 2012; Trief, Grant, Elbert, & Weinstock, 1998; Wen et al., 2004). A study done by Mayberry and Osborn (2012) found that individuals with type-2 diabetes adhered less to their diabetes self-management plan and performed fewer diabetes self-management behaviors when they perceived their family members as being nonsupportive or too controlling with diabetes management.

In this current study, it was noted that older participants were sometimes accompanied by their extended family members, but usually they were accompanied by their children and/or spouses. These family members were included in the diabetes self-management education given by the healthcare providers at the clinics. Family members were encouraged to be actively involved in supporting the diabetes self-management behaviors of the participant.

Family involvement is central in assisting individuals with managing their chronic disease processes (Pereira et al., 2014; Rosland et al., 2012; Trief et al., 1998). This

also holds true for individuals diagnosed with type-2 diabetes. If healthcare providers want to improve diabetes self-management behaviors in patients with type-2 diabetes, risk reduction and health promotion strategies focusing on positive family support and/or family therapy (Trief et al., 1998) should be developed and implemented in this population.

Literature Examining Social Environment and Medication Adherence

This study found there is not an association between the social environment and medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes. In this study, the social environment is defined as the individual's interest in individual and group activities (Rodrigue et al., 2000). Since the participants of this study are immigrants, some are without close family and may have limited social interactions as a result. This may have reduced the effect of socialization on medication adherence in this study population. Additionally, a majority of the participants in this research study are women. Hispanic women tend to receive less social support than Hispanic men; therefore, socialization may not be perceived as beneficial in this study population (Mansyur, Rustveld, Nash, & Jibaja-Weiss, 2015). Throughout the literature, it is well documented that there is an association between social environment and medication adherence (Fortmann et al., 2011; Gomes-Villas Boas et al., 2012; Kaplan et al., 2013; Mansyur et al., 2015; Mishra & Lager, 2009). The findings in the literature are not congruent with the findings from this current study.

A recent cross-sectional study done by Mansyur et al. (2015) found that perceived social support had different healthcare outcomes for Hispanic men compared to Hispanic women diagnosed with type-2 diabetes. Perceived social support increased diabetes self-care management behaviors in Hispanic women but perceived social

support did not improve diabetes self-care management behaviors in Hispanic men. The exact reason for this phenomenon needs to be examined further. Mansyur et al. (2015) hypothesized that Hispanic women's diabetes self-care behaviors improved due to perceived family support because culturally, Hispanic women tend to receive less social support than their male counterparts. Conversely, the Hispanic men took this perceived support for granted and their diabetes self-care behaviors did not improve.

In this current study, participants at one of the clinics had access to a monthly diabetes self-management group and they were encouraged to regularly participate. These participants met to discuss their well-being and to ask questions regarding their health status and diabetes self-management behaviors. Diabetes education was also reinforced during this time. These participants were actively engaged in their diabetes self-management regimens. This group was composed mostly of women who were supportive of each other and they seemed to benefit from the group interaction. They verbalized their appreciation for the monthly group sessions and how they learned diabetes self-management behaviors from each other.

Since human beings are social beings, it is only fitting for the social environment to impact diabetes self-management behaviors. The exact effect the social environment has on diabetes self-management behavior is unknown. However, social support is associated with medication adherence in individuals diagnosed with type-2 diabetes (Gomes-Villas Boas et al., 2012). Healthcare providers should assess the level of social support individuals have in order to develop and implement tailored strategies to enhance or maintain their level of social support (Bailey & Kodack, 2011; Marzec & Maddox, 2013; Mansyur et al., 2015), which would likely have a positive effect on medication adherence and healthcare outcomes in this population.

Literature Examining Psychological Distress and Medication Adherence

This study found that there is an association between psychological distress and medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes. The findings in the literature are congruent with the findings from this study. In this study, psychological distress is defined as negative feelings related to type-2 diabetes such as depression, anxiety, anger, guilt/self-blame, and worry (Rodrigue et al., 2000). Throughout the literature, it is well documented that psychological distress is negatively associated with medication adherence (Anders et al., 2008; Bhattacharya, 2012; Caldwell et al., 1988; Davey et al., 2010; de Ridder et al., 2008; Fisher et al, 2010; Lazarus, 1993; Peyrot et al., 2005; Smalls et al., 2012). A cross-sectional study done by Gonzalez et al. (2007) found that mild symptoms of depression negatively affected medication adherence and diabetes self-management behaviors in adults diagnosed with type-2 diabetes. Another study by Marzec and Maddox (2013) found that high levels of depression were associated with an increased level of medication nonadherence in individuals with type-2 diabetes, and concluded that low social support was partly the reason for this increased level of depression in their study population.

In this current study, the healthcare providers of the clinics assessed each participant for depression using the PHQ-9 and/or an equivalent tool. They used the information from these tools to determine whether the participants needed individual and/or group therapy. When the clinics were open, they provided either individual and/or group therapy to the participants who needed this service. They also used referral services to provide additional help to these individuals when the clinics were not open.

In order for healthcare providers to improve medication adherence in the targeted population, they should routinely assess the psychological distress of their patients in order to develop and implement tailored strategies to address the psychological needs of each individual (Gonzalez et al. 2007; Hearnshaw et al., 2006; Marzec & Maddox, 2013). When the psychological needs of individuals are not addressed by healthcare workers, this could negatively affect the healthcare outcome of these individuals.

Implications for the LCHD Framework

The LCHD Framework has been used to explore how health risk and health promotion strategies affect the health trajectories associated with various maternal–child populations over the lifespan. Utilizing this framework to depict the critical or sensitive periods in maternal–child populations enabled healthcare providers to determine these critical or sensitive periods in order for them to assess, develop, and implement risk reduction and health promotion strategies to counterbalance the effect of these stressors. By doing this, healthcare providers have made great strides in health disparities related to different maternal–child populations (Halfon & Hochstein, 2002), adult mental health changes over the lifespan (Clarke et al., 2011), educational disparity and illness over the lifespan (Dupre, 2008), obesity and the effect of hospitalizations over the lifespan (Schafer & Ferraro, 2007), urban Blacks across life stages (Brunswick & Merzel, 1988), and racial/ethnic health trajectories in different populations (Brown et al., 2012). However, prior to this current study, this framework has not been utilized to explore medication adherence or the risk reduction and health promotion strategies associated with middle-aged uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes.

Middle-aged adults are in the psychosocial developmental stage of Generativity versus Stagnation. This is a critical period for them. Adults who are successful during this developmental stage are productive members of society. They are usually raising their families, working to provide for their families, and volunteering in their communities. Conversely, adults who are not successful during this developmental stage are preoccupied with taking care of their own physical needs due to an illness such as type-2 diabetes, disregarding the needs of others (Atkinson & Hilgard, 1990). Consequently, their families, their workplaces, and their communities are negatively affected by this disengagement.

The LCHD framework could be utilized by healthcare providers to assess how well the targeted population is performing in their psychosocial developmental stage. Once their level of functioning has been assessed, the healthcare providers could develop and implement risk reduction and health promotion strategies to counterbalance the stressors occurring during this critical developmental stage (stressors are more detrimental during these times). There are modifiable risk factors associated with the target population and type-2 diabetes such as limited resources, financial hardships, stress, poor education, limited access to healthcare resources, and the lack of family/social support. However, if there are risk reduction and health promotion strategies in place during this sensitive time such as support groups, healthcare information, focus groups, individual/family therapy, and work support, this could help these individuals adjust to their type-2 diabetes which could improve their psychosocial adjustment and increase their level of productivity. These strategies could potentially optimize the health outcomes of this targeted population thereby reducing the disability, morbidity, and mortality rates associated with having type-2 diabetes.

Based on the findings from this study, the risk reduction and health promotion strategies could be developed from the life course factors. For healthcare orientation, healthcare providers can use interpreters to provide all diabetes self-management education supplemented with pictures and demonstrations to teach patients how to manage their diets and perform blood glucose checks. For the vocational environment, healthcare providers can provide patients with information on portion control, medication administration, exercise routines, and nutrition in order to control the daily fluctuations of their blood glucose levels. For the domestic environment, sexual relationship, and extended family relationships life course factors, the healthcare providers can encourage spouses and extended family members to be actively involved in the diabetes self-management behaviors of the patient. For the social environment, healthcare providers can encourage participants to be actively involved in diabetes self-management support groups and other group activities that would promote their well-being and their diabetes self-management behaviors. For psychological distress, healthcare providers can assess the psychological distress of their patients and then develop and implement individual and/or group therapy to increase the psychological well-being of these patients.

Individuals and populations cannot thrive in isolation. Thus, it is imperative that modifiable interpersonal/intrapersonal risk factors associated with psychosocial adjustment be assessed and risk reduction and health promotion strategies implemented to facilitate improved healthcare outcomes in this targeted population. This framework acknowledges that health is the cumulative impact of biological, environmental, and behavioral interactions over the lifespan. It would be optimal for these risk reduction and health promotion strategies to be in place from birth for this population. However, this is

beyond the reach of some individuals, healthcare providers, as well as healthcare systems. Continued research on this targeted population could generate enough evidence for healthcare providers to assess, develop, and implement effective risk reduction and health promotion strategies which could prove to be beneficial to this study population.

Study Limitations

This was a predictive correlational study; therefore, a causal relationship cannot be determined between psychosocial adjustment and medication adherence. The results of this study should be viewed while acknowledging that there are limitations. In this study the limitations may be due to the sample characteristics. First, the ethnic makeup of this sample may not be representative of those who are living with type-2 diabetes because the participants are a homogenous convenience sample which came from five related healthcare clinics in Northern Virginia. In future studies, this limitation can be corrected by choosing participants from other hospital systems/clinics and/or geographical areas and using randomization. Second, an important limitation to this study is the utilization of self-report instruments which could result in social desirability bias. Third, a majority of the study participants were not able to read in English or Spanish. Therefore, the meaning of the questions could have gotten lost through translation which could result in measurement error. Lastly, the researcher was not able to collect HbA1c levels from participants because this service was not offered by the clinics. This lab should be collected in future studies in order to have an accurate quantifiable measurement of medication adherence during a specified 3-month period.

Study Implications

Type-2 diabetes has been studied using numerous experimental and nonexperimental designs; however, researchers have yet to determine the predictors of medication adherence in the targeted population. Uninsured Hispanic immigrants continue to suffer high disability, morbidity, and mortality rates despite the availability of advance medical treatments. The purpose of this predictive correlational study was to examine the influence of psychosocial adjustment on medication adherence in uninsured Hispanic immigrants aged 40 to 64 years old diagnosed with type-2 diabetes. Research clearly depicts a positive correlation between psychosocial adjustment and medication adherence in individuals diagnosed with type-2 diabetes. It is hypothesized that if individuals are provided the psychosocial support they need, they can effectively manage their psychosocial well-being and improve their healthcare outcomes. However, before people can do this, healthcare providers must first be able to effectively assess an individual's psychosocial adjustment level and intervene accordingly to promote his or her level of well-being.

The main implication for this study is for healthcare providers to develop risk reduction and health promotion strategies specifically tailored to an individual's psychosocial needs. These strategies can stem from the life course factors discussed in this study: (a) healthcare orientation, (b) vocational environment, (c) domestic environment, (d) sexual relationship, (e) extended family relationships, (f) social environment, and (g) psychological distress. Developing these strategies could improve an individual's medication adherence and healthcare outcomes. Individuals having improved healthcare outcomes could lead to decreased disability, morbidity, and mortality rates in the targeted population, particularly those associated with type-2

diabetes. Improved healthcare outcomes could also lead to fewer hospital readmissions and lower overall healthcare costs for individuals, families, and the U.S. healthcare system.

Study Contributions to Nursing Literature and Body of Knowledge

This study can add insight to nursing literature as well as its body of knowledge. Applying this study's findings can improve the healthcare outcomes of individuals, families, and populations. Few research studies have focused on Hispanic immigrants from Central America, as most studies performed on this segment of the population are comprised of participants from Mexico. Since recent Hispanic immigrants originate from several different countries in Central America, they should be represented in the nursing research literature. On a daily basis, nurses are involved in meeting the healthcare needs of all patients, regardless of their ethnic backgrounds. This segment of the population represents the largest minority group in the United States. Hispanic immigrants also have the highest rate of type-2 diabetes and its associated healthcare complications; therefore, they are coming into contact with the healthcare system on a frequent and regular basis. When nurses are treating diverse individuals in various healthcare settings, being able to utilize research to enhance risk reduction and health promotion strategies—in specific patient populations—is beneficial to the patient as well as the nursing profession.

APPENDIX A. REQUEST TO USE FIGURE

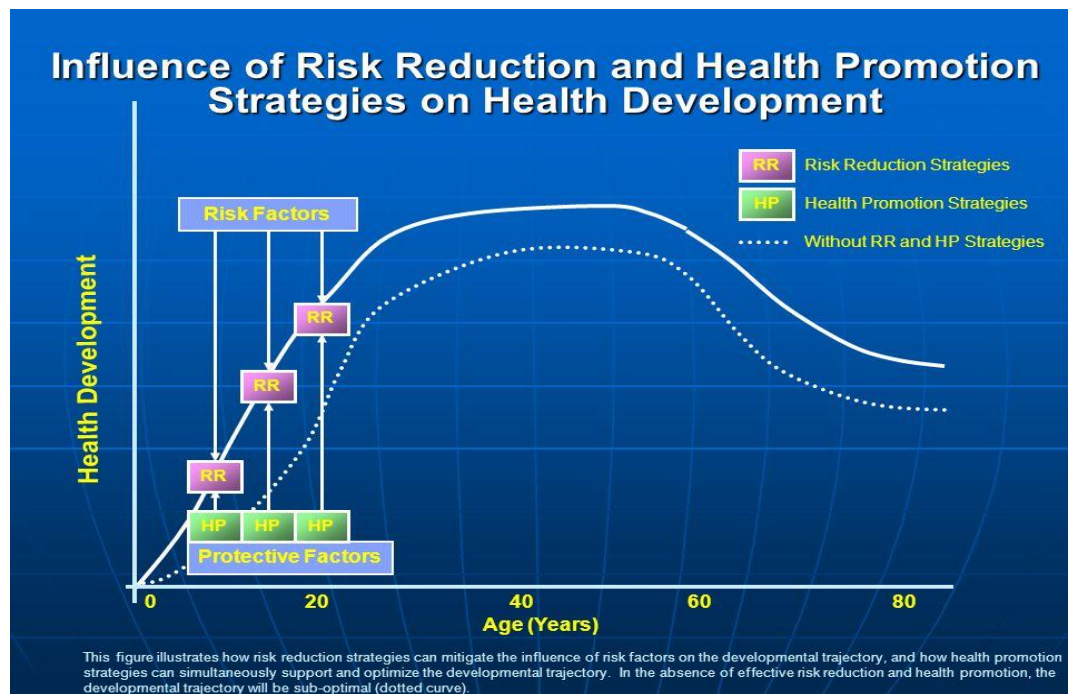


Figure 1. The Health Development Organization: An Organizational Approach to Achieving Child Health Development (Halfon, N., Inkelas, M., & Hochstein, M. 2000).

dwilli1

Tue 10/28/2014 10:23 AM

To:

Neal Halfon <nhalfon@ucla.edu> ;

You forwarded this message on 10/30/2014 10:48 AM.

Dr. Halfon,

My name is Deborah Ann Williams. I am a graduate nursing student pursuing my PhD at George Mason University. The purpose of this correspondence is to request your permission to use your Risk Reduction and Health Promotions Figure in my dissertation proposal.

I am using your Life Course Health Development Framework as my conceptual framework for my proposed study, and it would add understanding to my proposal if I were allowed to use this figure.

Thank you in advance for your cooperation!

Sincerely,
Deborah Williams

Neal Halfon <nhalfon@ucla.edu>

Sat 11/1/2014 3:51 PM

Inbox

To:

dwilli1;

You replied on 11/2/2014 12:59 AM.

It is fine for you to use

Sent via BlackBerry from T-Mobile

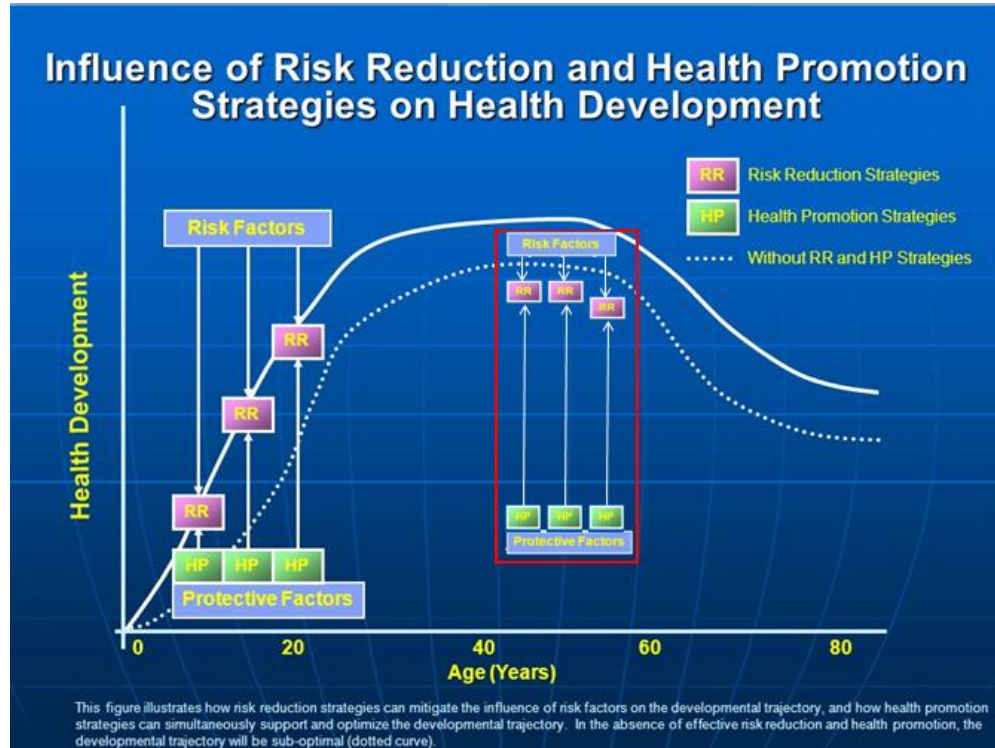


Figure 2. Health Trajectory for Hispanic Immigrants with Type-2 Diabetes

APPENDIX B. HUMAN SUBJECTS REVIEW BOARD FORMS



Office of Research Integrity and Assurance

Research Hall, 4400 University Drive, MS 6D5, Fairfax, Virginia 22030
Phone: 703-993-5445; Fax: 703-993-9590

DATE: January 29, 2015

TO: Marie Kodadek, RN, PhD, CNE
FROM: George Mason University IRB

Project Title: [097136-1] The Influence of Psychosocial Adjustment on Medication Adherence among Uninsured Immigrants Aged 40-64 Years Old with a Type-2 Diabetes Diagnosis

SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: January 29, 2015

REVIEW CATEGORY: Exemption category #2 & 4

Thank you for your submission of New Project materials for this project. The Office of Research Integrity & Assurance (ORIA) has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

Please remember that all research must be conducted as described in the submitted materials.

Please note that any revision to previously approved materials must be submitted to the ORIA prior to initiation. Please use the appropriate revision forms for this procedure.

If you have any questions, please contact Karen Motsinger at 703-993-4208 or kmotsing@gmu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within George Mason University IRB's records.



Office of Research Integrity and Assurance

Research Hall, 4400 University Drive, MS 6D5, Fairfax, Virginia 22030
Phone: 703-993-5445; Fax: 703-993-9590

DATE: February 16, 2015

TO: Marie Kodadek, RN, PhD, CNE
FROM: George Mason University IRB

Project Title: [697136-2] The Influence of Psychosocial Adjustment on Medication Adherence among Uninsured Immigrants Aged 40-64 Years Old with a Type-2 Diabetes Diagnosis

SUBMISSION TYPE: Amendment/Modification

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: February 16, 2015

REVIEW CATEGORY: Exemption category #2 & 4

Thank you for your submission of Amendment/Modification materials for this project. The Office of Research Integrity & Assurance (ORIA) has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

Please remember that all research must be conducted as described in the submitted materials.

Please note that any revision to previously approved materials must be submitted to the ORIA prior to initiation. Please use the appropriate revision forms for this procedure.

If you have any questions, please contact Karen Motsinger at 703-993-4208 or kmotsing@gmu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within George Mason University IRB's records.



Office of Research Integrity and Assurance

Research Hall, 4400 University Drive, MS 6D5, Fairfax, Virginia 22030
Phone: 703-993-5445; Fax: 703-993-9590

DATE: June 10, 2015

TO: Marie Kodadek, RN, PhD, CNE
FROM: George Mason University IRB

Project Title: [897136-3] The Influence of Psychosocial Adjustment on Medication Adherence among Uninsured Immigrants Aged 40-64 Years Old with a Type-2 Diabetes Diagnosis

SUBMISSION TYPE: Amendment/Modification

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: June 10, 2015

REVIEW CATEGORY: Exemption category #2

Thank you for your submission of Amendment/Modification materials for this project. The Office of Research Integrity & Assurance (ORIA) has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

Please remember that all research must be conducted as described in the submitted materials.

Please note that any revision to previously approved materials must be submitted to the ORIA prior to initiation. Please use the appropriate revision forms for this procedure.

If you have any questions, please contact Karen Motsinger at 703-993-4208 or kmotsing@gmu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within George Mason University IRB's records.

APPENDIX C. INFORMED CONSENT FORM

The Influence of Psychosocial Adjustment on Medication Adherence among Uninsured Hispanic Immigrants Aged 40 to 64 Years-old with a Type-2 Diabetes Diagnosis

RESEARCH PROCEDURES

This study will explore the influence of psychosocial adjustment on medication adherence among uninsured Hispanic adults aged 40 to 64 years-old who have been diagnosed with type-2 diabetes. If you agree to participate, you will be asked to fill out a Demographic Survey, the PAIS-SR Instrument, and the Morisky Medication Adherence Scale. Total time to complete the forms should not exceed 30 minutes. The researcher will record your fasting blood sugar (FBS), your A1c level, and your body mass index (BMI) from your electronic medical record.

RISKS

There are no foreseeable risks for participating in this research. There will be no physical, social, or legal risks to you as a participant. Psychological risks would be minimal and related to emotional well-being. This study is low risk to the participants but will be a great benefit to the targeted population in regards to intellectual knowledge.

BENEFITS

There are no benefits to you as a participant other than to further research in examining the influence of psychosocial adjustment on medication adherence.

CONFIDENTIALITY

Confidentiality and anonymity will be maintained. There will be no identifiable personal information on the measurement instruments. No names will appear in any report or publications. The data will be coded. The researcher will be the only person with access to the key which links your name to a code.

PARTICIPATION

The researcher will have no personal relationship to the participants other than researcher and participant.

The participants of this study will be compensated with a \$5 Wal-mart gift card for their participation. They will be thanked for their cooperation and for taking time out their day to participate in this study solely for altruistic reasons.

Your participation is voluntary, and you may withdraw from the study at any time and for any reason. If you decide not to participate or if you withdraw from the study, there is no

penalty or loss of benefits to which you are otherwise entitled. There are no costs to you or any other party.

By signing this form you are giving consent for the researcher to access the electronic medical record information related to your fasting blood sugar (FBS) value, A1c level, and your body mass index (BMI).

CONTACT

This research is being conducted Deborah Ann Williams, MSN CHHS PhD department at George Mason University. She may be reached at 703-861-4094 for questions or to report a research-related problem. Dr. Marie Kodadek can be reached at 703-993-2964 in the CHHS PhD Department at George Mason University. You may contact the George Mason University Office of Research Integrity and Assurance at 703-993-4121 if you have questions or comments regarding your rights as a participant in the research.

This research has been reviewed according to George Mason University procedures governing your participation in this research.

CONSENT

I have read this form, all my questions have been answered by the research staff, and I agree to participate in this study.

Name

Date of Signature

Version date: 01/22/2015

APPENDIX D. DEMOGRAPHIC QUESTIONNAIRE

Type-2 Diabetes Survey

Respondent's Name: _____	1. PT. ID. NO. _____ 2. STD. NO. _____
Medical Institution: _____	3. Dx _____ 3. Dx Cd. _____
Treating Doctor's Name: _____	5. Rx _____ 6. Rx Cd. _____
Date Form Was Completed: _____	7. Med. Dept. _____
Age: _____ Sex: _____	8. Visit Cd. ____ 9. Soc. Stat. _____
Education: _____ Marital Status: _____	10. Tech. _____
Occupation: _____	

Please check one box for each question where there are check boxes. Please write in information where there is a line. If you do not wish to answer a question, please draw a line through it.

I. GENDER

1. What gender are you?

- a. Male.....☐
b. Female.....☐
c. Other.....☐

II. MARITAL STATUS

2. What is your marital status?

- a. Single.....☐
b. Married.....☐
c. Divorced.....☐
d. Separated.....☐
e. Widowed.....☐

III. AGE

3. What is your age? _____

IV. How do you identify your ETHNICITY?

4. What is your ethnicity?

Hispanic or Latina _____

Prefer not to answer _____

V. How do you identify your RACE?

5. What is your race? _____

Prefer not to answer _____

VI. EDUCATION

6. What is your highest level of education?

a. Grammar School.....☐

b. High School Education or
equivalent.....☐

c. Vocational/technical school
(2years).....☐

d. Some college.....☐

e. Bachelor's
Degree.....☐

f. Other.....☐

VII. HOUSING

7. Do you live alone or with others?

a. Live with others.....☐

b. Live alone.....☐

VIII. Country of Origin

8. Where were you born? _____

a. How many years have you been in the United
States? _____

IX. EMPLOYMENT

9. Are you currently employed?

a. Presently
employed.....☐

b. Presently
unemployed.....☐

c. Never employed.....☐

X. LENGTH OF TYPE-2 DIABETES DIAGNOSIS

10. How long have you had Type-2 Diabetes and how is it treated?

_____ (Year/Months) | Treatment: _____

XI. AGE OF DIAGNOSIS

How old were you when you were diagnosed with Type-2 Diabetes?

_____ (Year/Months)

XII. In general, what language do you read and speak? _____

XIII. What language do you usually speak at home? _____

XIV. In which language do you usually think? _____

XV. What language do you usually speak with your friends? _____

APPENDIX E. THE PSYCHOSOCIAL ADJUSTMENT TO ILLNESS SCALE SELF-REPORT (PAIS-SR)

INSTRUCTIONS

The present form contains questions concerning the effects that your illness has had on you. We are interested in knowing what effects it has had on your relationships and your ability to perform at home and on your job. Also, we would like to know about effects on family and personal relationships. Other questions concern its effects on your social and leisure time activities, and how you have felt emotionally.

In answering each question, please put a check mark (☒) in the box alongside the answer that best describes your experience. Please answer all the questions and try not to skip any. If none of the answers to a question match your experience exactly, please choose the answer that comes closest to the experience you have had.

The time we would like you to refer to is **the past 30 days, including today**. Answer each question in terms of what your experience has been like during this time frame. In the event you are presently a patient in the hospital, please report your experiences for **the 30 days before entering the hospital**.

Some questions on the form assume that you are married or have a steady partner you are close to. Other questions ask about family relationships. If these questions do not apply to you because you are unmarried, or you have no family or partner, please leave them blank. Try to answer **all** the questions that do apply to you, however.

Section II asks questions about your job performance. If you have either full-time or substantial part-time employment, please answer in terms of your job. If you are primarily a student, answer in terms of your **school work**. If you are a housewife, answer as though **housework**, neighbors, etc. are your work environment.

We appreciate the time you have taken to do this form. Please check again to make sure you have completed all the items. If you have any questions about the form, please ask. If you are responding by mail, please write them in the space provided below. Please return the form as soon as you have completed it.

SECTION I

(1) Which of the following statements best describes your usual attitude about taking care of your health?

- ☐ a) I am very concerned and pay close attention to my personal health.
- ☐ b) Most of the time I pay attention to my health care needs.
- ☐ c) Usually, I try to take care of health matters but sometimes I just don't get around to it.
- ☐ d) Health care is something that I just don't worry too much about.

(2) Your present illness probably requires some special attention and care on your part. Would you please select the statement below that best describes your reaction.

- ☐ a) I do things pretty much the way I always have done them and I don't worry or take any special considerations for my illness.
- ☐ b) I try to do all the things I am supposed to do to take care of myself, but lots of times I forget or I am too tired or busy.
- ☐ c) I do a pretty good job taking care of my present illness.
- ☐ d) I pay close attention to all the needs of my present illness and do everything I can to take care of myself.

(3) In general, how do you feel about the quality of medical care available today and the doctors who provide it?

- ☐ a) Medical care has never been better, and the doctors who give it are doing an excellent job.
- ☐ b) The quality of medical care available is very good, but there are some areas that could stand improvement.
- ☐ c) Medical care and doctors are just not of the same quality they once were.
- ☐ d) I don't have much faith in doctors and medical care today.

(4) During your present illness you have received treatment from both doctors and medical staff. How do you feel about them and the treatment you have received from them?

- ☐ a) I am very unhappy with the treatment I have received and don't think the staff has done all they could have for me.
- ☐ b) I have not been impressed with the treatment I have received, but I think it is probably the best they can do.
- ☐ c) The treatment has been pretty good on the whole, although there have been a few problems.
- ☐ d) The treatment and the treatment staff have been excellent.

(5) When they are ill, different people expect different things about their illness, and have different attitudes about being ill. Could you please check the statement below which comes closest to describing your feelings.

- ☐ a) I am sure that I am going to overcome the illness and its problems quickly and get back to being my old self.
- ☐ b) My illness has caused some problems for me, but I feel I will overcome them fairly soon, and get back to the way I was before.
- ☐ c) My illness has really put a great strain on me, both physically and mentally, but I am trying very hard to overcome it, and feel sure that I will be back to my old self one of these days.
- ☐ d) I feel worn out and very weak from my illness, and there are times when I don't know if I am really ever going to be able to overcome it.

(6) Being ill can be a confusing experience, and some patients feel that they do not receive enough information and detail from their doctors and the medical staff about their illness. Please select a statement below which best describes your feelings about this matter.

- ☐ a) My doctor and the medical staff have told me very little about my illness even though I have asked more than once.
- ☐ b) I do have some information about my illness but I feel I would like to know more.
- ☐ c) I have a pretty fair understanding about my illness and feel that if I want to know more I can always get the information.
- ☐ d) I have been given a very complete picture of my illness, and my doctor and the medical staff have given me all the details I wish to have.

(7) In an illness such as yours, people have different ideas about their treatment and what to expect from it. Please select one of the statements below which best describes what you expect about your treatment.

- ☐ a) I believe my doctors and medical staff are quite able to direct my treatment and feel it is the best treatment I could receive.
- ☐ b) I have trust in my doctor's direction of my treatment; however, sometimes I have doubts about it.
- ☐ c) I don't like certain parts of my treatment which are very unpleasant, but my doctors tell me I should go through it anyway.
- ☐ d) In many ways I think my treatment is worse than the illness, and I am not sure it is worth going through it.

(8) In an illness such as yours, patients are given different amounts of information about their treatment. Please select a statement from those below which best describes information you have been given about your treatment.

- ☐ a) I have been told almost nothing about my treatment and feel left out about it.
- ☐ b) I have some information about my treatment, but not as much as I would like to have.
- ☐ c) My information concerning treatment is pretty complete, but there are one or two things I still want to know.
- ☐ d) I feel my information concerning treatment is very complete and up-to-date.

SECTION II

(1) Has your illness interfered with your ability to do your job (schoolwork)?

- ☐ a) No problems with my job
- ☐ b) Some problems, but only minor ones
- ☐ c) Some serious problems
- ☐ d) Illness has totally prevented me from doing my job

(2) How well do you physically perform your job (studies) now?

- ☐ a) Poorly
- ☐ b) Not too well
- ☐ c) Adequately
- ☐ d) Very well

(3) During the past 30 days, have you lost any time at work (school) due to your illness?

- ☐ a) 3 days or less
- ☐ b) 1 week
- ☐ c) 2 weeks
- ☐ d) More than 2 weeks

(4) Is your job (school) as important to you now as it was before your illness?

- ☐ a) Little or no importance to me now
- ☐ b) A lot less important
- ☐ c) Slightly less important
- ☐ d) Equal or greater importance than before

(5) Have you had to change your goals concerning your job (education) as a result of your illness?

- ☐ a) My goals are unchanged
- ☐ b) There has been a slight change in my goals
- ☐ c) My goals have changed quite a bit
- ☐ d) I have changed my goals completely

(6) Have you noticed any increase in problems with your co-workers (students, neighbors) since your illness?

- ☐ a) A great increase in problems
- ☐ b) A moderate increase in problems
- ☐ c) A slight increase in problems
- ☐ d) None

SECTION III

(1) How would you describe your relationship with your husband or wife (partner, if not married) since your illness?

- ☐ a) Good
- ☐ b) Fair
- ☐ c) Poor
- ☐ d) Very Poor

(2) How would you describe your general relationships with the other people you live with (e.g., children, parents, aunts, etc.)?

- ☐ a) Very Poor
- ☐ b) Poor
- ☐ c) Fair
- ☐ d) Good

(3) How much has your illness interfered with your work and duties around the house?

- ☐ a) Not at all
- ☐ b) Slight problems, easily overcome
- ☐ c) Moderate problems, not all of which can be overcome
- ☐ d) Severe difficulties with household duties

(4) In those areas where your illness has caused problems with your household work, how has the family shifted duties to help you out?

- ☐ a) The family has not been able to help out at all
- ☐ b) The family has tried to help but many things are left undone
- ☐ c) The family has done well except for a few minor things
- ☐ d) No problem

(5) Has your illness resulted in a decrease in communication between you and members of your family?

- ☐ a) No decrease in communication
- ☐ b) A slight decrease in communication
- ☐ c) Communication has decreased, and I feel somewhat withdrawn from them
- ☐ d) Communication has decreased a lot, and I feel very alone

(6) Some people with an illness like yours feel they need help from other people (friends, neighbors, family, etc.) to get things done from day-to-day. Do you feel you need such help and is there anyone to provide it?

- ☐ a) I really need help but seldom is anyone around to help
- ☐ b) I get some help, but I can't count on it all the time
- ☐ c) I don't get all the help I need all of the time, but most of the time help is there when I need it
- ☐ d) I don't feel I need such help, or the help I need is available from my family or friends

(7) Have you experienced any physical disability with your illness?

- ☐ a) No physical disability
- ☐ b) A slight physical disability
- ☐ c) A moderate physical disability
- ☐ d) A severe physical disability

(8) An illness such as yours can sometimes cause a drain on the family's finances; are you having any difficulties meeting the financial demands of your illness?

- ☐ a) Severe financial hardship
- ☐ b) Moderate financial problems
- ☐ c) A slight financial drain
- ☐ d) No money problems

SECTION IV

(1) Sometimes having an illness can cause problems in a relationship. Has your illness led to any problems with your husband or wife (partner, if not married)?

- ☐ a) There has been no change in our relationship
- ☐ b) We are a little less close since my illness
- ☐ c) We are definitely less close since my illness
- ☐ d) We have had serious problems or a break in our relationship since my illness

(2) Sometimes when people are ill they report a loss of interest in sexual activities. Have you experienced less sexual interest since your illness?

- ☐ a) Absolutely no sexual interest since illness
- ☐ b) A marked loss of sexual interest
- ☐ c) A slight loss of sexual interest
- ☐ d) No loss of sexual interest

(3) Illness sometimes causes a decrease in sexual activity. Have you experienced any decrease in the frequency of your sexual activities?

- ☐ a) No decrease in sexual activities
- ☐ b) Slight decrease in sexual activities
- ☐ c) Marked decrease in sexual activities
- ☐ d) Sexual activities have stopped

(4) Has there been any change in the pleasure or satisfaction you normally experience from sex?

- ☐ a) Sexual pleasure and satisfaction have stopped
- ☐ b) A marked loss of sexual pleasure or satisfaction
- ☐ c) A slight loss of sexual pleasure or satisfaction
- ☐ d) No change in sexual satisfaction

(5) Sometimes an illness will cause interference in a person's ability to perform sexual activities even though the person is still interested in sex. Has this happened to you, and if so, to what degree?

- ☐ a) No change in my ability to have sex
- ☐ b) Slight problems with my sexual performance
- ☐ c) Constant sexual performance problems
- ☐ d) Totally unable to perform sexually

(6) Sometimes an illness will interfere with a couple's normal sexual relationship and cause arguments or problems between them. Have you and your partner had any arguments like this, and if so, to what degree?

- ☐ a) Constant arguments
- ☐ b) Frequent arguments
- ☐ c) Some arguments
- ☐ d) No arguments

SECTION V

(1) Have you had as much contact as usual (either personally or by telephone) with members of your family outside your household since your illness?

- ☐ a) Contact is the same or greater since illness
- ☐ b) Contact is slightly less
- ☐ c) Contact is markedly less
- ☐ d) No contact since illness

(2) Have you remained as interested in getting together with these members of your family since your illness?

- ☐ a) Little or no interest in getting together with them
- ☐ b) Interest is a lot less than before
- ☐ c) Interest is slightly less
- ☐ d) Interest is the same or greater since illness

(3) Sometimes, when people are ill, they are forced to depend on members of the family outside their household for physical help. Do you need physical help from them, and do they supply the help you need?

- ☐ a) I need no help, or they give me all the help I need
- ☐ b) Their help is enough, except for some minor things
- ☐ c) They give me some help but not enough
- ☐ d) They give me little or no help even though I need a great deal

(4) Some people socialize a great deal with members of their family outside their immediate household. Do you do much socializing with these family members, and has your illness reduced such socializing?

- ☐ a) Socializing with them has been pretty much eliminated
- ☐ b) Socializing with them has been reduced significantly
- ☐ c) Socializing with them has been reduced somewhat
- ☐ d) Socializing with them has been pretty much unaffected, or (I have never done much socializing of this kind)

(5) In general, how have you been getting along with these members of your family recently?

- ☐ a) Good
- ☐ b) Fair
- ☐ c) Poor
- ☐ d) Very poor

SECTION VI

(1) Are you still as interested in your leisure time activities and hobbies as you were prior to your illness?

- ☐ a) Same level of interest as previously
- ☐ b) Slightly less interest than before
- ☐ c) Significantly less interest than before
- ☐ d) Little or no interest remaining

(2) How about actual participation? Are you still actively involved in doing those activities?

- ☐ a) Little or no participation at present
- ☐ b) Participation reduced significantly
- ☐ c) Participation reduced slightly
- ☐ d) Participation remains unchanged

Please continue on the following page ►

(3) Are you as interested in leisure time activities with your family (i.e., playing cards & games, taking trips, going swimming, etc.) as you were prior to your illness?

- ☐ a) Same level of interest as previously
- ☐ b) Slightly less interest than before
- ☐ c) Significantly less interest than before
- ☐ d) Little or no interest remaining

(4) Do you still participate in those activities to the same degree you once did?

- ☐ a) Little or no participation at present
- ☐ b) Participation reduced significantly
- ☐ c) Participation reduced slightly
- ☐ d) Participation remains unchanged

(5) Have you maintained your interest in social activities since your illness (e.g., social clubs, church groups, going to the movies, etc.)?

- ☐ a) Same level of interest as previously
- ☐ b) Slightly less interest than before
- ☐ c) Significantly less interest than before
- ☐ d) Little or no interest remaining

(6) How about participation? Do you still go out with your friends and do those things?

- ☐ a) Little or no participation at present
- ☐ b) Participation reduced significantly
- ☐ c) Participation reduced slightly
- ☐ d) Participation remains unchanged

SECTION VII

(1) Recently, have you felt afraid, tense, nervous, or anxious?

- ☐ a) Not at all
- ☐ b) A little bit
- ☐ c) Quite a bit
- ☐ d) Extremely

(2) Recently, have you felt sad, depressed, lost interest in things, or felt hopeless?

- ☐ a) Extremely
- ☐ b) Quite a bit
- ☐ c) A little bit
- ☐ d) Not at all

(3) Recently, have you felt angry, irritable, or had difficulty controlling your temper?

- ☐ a) Not at all
- ☐ b) A little bit
- ☐ c) Quite a bit
- ☐ d) Extremely

(4) Recently, have you blamed yourself for things, felt guilty, or felt like you have let people down?

- ☐ a) Extremely
- ☐ b) Quite a bit
- ☐ c) A little bit
- ☐ d) Not at all

(5) Recently, have you worried much about your illness or other matters?

- ☐ a) Not at all
- ☐ b) A little bit
- ☐ c) Quite a bit
- ☐ d) Extremely

(6) Recently, have you been feeling down on yourself or less valuable as a person?

- ☐ a) Extremely
- ☐ b) Quite a bit
- ☐ c) A little bit
- ☐ d) Not at all

(7) Recently, have you been concerned that your illness has caused changes in the way you look that make you less attractive?

- ☐ a) Not at all
- ☐ b) A little bit
- ☐ c) Quite a bit
- ☐ d) Extremely

APPENDIX F. MORISKY 8-ITEM MEDICATION ADHERENCE QUESTIONNAIRE

Morisky 8-Item Medication Adherence Questionnaire

for your Type-2 Diabetes Medication

1.) Do you sometimes forget to take your medicine?

☐ Yes

☐ No

2.) People sometimes miss taking their medicines for reasons other than forgetting. Thinking over the past 2 weeks, were there any days when you did not take your medicine?

☐ Yes

☐ No

3.) Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?

☐ Yes

☐ No

4.) When you travel or leave home, do you sometimes forget to bring along your medicine?

☐ Yes

☐ No

5.) Did you take all your medicines yesterday?

☐ Yes

☐ No

6.) When you feel like your symptoms are under control, do you sometimes stop taking your medicine?

- ☐ Yes
- ☐ No

7.) Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?

- ☐ Yes
- ☐ No

8.) How often do you have difficulty remembering to take all your medicine?

- ☐ A. Never/rarely
- ☐ B. Once in a while
- ☐ C. Sometimes
- ☐ D. Usually
- ☐ E. All the time

A = 0;

B-E = 1

Total score

Scores: > 2 = low adherence

1 or 2 = medium adherence

0 = high adherence

Morisky DE, Green LW, Levine DM. Concurrent and predictive validity of a self-reported measure of medication adherence. *Med Care*. 1986;24:67-74. Morisky 8-Item Medication Adherence Questionnaire.

REFERENCES

- Acculturation. (2014). In *Merriam-Webster Dictionary*. Retrieved from <http://www.merriam-webster.com/dictionary/acculturation>
- Aikens, J. E., & Piette, J. D. (2013). Longitudinal association between medication adherence and glycaemic control in type 2 diabetes. *Diabetic Medicine*, 30(3), 338–344. doi:10.1111/dme.12046
- Al-Qazaz, H. K., Hassali, M. A., Shafie, A. A., Sulaiman, S. A., Sundram, S., & Morisky, D. E. (2010). The eight-item Morisky Medication Adherence Scale MMAS: Translation and validation of the Malaysian version. *Diabetes Research and Clinical Practice*, 90(2), 216–221. doi:10.1016/j.diabres.2010.08.012
- Al Sayah, F., Majumdar, S. R., & Johnson, J. A. (2015). Association of inadequate health literacy with health outcomes in patients with type 2 diabetes and depression: Secondary analysis of a controlled trial. *Canadian Journal of Diabetes*, 39(4), 259–265. doi:10.1016/j.jcjd.2014.11.005
- American Diabetes Association. (2014). *Diabetes basics*. Retrieved from <http://www.diabetes.org/diabetes-basics/statistics/>
- Anders, R. L., Olson, T., Wiebe, J., Bean, N. H., DiGregorio, R., Guillermina, M., & Ortiz, M. (2008). Diabetes prevalence and treatment adherence in residents living in a colonia located on the West Texas, USA/Mexico border. *Nursing and Health Sciences*, 10(3), 195–202. doi:10.1111/j.1442-2018.2008.00397.x
- Annor, F. B., Roblin, D. W., Okosun, I. S., & Goodman, M. (2015). Work-related psychosocial stress and glycemic control among working adults with diabetes mellitus. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*, 9(2), 85–90. doi:10.1016/j.dsx.2015.02.003
- Atkinson, R. L., & Hilgard, E. R. (1990). *Introduction to psychology* (10th ed.). San Diego, CA: Thomson Learning.
- Bailey, C. J., & Kodack, M. (2011). Patient adherence to medication requirements for therapy of type 2 diabetes: Patient adherence to medication requirements. *International Journal of Clinical Practice*, 65(3), 314–322. doi:10.1111/j.1742-1241.2010.02544
- Bailey, G. R., Barner, J. C., Weems, J. K., Leckbee, G., Solis, R., Montemayor, D., & Pope, N. D. (2012). Assessing barriers to medication adherence in underserved

- patients with diabetes in Texas. *The Diabetes Educator*, 38(2), 271–279.
doi:10.1177/0145721711436134
- Barag, S. H. (2011). Insulin therapy for management of type 2 diabetes mellitus: Strategies for initiation and long-term patient adherence. *Journal of the American Osteopathic Association*, 111(7 suppl 5), S13–S19.
- Beverly, E. A., & Penrod, J. (2007). Living with type 2 diabetes: Marital perspectives of middle-aged and older couples. *Journal of Psychosocial Nursing*, 45(2), 25–32.
- Bhattacharya, G. (2012). Psychosocial impacts of type 2 diabetes self-management in a rural African-American population. *Journal of Immigrant and Minority Health*, 14(6), 1071–1081. doi:10.1007/s10903-012-9585-7
- Bogner, H. R., Morales, K. H., de Vries, H. F., & Cappola, A. R. (2012). Integrated management of type 2 diabetes mellitus and depression treatment to improve medication adherence: A randomized controlled trial. *The Annals of Family Medicine*, 10(1), 15–22.
- Boyle, J. P., Thompson, T. J., Gregg, E. W., Barker, L. E., & Williamson, D. F. (2010). Projection of the year 2050 burden of diabetes in the US adult population: Dynamic modeling of incidence, mortality, and prediabetes prevalence. *Population Health Metrics*, 8(1), 1–29.
- Brown, M. T., & Bussell, J. K. (2011). Medication adherence: WHO cares? *Mayo Clinic Proceedings*, 86, 304. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/pmc3068890/>
- Brown, T. H., O'Rand, A. M., & Adkins, D. E. (2012). Race-ethnicity and health trajectories tests of three hypotheses across multiple groups and health outcomes. *Journal of Health and Social Behavior*, 53(3), 359–377.
- Brunswick, A. F., & Merzel, C. R. (1988). Health through three life stages: A longitudinal study of urban Black adolescents. *Social Science and Medicine*, 27(11), 1207–1213.
- Caldwell, E. M., Baxter, J., Mitchell, C. M., Shetterly, S. M., & Hamman, R. F. (1998). The association of non-insulin-dependent diabetes mellitus with perceived quality of life in a biethnic population: The San Luis Valley Diabetes Study. *American Journal of Public Health*, 88(8), 1225–1229.
- Centers for Disease Control and Prevention. (2011, January). *CDC health disparities and inequalities report: United States, 2011* (Morbidity and Mortality Weekly Report, 1-109). Retrieved from <http://www.cdc.gov/mmwr/pdf/other/su6004.pdf>
- Centers for Disease Control and Prevention. (2013). *No health insurance coverage among persons under 65, by selected characteristics: United States, selected years 1984-2012* (Trend Tables 125, 1-3). Retrieved from <http://www.cdc.gov/nchs/data/hus/2013/125.pdf>

- Chan, F., Da Silva Cardoso, E., & Chronister, J. A. (2009). *Understanding psychosocial adjustment to chronic illness and disability: A handbook for evidence-based practitioners in rehabilitation* (1st ed.). New York, NY: Springer Publishing Company.
- Chan, K. S., Gaskin, D. J., Dinwiddie, G. Y., & McCleary, R. (2012). Do diabetic patients living in racially segregated neighborhoods experience different access and quality of care? *Medical Care*, 50(8), 692.
- Clarke, P., Marshall, V., House, J., & Lantz, P. (2011). The social structuring of mental health over the adult life course: Advancing theory in the sociology of aging. *Social Forces*, 89(4), 1287–1313.
- Cowie, C. C., Rust, K. F., Byrd-Holt, D. D., Gregg, E. W., Ford, E. S., Geiss, L. S., ... Fradkin, J. E. (2010). Prevalence of diabetes and high risk for diabetes using a1c criteria in the U.S. population in 1988-2006. *Diabetes Care*, 33(3), 562–568.
- Davey, M. P., Kissil, K., Niño, A., & Tubbs, C. Y. (2010). "They paid no mind to my state of mind": African American breast cancer patients' experiences of cancer care delivery. *Journal of Psychosocial Oncology*, 28(6), 683–698. doi:10.1080/07347332.2010.516807
- Davila, E. P., Florez, H., Trepka, M. J., Fleming, L. E., Niyonsenga, T., Lee, D. J., & Parkash, J. (2011). Long work hours is associated with suboptimal glycemic control among US workers with diabetes. *American Journal of Industrial Medicine*, 54(5), 375–383. doi:10.1002/ajim.20923
- De Oliveira-Filho, A. D., Morisky, D. E., Neves, S. J. F., Costa, F. A., & de Lyra, D. P. (2013). The 8-item Morisky Medication Adherence Scale: Validation of a Brazilian–Portuguese version in hypertensive adults. *Research in Social and Administrative Pharmacy*, 10(3), 554–561. doi:10.1016/j.sapharm.2013.10.006
- D'Eramo Melkus, G., Chyun, D., Vorderstrasse, A., Newlin, K., Jefferson, V., & Langerman, S. (2010). The effect of a diabetes education, coping skills training, and care intervention on physiological and psychosocial outcomes in Black women with type 2 diabetes. *Biological Research for Nursing*, 12(1), 7–19. doi:10.1177/1099800410369825
- de Ridder, D., Geenen, R., Kuijer, R., & Middendorp, H. (2008). Psychological adjustment to chronic illness. *Lancet*, 372, 246–255.
- Derogatis, L. R. (n.d.). *Synopsis of the Psychosocial Adjustment to Illness Scale (PAIS/PAIS-SR)*. Retrieved from <http://derogatis-tests.com>
- Dirksen, S. R., & Erickson, J. R. (2002). Well-being in Hispanic and Non-Hispanic White survivors of breast cancer. *Oncology Nursing Forum*, 29(5), 820–826. doi:10.1188/02.ONF.820-826

- Dupre, M. E. (2008). Educational differences in health risks and illness over the life course: A test of cumulative disadvantage theory. *Social Science Research*, 37(4), 1253–1266. doi:10.1016/j.ssresearch.2008.05.007
- Dutta, A., & Kundu, M. M. (n.d.). *Psychosocial adjustment to disability: A multi-ethnic approach*. Retrieved from <http://www3.subr.edu/rehabilitation/RRIUP/select%20publications/Psychosocial%20Adjustment.pdf>
- Egede, L. E., Lynch, C. P., Gebregziabher, M., Hunt, K. J., Echols, C., Gilbert, G. E., & Mauldin, P. D. (2013). Differential impact of longitudinal medication non-adherence on mortality by race/ethnicity among veterans with diabetes. *Journal of General Internal Medicine*, 28(2), 208–215. doi:10.1007/s11606-012-2200-8
- Fisher, L., Glasgow, R. E., & Strycker, L. A. (2010). The relationship between diabetes distress and clinical depression with glycemic control among patients with type 2 diabetes. *Diabetes Care*, 33(5), 1034–1036
- Fortmann, A. L., Gallo, L. C., & Philis-Tsimikas, A. (2011). Glycemic control among Latinos with type 2 diabetes: The role of social-environmental support resources. *Health Psychology*, 30(3), 251–258. doi:10.1037/a0022850
- Gomes-Villas Boas, L., Foss, M. C., Freitas, M. C. F., & Pace, A. E. (2012). Relationship among social support, treatment adherence and metabolic control of diabetes mellitus patients. *Rev. Latino-Am Enfermagem*, 20(1). Retrieved from http://www.scielo.br/pdf/rlae/v20n1/pt_08.pdf
- Gonzalez, J. S., Safren, S. A., Cagliero, E., Wexler, D. J., Delahanty, L., Wittenberg, E., ... Grant, R. W. (2007). Depression, self-care, and medication adherence in type 2 diabetes: Relationships across the full range of symptom severity. *Diabetes Care*, 30(9), 2222–2227. doi:10.2337/dc07-0158
- Halfon, N., & Hochstein, M. (2002). Life Course Health Development: An integrated framework for developing health, policy, and research. *The Milbank Quarterly*, 80, 433–479.
- Halfon, N., Inkelas, M., & Hochstein, M. (2000). The health development organization: An organizational approach to achieving child health development. *The Milbank Quarterly*, 78(3), 447–497. doi:10.1111/1468-0009.00180
- Hansen, E., Landstad, B. J., Hellzén, O., & Svebak, S. (2011). Motivation for lifestyle changes to improve health in people with impaired glucose tolerance. *Scandinavian Journal of Caring Sciences*, 25(3), 484–490.
- Hearnshaw, H., Lindenmeyer, A., Vermeire, E., Van Royen, P., Wens, J., & Biot, Y. (2006). Interventions to improve adherence to medication in people with type 2 diabetes mellitus: The role of nurses. *European Diabetes Nursing*, 3(2), 73–77.

- Heraclides, A. M., Chandola, T., Witte, D. R., & Brunner, E. J. (2012). Work stress, obesity and the risk of type 2 diabetes: Gender-specific bidirectional effect in the Whitehall II Study. *Obesity*, 20(2), 428–433. doi:10.1038/oby.2011.95
- Herman, W. H., & Cohen, R. M. (2012). Racial and ethnic differences in the relationship between HbA1c and blood glucose: Implications for the diagnosis of diabetes. *The Journal of Clinical Endocrinology and Metabolism*, 97(4), 1067–1072. doi:10.1210/jc.2011-1894
- Herranz, J., & Gavilan, J. (1999). Psychosocial adjustment after laryngeal cancer. *The Annals of Otolaryngology, Rhinology and Laryngology*, 108(10), 990-998.
- Hu, J., Wallace, D. C., McCoy, T. P., & Amirehsani, K. A. (2013). A family-based diabetes intervention for Hispanic adults and their family members. *The Diabetes Educator*, 40(1), 48–59. doi: 0145721713512682
- Huth, C., Thorand, B., Baumert, J., Kruse, J., Emeny, R. T., Schneider, A., ... Ladwig, K.-H. (2014). Job strain as a risk factor for the onset of type 2 diabetes mellitus: Findings from the MONICA/KORA Augsburg Cohort Study. *Psychosomatic Medicine*, 76(7), 562–568.
- Iannotta, J. G. (2002). *National Research Council (US) Committee on Population: Emerging issues in Hispanic health: Summary of a workshop*. Washington, DC: National Academies Press.
- Kang-Kim, M., Betancourt, J. R., Ayanian, J. Z., Zaslavsky, A. M., Yucel, R. M., & Weissman, J. S. (2008). Access to care and use of preventive services by Hispanics: State-based variations from 1991-2004. *Medical Care*, 46(5), 507–515.
- Kaplan, S. H., Billimek, J., Sorkin, D. H., Ngo-Metzger, Q., & Greenfield, S. (2013). Reducing racial/ethnic disparities in diabetes: The Coached Care (R2D2C2) Project. *Journal of General Internal Medicine*, 28(10), 1340–1349. doi:10.1007/s11606-013-2452-y
- Karlsen, B., Oftedal, B., & Bru, E. (2012). The relationship between clinical indicators, coping styles, perceived support and diabetes-related distress among adults with type 2 diabetes. *Journal of Advanced Nursing*, 68(2), 391–401. doi:10.1111/j.1365-2648.2011.05751.x
- Kent, D., Haas, L., Randal, D., Lin, E., Thorpe, C. T., Boren, S. A., ...Martin, A. L. (2010). Healthy coping: Issues and implications in diabetes education and care. *Population Health Management*, 13(5), 227–233. doi:10.1089/pop.2009.0065
- Khan, H., Lasker, S. S., & Chowdhury, T. A. (2011). Exploring reasons for very poor glycaemic control in patients with type 2 diabetes. *Primary Care Diabetes*, 5(4), 251–255. doi:10.1016/j.pcd.2011.07.001

- Kheir, N., Greer, W., Yousif, A., Al Geed, H., & Al Okkah, R. (2011). Knowledge, attitude and practices of Qatari patients with type 2 diabetes mellitus: Diabetes management in Qatar. *International Journal of Pharmacy Practice*, 19(3), 185–191. doi:10.1111/j.2042-7174.2011.00118.x
- Lazarus, R. S. (1993). Coping theory and research: Past, present and future. *Psychosomatic Medicine*, 55, 234–247.
- Livneh, H., & Antonak, R. F. (2005). Psychosocial adaptation to chronic illness and disability: A primer for counselors. *Journal of Counseling and Development*, 83(1), 12–20.
- Lopez, J. M. S., Bailey, R. A., Rupnow, M. F. T., & Annunziata, K. (2014). Characterization of type 2 diabetes mellitus burden by age and ethnic groups based on a nationwide survey. *Clinical Therapeutics*, 36(4), 494–506. doi:10.1016/j.clinthera.2013.12.016
- Lutfey, K. E., & Wishner, W. J. (1999). Beyond “compliance” is “adherence”: Improving the prospect of diabetes. *Diabetes Care*, 22(4), 635–639.
- Mansyur, C. L., Rustveld, L. O., Nash, S. G., & Jibaja-Weiss, M. L. (2015). Social factors and barriers to self-care adherence in Hispanic men and women with diabetes. *Patient Education and Counseling*, 98(6), 805–810. doi:10.1016/j.pec.2015.03.001
- Mantwill, S., & Schulz, P. J. (2015). Low health literacy associated with higher medication costs in patients with type 2 diabetes mellitus: Evidence from matched survey and health insurance data. *Patient Education and Counseling*, 98(12), 1625–1630. doi:10.1016/j.pec.2015.07.00
- Marzec, L. N., & Maddox, T. M. (2013). Medication adherence in patients with diabetes and dyslipidemia: Associated factors and strategies for improvement. *Current Cardiology Reports*, 15(11), 418. doi:10.1007/s11886-013-0418-7
- Mayberry, L. S., & Osborn, C. Y. (2012). Family support, medication adherence, and glycemic control among adults with type 2 diabetes. *Diabetes Care*, 35(6), 1239–1244.
- McDowell, J. R. S., McPhail, K., Halyburton, G., Brown, M., & Lindsay, G. (2009). Perceptions of a service redesign by adults living with type 2 diabetes. *Journal of Advanced Nursing*, 65(7), 1432–1441.
- Merluzzi, T. V., & Sanchez, M. A. M. (1997). Factor structure of the Psychosocial Adjustment to Illness Scale (self-report) for persons with cancer. *Psychological Assessment*, 9(3), 269–276.
- Mertler, C. A., & Vannatta, R. A. (2010). *Advanced and multivariate statistical methods* (4th ed.). City, ST: Pyrczak Publishing.

- Middle-aged. (2014). In *Merriam-Webster Dictionary*. Retrieved from <http://www.merriam-webster.com/dictionary/middle%20age>
- Mier, N., Bocanegra-Alonso, A., Zhan, D., Zuniga, M. A., & Acosta, R. I. (2008). Health-related quality of life in a binational population with diabetes at the Texas-Mexico border. *Revista Panamericana de Salud Pública*, 23(3), 154–163.
- Misra, R., & Lager, J. (2009). Ethnic and gender differences in psychosocial factors, glycemic control, and quality of life among adult type 2 diabetic patients. *Journal of Diabetes and Its Complications*, 23(1), 54–64. doi:10.1016/j.jdiacomp.2007.11.003
- Morisky, D. E., Ang, A., Krousel-Wood, M., & Ward, H. J. (2008). Predictive validity of a medication adherence measure in an outpatient setting. *The Journal of Clinical Hypertension*, 10(5), 348–354.
- Morisky, D. E., Green, L. W., & Levine, D. M. (1986). Concurrent and predictive validity of a self-reported measure of medication adherence. *Medical Care*, 24(1), 67–74.
- Morris, N. S., MacLean, C. D., & Littenberg, B. (2013). Change in health literacy over 2 years in older adults with diabetes. *The Diabetes Educator*, 39(5), 638–646, doi:10.1177/0145721713496871
- Munir, F., Randall, R., Yarker, J., & Nielsen, K. (2009). The Influence of employer support on employee management of chronic health conditions at work. *Journal of Occupational Rehabilitation*, 19(4), 333–344. doi:10.1007/s10926-009-9199-7
- Negarandeh, R., Mahmoodi, H., Noktehdan, H., Heshmat, R., & Shakibazadeh, E. (2013). Teach back and pictorial image educational strategies on knowledge about diabetes and medication/dietary adherence among low health literate patients with type 2 diabetes. *Primary Care Diabetes*, 7(2), 111–118. doi:10.1016/j.pcd.2012.11.001
- Norris, A. E., Ford, K., & Bova, C. A. (1996). Psychometrics of a brief acculturation scale for Hispanics in a probability sample of urban Hispanic adolescents and young adults. *Hispanic Journal of Behavioral Sciences*, 18(1), 29–38. doi:10.1177/07399863960181004
- Odegard, P. S., & Capoccia, K. (2007). Medication taking and diabetes: A systematic review of the literature. *The Diabetes Educator*, 33(6), 1014–1029. doi:10.1177/0145721707308407
- Parada, H., Horton, L. A., Cherrington, A., Ibarra, L., & Ayala, G. X. (2012). Correlates of medication nonadherence among Latinos with type 2 diabetes. *The Diabetes Educator*, 38(4), 552–561. doi:10.1177/0145721712445215
- Parchman, M. L., Zeber, J. E., & Palmer, R. F. (2010). Participatory decision making, patient activation, medication adherence, and intermediate clinical outcomes in

- type 2 diabetes: A STARNet study. *The Annals of Family Medicine*, 8(5), 410–417. doi:10.1370/afm.1161
- Pereira, M. G., Pedras, S., & Machado, J. C. (2014). Family variables as moderators between beliefs towards medicines and adherence to self-care behaviors and medication in type 2 diabetes. *Families, Systems, and Health*, 32(2), 198–206. doi:10.1037/fsh0000029
- Peyrot, M., Rubin, R. R., Lauritzen, T., Snoek, F. J., Matthews, D. R., & Skovlund, S. E. (2005). Psychosocial problems and barriers to improved diabetes management: Results of the cross-national Diabetes Attitudes, Wishes and Needs (DAWN) Study. *Diabetic Medicine*, 22(10), 1379–1385.
- Polit, D. F., & Beck, C. T. (2011). *Nursing research: Generating and assessing evidence for nursing practice* (9th ed.). City, ST: Lippincott Williams and Wilkins.
- Rane, K., Wajngot, A., Wändell, P. E., & Gåfvels, C. (2011). Psychosocial problems in patients with newly diagnosed diabetes: Number and characteristics. *Diabetes Research and Clinical Practice*, 93(3), 371–378. doi:10.1016/j.diabres.2011.05.009
- Richmond, J. (1998). How important are the psychosocial aspects of diabetes? *Journal of Diabetes Nursing*, 2, 146–149.
- Rodrigue, J. R., Kanasky, W. F., Jackson, S. I., & Perri, M. G. (2000). The Psychosocial Adjustment to Illness Scale-Self-Report: Factor structure and item stability. *Psychological Assessment*, 12(4), 409–413. doi:10.1037//1040-3590.12.4.409
- Rosland, A.-M., Heisler, M., & Piette, J. D. (2012). The impact of family behaviors and communication patterns on chronic illness outcomes: A systematic review. *Journal of Behavioral Medicine*, 35(2), 221–239. doi:10.1007/s10865-011-9354-4
- Rothschild, S. K., Martin, M. A., Swider, S. M., Lynas, C. T., Avery, E. F., Janssen, I., & Powell, L. H. (2012). The Mexican-American Trial of Community Health Workers (MATCH): Design and baseline characteristics of a randomized controlled trial testing a culturally tailored community diabetes self-management intervention. *Contemporary Clinical Trials*, 33(2), 369–377. doi:10.1016/j.cct.2011.10.013
- Schafer, M. H., & Ferraro, K. F. (2007). Obesity and hospitalization over the adult life course: Does duration of exposure increase use? *Journal of Health and Social Behavior*, 48(4), 434–449.
- Scheurer, D., Choudhry, N., Swanton, K. A., Matlin, O., & Shrank, W. (2012). Association between different types of social support and medication adherence. *The American Journal of Managed Care*, 18, 461–467.

- Schoenthaler, A. M., Schwartz, B. S., Wood, C., & Stewart, W. F. (2012). Patient and physician factors associated with adherence to diabetes medications. *The Diabetes Educator*, 38(3), 397–408. doi:10.1177/0145721712440333
- Shah, B. M., Gupchup, G. V., Borrego, M. E., Raisch, D. W., & Knapp, K. K. (2012). Depressive symptoms in patients with type 2 diabetes mellitus: Do stress and coping matter? *Stress and Health*, 28(2), 111–122.
- Smalls, B. L., Walker, R. J., Hernandez-Tejada, M. A., Campbell, J. A., Davis, K. S., & Egede, L. E. (2012). Associations between coping, diabetes knowledge, medication adherence and self-care behaviors in adults with type 2 diabetes. *General Hospital Psychiatry*, 34(4), 385–389. doi:10.1016/j.genhosppsych.2012.03.018
- Stanton, A. L., Revenson, T. A., & Tennen, H. (2007). Health psychology: Psychological adjustment to chronic disease. *Annual Review of Psychology*, 58(1), 565–592. doi:10.1146/annurev.psych.58.110405.085615
- Stopford, R., Winkley, K., & Ismail, K. (2013). Social support and glycemic control in type 2 diabetes: A systematic review of observational studies. *Patient Education and Counseling*, 93(3), 549–558. doi:10.1016/j.pec.2013.08.016
- Sultana, G., Kapur, P., Aqil, M., Alam, M. S., & Pillai, K. K. (2010). Drug utilization of oral hypoglycemic agents in a university teaching hospital in India: Drug utilization in type 2 diabetic patients. *Journal of Clinical Pharmacy and Therapeutics*, 35(3), 267–277. doi:10.1111/j.1365-2710.2009.01080.x
- Sweileh, W. M., Zyoud, S. H., Abu Nab'a, R. J., Deleq, M. I., Enaia, M. I., Nassar, S. M., & Al-Jabi, S. W. (2014). Influence of patients' disease knowledge and beliefs about medicines on medication adherence: Findings from a cross-sectional survey among patients with type 2 diabetes mellitus in Palestine. *BioMed Central Public Health*, 14(1), 94. doi: 10.1186/1471-2458-14-94
- Tabachnick, B. G., & Fidell, L. S. (2006). *Using multivariate statistics* (5th ed.). Boston, MA: Pearson.
- Tang, T. S., Funnell, M. M., Noorulla, S., Oh, M., & Brown, M. B. (2012). Sustaining short-term improvements over the long-term: Results from a 2-year Diabetes Self-Management Support (DSMS) intervention. *Diabetes Research and Clinical Practice*, 95(1), 85–92. doi:10.1016/j.diabres.2011.04.003
- Thorpe, C. T., Fahey, L. E., Johnson, H., Deshpande, M., Thorpe, J. M., & Fisher, E. B. (2012). Facilitating healthy coping in patients with diabetes: A systematic review. *The Diabetes Educator*, 39(1), 33–52. doi:10.1177/0145721712464400
- Tiv, M., Viel, J.-F., Mauny, F., Eschwège, E., Weill, A., Fournier, C., ... Penfornis, A. (2012). Medication adherence in type 2 diabetes: The ENTRED Study 2007, a French population-based study. *PLoS ONE*, 7(3), e32412. doi:10.1371/journal.pone.0032412

- Toulouse, C., & Kodadek, M. (2015). Continuous access to medication and health outcomes in uninsured adults with type 2 diabetes. *Journal of the American Association of Nurse Practitioners*, 1-8. doi:10.1002/2327-6924.12326
- Trief, P. M., Aquillino, C., Paradies, K., & Weinstock, R. S. (1999). Impact of the work environment on glycemic control and adaptation to diabetes. *Diabetes Care*, 22(4), 569–574.
- Trief, P. M., Grant, W., Elbert, K., & Weinstock, R. S. (1998). Family environment, glycemic control, and the psychosocial adaptation of adults with diabetes. *Diabetes Care*, 21, 241–245. doi:10.2337/diacare.21.2.241
- Trief, P. M., Ploutz-Snyder, R., Britton, K. D., & Weinstock, R. S. (2004). The relationship between marital quality and adherence to the diabetes care regimen. *Annals of Behavioral Medicine*, 27(3), 148–154.
- Trouilloud, D., & Regnier, J. (2013). Therapeutic education among adults with type 2 diabetes: Effects of a three-day intervention on perceived competence, self-management behaviours and glycaemic control. *Global Health Promotion*, 20(2 Suppl), 94–98. doi:10.1177/1757975913483331
- United Kingdom Prospective Diabetes Study Group. (1998). Intensive blood-glucose with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *The Lancet*, 352, 837–853.
- United States Census Bureau.(2011, March). *Overview of race and Hispanic origin: 2010 census briefs* (Report No. C20108BR-02). Retrieved from <http://www.census.gov/prod/cen2010/briefs/c2010br-02.pdf>
- Wallen, G. R., Feldman, R. H., & Anliker, J. (2002). Measuring acculturation among Central American women with the use of a brief language scale. *Journal of Immigrant Health*, 4(2), 95–102.
- Welch, G., Zagarins, S. E., Feinberg, R. G., & Garb, J. L. (2011). Motivational interviewing delivered by diabetes educators: Does it improve blood glucose control among poorly controlled type 2 diabetes patients? *Diabetes Research and Clinical Practice*, 91(1), 54–60. doi:10.1016/j.diabres.2010.09.036
- Wen, L. K., Parchman, M. L., & Shepherd, M. D. (2004). Family support and diet barriers among older Hispanic adults with type 2 diabetes. *Family Medicine*, 36(6), 423–430.
- World Health Organization. (2003, January). *Adherence to long-term therapies: Evidence for action*. Retrieved from http://www.who.int/chp/knowledge/publications/adherence_introduction.pdf
- World Health Organization. (1948, April). *WHO definition of health*. Retrieved from <http://www.who.int/about/definition/en/print.html>

BIOGRAPHY

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Float Nurse/Charge Nurse, Midlands Community Hospital, Papillion, Nebraska, 1999-2001

Assistant Unit Manager of Renal Unit, Jackson Hospital, Montgomery, Alabama, 1995-1998

Staff/Charge Nurse Medical-Surgical Unit, Memorial Hospital, Belleville, Illinois, 1992-1995

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