2-2-2024

The Role of Educational Status and the Management of Diabetes Among Mexican Migrants on the Northern Mexican Border

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Walden University
2024

Abstract

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MS, Salisbury University, 2016

BS, Salisbury University, 2014

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

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Abstract

There was a marked absence of studies exploring the educational status and diabetes management (DM) of Mexican migrants on the Northern Mexican border. Using secondary data from the February 2021 Mexican Migrant Project (MMP174), this quantitative cross-sectional study examined the relationship between educational status and DM among Mexican migrants on the Northern Mexican border. The study also examined the impact of marital status on the effectiveness of DM among the Mexican migrant demographic. The theoretical framework was Rosenstock's health belief model, which promotes health and disease prevention and predicts behavior changes among Mexican migrants with diabetes. The MMP174 data set included 9,052 participants. A logistic regression analysis for the first research question (RQ) demonstrated a significant relationship between DM and educational status among Mexican migrants on the Northern Mexican border: 1–5 years of school (b = -.003, p <.001, 95% C.I. [.662–1.115], 6–10 years of school (b = -.125, p <.001, 95% C.I [.662–1.185]) and increased education levels from 35–40 years of school (b = -.506, p <.001, 95% C.I [.342–.711]). The moderation analysis for the second RQ demonstrated statistical significance when marital status was included. Findings could be used to inform public health officials, health care workers, and significant others of their role in DM among Mexican migrants.

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Dedication

My capstone is dedicated to my parents, Nihal and Lumbini Mayarata. They were my strength and light that pushed me forward even when I was losing trust in the process. I could not have achieved this degree without their support and unconditional love; thank you, amma and appachi.

Acknowledgments

I thank Dr. Edward Irobi, Dr. Gwendolyn Francavillo, and Dr. Susan Nyanzi for their continued support and for never giving up on me. I would also like to thank my husband, Thomas Quinn; my brother, Koliya Mayarata, and his wife, Dashira Mayarata, and their children, Christian Abel and Cachy Adaraya; and lastly, my best friends, Lauren N.J. Washington Ivey, M.S., and Charles Ivey, for their continued love, prayers, encouraging words, and patience throughout my doctoral journey.

Table of Contents

List of Tables

List of Figures

Section 1: Foundation of the Study and Literature Review

Diabetes is a chronic health condition in which the pancreas does not make enough or any insulin, resulting in increased blood sugar (Cleveland Clinic, 2023). Diabetes is an increasing public health concern among certain racial and ethnic groups, including African Americans, Hispanics, and Asian Americans (Centers for Disease Control and Prevention [CDC], 2022a). More than 50% of Hispanics or Latinos are expected to develop diabetes in their lifetime (CDC, 2022a). Diabetes increases the risk and complications of other medication conditions, including stroke, heart disease, nerve damage, kidney disease, sleep apnea, dementia, and more (Mayo Clinic, 2023). In 2017, Hispanics were twice as likely to be hospitalized for end-stage renal disease compared to non-Hispanic Whites due to diabetes (United States Department of Health and Human Services Office of Minority Health [USHHS OMH], 2018). In 2018, data demonstrated that Hispanics were 1.3 times more likely to die from diabetes and 70% more likely to be diagnosed with diabetes compared to non-Hispanic Whites (USHHS OMH, 2018).

In Section 1, I provide the background of my study, problem statement, research question (RQs), and hypotheses. I also include the theoretical framework, nature of the study, and definitions of terms used. The study's assumptions, scope, delimitations, limitations, and significance are discussed. The section concludes with a summary and conclusion.

Background

There is a growing public health emergency at the northern Mexico border, where migrants live in shelters, and a demand for essential services exists (Diamond et al.,

2020). There is insufficient health care access and basic sanitation among migrants on the Northern Mexican border, putting this population at risk for poor health outcomes (Diamond et al., 2020). Since the outbreak of COVID-19, health care services on the Northern Mexican border have been reduced, reducing resources for the high-risk population (Diamond et al., 2020). Noncommunicable diseases (i.e., diabetes) are overlooked due to the lack of health screenings (Diamond et al., 2020). It is estimated that 25% of the migrants have an underlying health condition in which United States Customs and Border Protection confiscates lifesaving medications, and it can take weeks or months to get a new prescription. Migrants' health conditions are left undiagnosed and untreated due to the lack of health screenings, language barriers, and the fear of diagnosis (Diamond et al., 2020).

Low levels of health literacy are identified as barriers to achieving equal health care by the National Health Plan 2012–2016 (Medina et al., 2022). The migrant population suffers from high vulnerability and low levels of health literacy (Medina et al., 2022). Low levels of health literacy result in worse health status and limited access to health care, resulting in vulnerability and health inequalities (Medina et al., 2022). Though there are a few studies regarding migrants and health literacy, there is still limited research and a need for further investigation (Medina et al., 2022).

Research studies have shown that marital status and gender differences increase the risk of death from diabetes (Kposowa et al., 2021). Studies have shown that divorced/separated men and widowed women have an increased risk of death due to diabetes (Kposowa et al., 2021). Researchers found that the relationship between marital

status and the outcome of diabetes varied by gender (Ramezankhani et al., 2019). Men who were never married were associated with a higher risk of hypertension, while widowed women had a lower risk of diabetes (Ramezankhani et al., 2019). Although researchers have investigated these issues, no empirical studies were found on the relationship between educational status and diabetes management (DM) among Mexican migrants on the Northern Mexican border, considering the moderating effect of marital status. Findings from my study contributed to the literature by highlighting the significance of marital status and DM among Mexican migrants on the Northern Mexican border.

Problem Statement

Uncontrolled diabetes is a health issue that faces Mexican immigrants crossing the Northern border of Mexico (Bonfiglio et al., 2020). Migrants face many health disparities, from obstacles to receiving quality health care and education to income gaps (CDC, 2021). Migration and border health have become a public health focus to improve the border health system, understand the migratory population (migrants), and prevent the spread of infectious disease threats (CDC, 2022b).

The migrant population is understudied and vulnerable. Quandt et al. (2018) noted insufficient research and data regarding DM among the migrant population. Ramezankhani et al. (2019) emphasized the need for further research to understand the role of marital status in DM as it varies by gender. Agyemang and van den Born (2019) noted that migrants are at a higher risk for diabetes by developing the disease at an earlier age compared to the host population. Findings from Martinez-Cardoso et al.'s (2020)

study demonstrated that immigrants are challenged with obstacles in managing their diabetes, validating the importance of addressing Mexican migrants' educational status and the importance of marital status in DM. The findings of Medina et al. (2022) demonstrated inadequate levels of health literacy among the migrant population. This indicates that educational status may play a significant role in Mexican migrants managing their diabetes and should be considered when developing DM educational programs.

McEwen et al. (2019) demonstrated that environmental and policy factors contribute to a gap in evidence-based practice and uptake of self-management behaviors among Mexican adults and Hispanic diabetics individuals residing on the Mexico-U.S. border. The environment and policies impact diabetes self-management behaviors in Mexican adults and Hispanic diabetic individuals living at the Mexico-U.S. border; evaluating the influence of marital status in increasing self-management behaviors is essential to determine factors that can contribute to the update of diabetes self-management behaviors (McEwen et al., 2019). Barriers to participating in healthy behaviors include poor understanding of diabetes and appropriate nutrition and obtaining health information from unreliable sources, which highlights the importance of addressing educational status in the management of diabetes among Mexican migrants (Miranda et al., 2021).

After reviewing the literature, I found limited data on the educational status and DM of Mexican migrants on the Northern Mexican border, considering the moderating effect of marital status. The research problem addressed in this study was the relationship

between educational status and DM among Mexican migrants on the Northern Mexican border. I aimed to explore the impact of marital status on the effectiveness of DM among the Mexican migrant demographic.

Purpose of the Study

The purpose of this quantitative cross-sectional study was to examine the role of educational status on DM among Mexican migrants and whether marital status can modify the relationship between having diabetes and DM. According to the CDC (2018), the prevalence of diagnosed and undiagnosed diabetes was higher in Hispanics compared to non-Hispanic adults. The National Health and Nutrition Examination Survey, 2013–2016, reported that diabetes was higher in Hispanics (19.8%) compared to non-Hispanic Whites (12.4%) and non-Hispanic Asians (15.3%; CDC, 2018). The prevalence of diagnosed and undiagnosed diabetes was higher in Hispanics (13.6% and 6.2%) compared to non-Hispanic whites (8.5% and 3.9%; CDC, 2018).

According to USHHS OMH (2018), Hispanics are at higher risk for diabetes mortality (24.6%) compared to non-Hispanic Whites (18.9%). Hispanics are also at a higher risk for visual impairments due to diabetes (31.6%) compared to non-Hispanic Whites (21.2%; USHHS OMH, 2018). Hispanics have a higher rate of hospital admissions for uncontrolled diabetes without complication (39.6%) compared to non-Hispanic Whites (36.4%; USHHS OMH, 2018). According to the CDC (2023), 80% of lower limb amputations are due to complications with diabetes. In 2017, Hispanics with diabetes demonstrated a higher rate of lower extremity amputations (30.4%) compared to non-Hispanic Whites (26.8%; USHHS OMH, 2018). Research and data have

demonstrated that Hispanics overall are vulnerable to diabetes. By examining the role of educational status on DM among Mexican migrants and whether marital status can modify the relationship between having diabetes and DM, the current study could inform public health officials, health care workers, and significant others of their role in DM among Mexican migrants.

Research Variables

This study had one independent variable (IV) and one dependent variable (DV). The IV measured educational status as school years completed (SYC) and was a definite value. The DV was DM, which measured a history of diabetes or high sugar level and was a categorical variable with 1 = yes and 2 = no. The moderator variable marital status was calculated on a 6-point Likert scale: 1= *never married*, 2 = *married* (civil or religious), 3 = *consensual union*, 4 = *widowed*, 5 = *divorced*, and 6 = *separated*. Other variables such as age (continuous variable) measured in years, gender (categorical variable) measured with 1 = male and 2 = female, and income level (continuous variable) measured in numerical value were included.

RQs and Hypotheses

This quantitative cross-sectional study was designed to determine the role of educational status on DM among Mexican migrants and whether marital status can modify the relationship between having diabetes and DM. I aspired to answer the following RQs and hypotheses:

RQ1: Is there a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income?

H_o1: There is no relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

H_a1: There is a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

RQ2: Does marital status moderate the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income?

H_o2: Marital status does not moderate the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

H_a2: Marital status moderates the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

Theoretical Framework

Rosenstock's (1974) health belief model (HBM) promotes health and disease prevention and predicts health behavior changes among individuals. The HBM is derived from psychological and behavioral therapy with six constructs: (a) perceived susceptibility, (b) perceived severity, (c) perceived benefits, (d) perceived barriers, (e) cue to action, and (f) self-efficacy (LaMorte, 2022). Rosenstock's HBM was appropriate for this study when addressing Mexican migrants' beliefs about diabetes. According to Rosenstock, the decision to perform healthy behaviors is based on a multidimensional

approach to making health decisions. Melkamu et al. (2021) noted that the HBM would be appropriate for practicing diabetes self-care management.

Nature of the Study

The nature of this study was quantitative cross-sectional. Secondary data were retrieved from the Mexican Migrant Project (MMP), a collaborative study at Princeton University and the University of Guadalajara (MMP, 2021). Secondary data consists of surveys. The IV was educational status, and the DV was DM. The moderator variable was marital status. The covariates were age, gender, and income level. The Statistical Package for Science Software (SPSS) Version 28 (IBM, 2023) was used to run a linear regression for RQ1 to evaluate the relationship between educational status and DM. SPSS was used to run a moderation analysis for RQ2. I examined marital status as the third variable/moderating variable to determine how it influences educational status and DM.

Literature Search Strategy

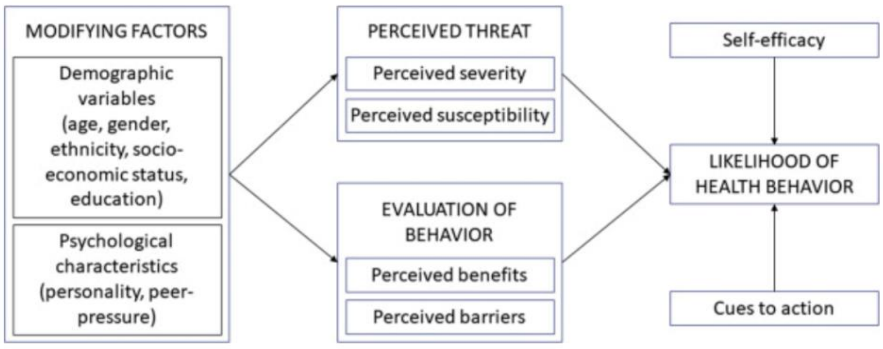
For an extensive literature search, I used the following online search engines: American Journal of Public Health, BMC Public Health, Cochrane Library, Google Scholar, and PubMed. I also used websites like the CDC, World Health Organization (WHO), and Mayo Clinic. The keywords searched included *educational status, migrants, Mexican migrants, spouse, diabetes, knowledge,* and *marital status.* The keywords were used either individually or in combination. During my literature research, I focused on studies published within the past 5 years to use the most up-to-date research available.

Theoretical Framework

Rosenstock's (1974) HBM is a theoretical model that promotes health and disease prevention and predicts health behavior changes among individuals. The HBM helps to facilitate an understanding of which condition an individual will engage in health preventives and treatments (Rosenstock, 1966). Rosenstock's HBM comprises six constructs (see Figure 1; LaMorte, 2022). Perceived susceptibility refers to an individual's belief in obtaining a specific illness/condition (Washburn, n.d.). Perceived severity refers to an individual's understanding of the severity of the illness/disease (Washburn, n.d.). Perceived benefit refers to an individual's understanding that the new behavior better lowers the risk of illness (Washburn, n.d.). Perceived barriers are obstacles that will stop the individual from a positive behavior change (Washburn, n.d.). Cues to action refer to factors that promote behavior change (Washburn, n.d.). Self-efficacy is an individual's belief and confidence to promote behavior change (Washburn, n.d.).

Figure 1

Health Belief Model



Note. Adapted from Rosenstock et al. (1988).

Applying HBM

The HBM was appropriate for determining whether Mexican migrants understand the potential risk factors that make them susceptible to becoming diabetic and the complications that can result from poor DM. The perceived severity of the disease must be understood if actions are to be taken, and the benefits must outweigh the costs (Hayden, 2019). The identification of perceived barriers to DM must be addressed. Education through one-on-one interaction with health care workers, advertisements, or other educational means can distill perceptions about perceived barriers and external cues to action (Lin & Yeh, 2017). Without self-efficacy, Mexican migrants' compliance and management of their diabetes may not occur. Education can also be effective in increasing Mexican migrants' self-efficacy and increasing their belief in their ability to manage their diabetes effectively (Hayden, 2019). The constructs of the HBM were used to understand the behaviors of diabetic Mexican migrants' regarding DM.

Educational Intervention and HBM

HBM constructs paired with educational intervention were more effective in promoting self-care behavior among diabetic patients (Shabibi et al., 2017). Education intervention improved perceived susceptibility (Shabibi et al., 2017). Self-efficacy scores also improved in the study with education intervention, promoting preventive behaviors and adherence to treatment regarding diabetes (Shabibi et al., 2017). Researchers also evaluated implementing education alongside HBM (Pezeshki et al., 2022). The results indicated that HBM constructs with educational intervention improved eye care practice among diabetic patients. Educational programs grounded in health education and health

promotion are practical and beneficial for self-care management among diabetic patients (Pezeshki et al., 2022). Higher levels of education resulted in increased self-care behaviors (Dehghani-Tafti et al., 2015).

HBM and DM

HBM demonstrated a significant and positive correlation among diabetic patients regarding foot ulcer health self-care behavior (Tsai et al., 2021). Applying HBM to self-care among diabetic patients positively influences health behavior (Tsai et al., 2021). HBM has demonstrated efficiency regarding DM and self-care behaviors among diabetic patients (Dehghani-Tafti et al., 2015). Self-efficacy is the most influential and significant predictor of health promotion and management with the HBM (Dehghani-Tafti et al., 2015). The HBM is an essential framework to increase adherence and promote self-care behavior among diabetic patients (Hu et al., 2022).

Literature Review Related to Key Variables

Diabetes

Diabetes, also known as diabetes mellitus, is the most common metabolic disease worldwide and the seventh leading cause of death in the United States (Sapra & Bhandari, 2023). Diabetes elevates blood glucose levels (Sapra & Bhandari, 2023). Diabetes can lead to microvascular and macrovascular complications, resulting in diabetic morbidity and mortality (Banday et al., 2020). Diabetes can result in long-term health conditions such as organ failure and dysfunction, nerve damage, and damage to blood vessels (Schuster & Duvuuri, 2002).

Diabetes Self-Management

Diabetes self-management consists of monitoring blood glucose levels, adhering to medications prescribed by health professionals, and engaging in proper diet and exercise (Schuster & Duvuuri, 2002). Diabetes self-management education interventions show significant effectiveness regarding lifestyle changes and self-care to improve and manage diabetes (Ernawati et al., 2021). Mikhael et al. (2020) examined 12 studies that demonstrated that diabetes self-management programs enhanced quality of life with adherence to medication, diabetes knowledge, and diabetes self-management behaviors. Masupe et al. (2022) noted that community-based health care teams, chronic disease counseling services, and patient advocacy are needed to improve overall patient health outcomes and self-management. Chawla et al. (2019) demonstrated that effective health education slowed the progression and complications of diabetes. McEwen et al. (2019) demonstrated that policy factors contributed to a gap in evidence-based practice and the uptake of self-management behaviors in the study population. Miranda et al. (2021) showed that barriers to participating in healthy behaviors included poor understanding of diabetes and appropriate nutrition and obtaining health information from unreliable sources, highlighting the importance of addressing educational status in managing diabetes in Mexican migrants.

Migrant Workers and Health Status

Bener (2017) noted a lack of research and data regarding migrant workers' health status, such as medical conditions, health risks, and injuries. This population experiences many health disparities, resulting in barriers to health care (Moyce & Schenker, 2018).

Migrant workers are a vulnerable population at a higher risk of occupational exposure, which can lead to poor health outcomes and injuries (Moyce & Schenker, 2018). Living conditions, language barriers, and cultural barriers among migrant workers can result in many health problems, such as infectious diseases, inadequate access to health care/preventive services, and heat stress (Hansen & Donohoe, 2003). Migrants are at a higher risk for diabetes and develop diabetes at an earlier age compared to the host population (Agyemang & van den Born, 2019).

Marital Status and Diabetes

Kposowa et al. (2021) evaluated the influence of marital status on individuals with diabetes mellitus while looking at gender and socioeconomic status. The results demonstrated a link between diabetes mortality in non-Hispanic White men and women, racial minority men and women, and individuals who were divorced/separated or widowed. Ramezankhani et al. (2019) demonstrated that being never married in men was associated with a higher risk of hypertension, while widowed women had a lower risk of diabetes. These findings are significant because they demonstrated that relationships between marital status and the outcome of diabetes varied by gender.

Definitions

Blood glucose is an alternative term for blood sugar levels (WHO, 2023).

Diabetes: A chronic disease in which blood glucose levels in the body are elevated, which can cause damage to the heart, blood vessels, and nerves (WHO, 2023).

Diabetes self-management: An at-home approach to monitoring and testing blood sugar levels, practicing healthy and balanced meals, exercising, taking medication as

prescribed by a health professional, avoiding dehydration, and monitoring signs and symptoms of diabetes (Rural Health Information Hub, 2020).

Educational status: An individual's level of education/schooling (Medical Dictionary Online, n.d.).

Income level: The amount of money earned over a period, which can be grouped into low-income, middle-income, and high/upper-income levels (Cornell Law School, 2021).

Marital status: An individual's status of single, married, separated, divorced, or widowed (Medical Dictionary Online, n.d.).

Migrant/migrant workers: An individual who moves to another country for seasonal/temporary employment (Ronda Pérez et al., 2012).

Assumptions

For this study, many assumptions were made. First, I assumed that the Mexican migrants were patients diagnosed with a history of diabetes or high blood sugar levels. A second assumption was that the Mexican migrants accurately answered the survey regarding educational status, diabetes, income level, marital status, age, and gender. A third assumption was that the secondary data provided by MMP accurately represented the migrant population of focus for this study. A final assumption was that the secondary data provided by MMP were reliable and valid.

Scope and Delimitations

The study's first delimitation was that the secondary data set provided by MMP would not distinguish between the diagnosis of Type 1 and Type 2 diabetes. The

secondary data set consisted of participants with a history of diabetes or high blood sugar levels. In the sample population provided by MMP (both male and female), there was no differentiation between sexes in the scope of the current study. The scope of the current study was limited to the evaluation of educational status and marital status regarding DM. Other factors, such as insurance status, physical activity, nutrition, and access to health care regarding DM, were not assessed in the scope of this study.

Limitations of the Study

Using secondary data by MMP posed a notable limitation due to potential missing or incomplete data. Second, participants may have needed to provide more accurate information regarding educational attainment, which could have impacted the significance and validity of the findings. Lastly, the collection method and accuracy of the secondary data needed to be clarified and distinguished.

Significance of the Study

This study may contribute to addressing a research gap regarding the influences of educational status on DM among Mexican Migrants residing on the Northern Mexican border while also considering the potential moderating effects of marital status. The existing literature on the relationship between DM and the migrant population was characterized by limited data and research (Quandt et al., 2018). Ramezankhani et al. (2019) highlighted the significance of investigating the impact of marital status on DM within the migrant community. By exploring this gap, I aimed to contribute to advancing health-related practices within the Mexican migrant population to improve DM and promote overall health and well-being. This study has the potential to make a valuable

contribution to the public health field by exploring the requirement for educational interventions and policies with the Mexican migrant community to manage their diabetes. This study holds significant implications for health policy planners by incorporating the findings to develop and refine new interventions addressing DM among the Mexican migrant community. I aimed to fill the gap and provide valuable insight into this understudied area regarding the influence of educational status on DM among Mexican migrants residing on the Northern Mexican border while also considering the potential moderating effects of marital status. The significance of this study lies in its potential to enhance educational resources and knowledge surrounding diabetes self-care and management for Mexican migrants and their partners (considering their marital status, if applicable) residing on the Northern Mexican border. The findings from this study may contribute to positive social change by reducing the burden of diabetes among the Mexican migrant community, improving overall health outcomes, and improving knowledge and skills for DM.

Summary

There is a growing public health emergency at the Northern Mexico border, where migrants live in shelters, and a demand for essential services exists (Diamond et al., 2020). Diabetes is an increasing public health concern among Hispanics, with more than 50% of Hispanics or Latinos expected to develop diabetes in their lifetime (CDC, 2022a). The migrant population is understudied and vulnerable. Quandt et al. (2018) noted insufficient research and data regarding DM among the migrant population. The purpose of this quantitative cross-sectional study was to examine the role of educational

status on DM among Mexican migrants and whether marital status can modify the relationship between having diabetes and DM. The constructs of the HBM were used to understand the behaviors of diabetic Mexican migrants' regarding DM. Findings from this study could be helpful to public health officials, health care workers, and significant others in their role in DM among Mexican migrants. In Section 1, I provided the background of my study, problem statement, RQs, and hypotheses. I also included the theoretical framework, nature of the study, literature search strategy and review, and definitions of terms used. The study's assumptions, scope, delimitations, limitations, and significance were also discussed. In Section 2, I describe the research design, rationale, and methodology, including the target population, sampling procedures, instrumentation and operationalization of constructs, and data analysis plan. Threats to validity, ethical guidelines, and a summary are also included.

Section 2: Research Design and Data Collection

The purpose of this quantitative cross-sectional study was to examine the role of educational status on DM among Mexican migrants and whether marital status can modify the relationship between having diabetes and DM. In Section 2, I discuss the research design, rationale, and methodology, including the target population, sampling procedures, instrumentation and operationalization of constructs, and data analysis plan. Threats to validity, ethical guidelines, and a summary are also included.

Research Design and Rationale

In this quantitative cross-sectional study, I examined the role of educational status on DM among Mexican migrants and whether marital status can modify the relationship between having diabetes and DM. The research design included using secondary data from the MMP (Princeton University, n.d.) to understand the role educational status plays in DM among Mexican migrants on the Northern Mexican border, also considering the moderating effect of marital status. The secondary data consisted of cross-sectional survey data that aided in answering the two RQs:

RQ1: Is there a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income?

RQ2: Does marital status moderate the relationship between educational status and DM in Mexican migrants on the Mexican border adjusted for age, gender, and income?

Using SPSS, I first conducted a descriptive analysis, including measures of central tendency (i.e., mean, median, and mode). This was important because it

summarized the samples and measures of the data set with frequencies and percentages (see Cooksey, 2020; Mishra et al., 2019). A logistic regression was appropriate for RQ1 to examine the relationship between two categorical outcome variables: (a) educational status and (b) DM (see Castro & Ferreira, 2023). This type of regression was appropriate to examine the association between the two categorical variables: (a) education status (IV) and (b) DM (see DV; Castro & Ferreira, 2023). A stacked bar chart (segmented bar chart) was the most appropriate diagram to demonstrate the association between educational status and DM because one categorical variable was on the x-axis, and the second was displayed on the y-axis (Pennsylvania State University, n.d.). A moderation analysis was appropriate for RQ2 to evaluate marital status as the third/moderating variable and how it influences educational status and DM (see Nowicki et al., 2018). A moderator variable can alter the strength of the relationship between the IV and DVs (Demidenko, 2019).

Methodology

Population

I analyzed secondary data in this quantitative cross-sectional study using Princeton University and the University of Guadalajara's February 2021 MMP (MMP, 2021). MMP is an ongoing study that has been collecting data since 1982. I used the most recent data from February 2021. The February 2021 MMP data set was referred to as MMP174. MMP174 is reputable and the best source for my study because it contains high-quality data on documented and undocumented Mexican migrants (see MMP, 2021). MMP174 is available for public viewing and downloading along with the

codebook for research and educational purposes online, and it contains data regarding the characteristics and behaviors of Mexican migrants (MMP, 2021). The data set includes social and economic information regarding Mexican-U.S. migration (MMP, 2021). The target population for this quantitative cross-sectional study was Mexican migrants who were on the Northern Mexican border and had a history of diabetes or high blood sugar levels. The data set contains 174 communities (MMP, 2021). The data set includes 9,052 observations and 612 variables (MMP, 2021).

Sampling Procedures

Anthropological and sociological research methods were used to gather the MMP174 data set (MMP, 2021). The anthropological research method is objective and subjective and is used to collect information to answer a RQ (University of Toronto, 2003). This type of data is documented so it is available for other researchers to duplicate it (University of Toronto, 2003). Sociological research methods consist of different social investigations such as surveys, experiments, field research, and secondary data analysis (Little, 2014). The MMP174 data set used an ethnosurvey of qualitative and quantitative data (MMP, 2021). An ethnosurvey is used in migration research, which includes social, economic, and cultural processes (Kaczmarczyk & Massey, 2019). The ethnosurvey approach included ethnographic fieldwork and representative survey sampling, yielding greater validity than ethnography or sample survey alone (MMP, 2021).

The interviewing process was performed in three phases. The first phase included gathering demographic data from each household member (MMP, 2021). All household members were identified, along with the relationship to the head of the household and

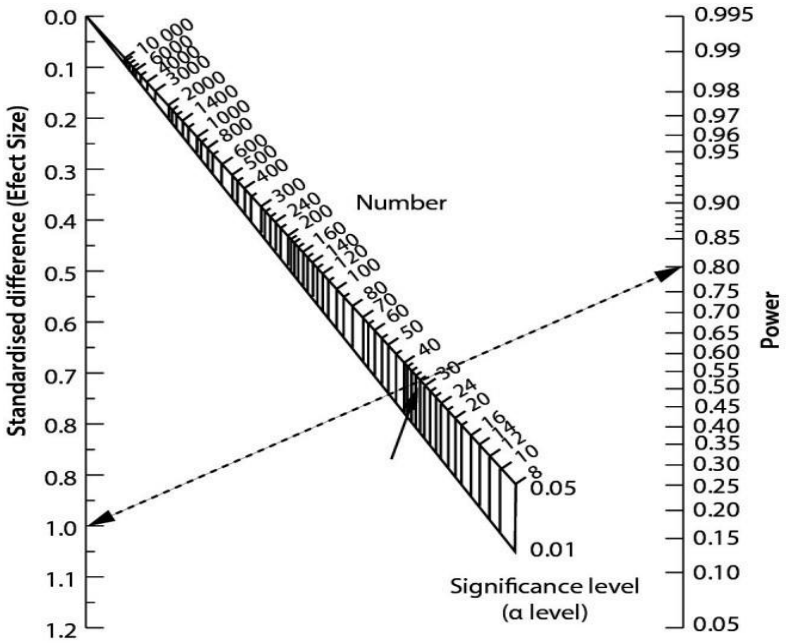
migration experience in the United States or Mexico (MMP, 2021). The second phase included gathering life histories such as occupational mobility (labor history), health status, migration history, and family formation (MMP, 2021). The third and final phase included information regarding experiences on the most recent trip to the U.S. border crossing, the number of relatives that accompanied this trip, the number of relatives living there, and social ties with the United States, including citizens' ability to speak the English language, job description/characteristics, and the use of U.S. social services (MMP, 2021).

Power Analysis

It is essential to conduct a power analysis to determine whether the results obtained from the data set are significant (Kemal, 2020). A small sample size can lead to effective/inaccurate results, while a large sample size might show significance with unnecessary data and subjects (Kemal, 2020). The MMP174 data set included a sample size of 9,052 observations (MMP, 2021). See Figure 2 of the nomogram, which is commonly used to estimate sample size and power. The effect size was 1, the power was 0.8, the alpha value was 0.05, and the sample size was 30

Figure 2

Nomogram for Sample Size and Power



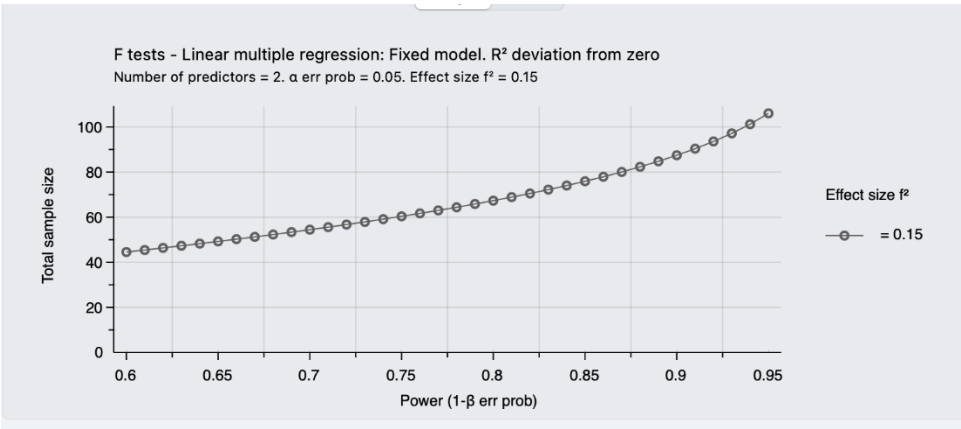
Note. Adapted from Serdar et al. (2021).

The alpha level determines whether to reject or fail to reject the null hypothesis (Serdar et al., 2021). The most common alpha level is 0.05, which means there is a 5% chance of the null hypothesis not being true. Some studies have lower alpha levels, such as 0.1 or 0.2 (Serdar et al., 2021). For my research, I kept the alpha level at 0.05. This meant the remaining 95% was my confidence level. A 0.95 (95%) confidence level meant that if I ran the test multiple times, I would be confident that I would get close to this sample estimate if I were to compute my study again (see O'Brien & Yi, 2016). It is also essential to look at the probability value (*p*-value), which is the probability of incorrectly accepting the alternative hypothesis (Serdar et al., 2021). The alternative hypothesis is accepted if the *p*-value is equal to or lower than the alpha level. If the *p*-value is higher

than the alpha level, the null hypothesis fails to be rejected (Serdar et al., 2021). This was considered for each of the hypotheses being tested for my study. G*Power is a free online source to calculate statistical power and sample size for a sample study (Serdar et al., 2021). G*Power 3.1.9.6 was used to calculate my study's minimum sample size of 89 to run a linear regression (see Figure 3).

Figure 3

*G*Power Test for Linear Multiple Regression*



Instrumentation and Operationalization of Constructs

The MMP was started in 1982 by Professor Jorge Durand at the University of Guadalajara and Professor Douglas Massey at Princeton University (MMP, 2021). This project was created to understand the complexity of Mexican migrants to the United States (see MMP, 2021). This secondary data set was appropriate for my study because it includes the social and economic characteristics and behaviors of Mexican migrants (MMP, 2021). The MMP data set is reliable and valid because it gathers and maintains high-quality data (MMP, 2021). The data set contains both documented and undocumented Mexican migrants to the United States and the nature of migration (MMP,

2021). The MMP data sets have been used in different books, articles, and dissertations (MMP, 2021).

Operationalization of Variables

The MMP study collected data using ethnosurveys. The enthosurveys collected age, sex, marital status, income, diabetes/high sugar level, and education level. In my study, age was estimated in the number of years. Sex was 1 = male and 2 = female. Income was calculated in a numerical number. The moderator variable, marital status, was measured on a 6-point Likert scale: 1 = *never married*, 2 = *married* (civil or religious), 3 = *consensual union*, 4 = *widowed*, 5 = *divorced*, and 6 = *separated*. Diabetes was measured with 1 = yes and 2 = no. The last variable, education, was measured by the number of SYCs.

Data Analysis Plan

The MMP174 data set was downloaded from the MMP website for my quantitative cross-sectional study. I analyzed this data set using SPSS. First, I conducted a missing value analysis to assess any missing data. This data cleaning was vital to reduce any errors that could have impacted the results of my study (see Van den Broeck et al., 2005).

RQs and Hypotheses

RQ1: Is there a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income?

H_o1: There is no relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

H_a1: There is a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

RQ2: Does marital status moderate the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income?

H_o2: Marital status does not moderate the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

H_a2: Marital status moderates the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

Statistical Test

A descriptive analysis and measures of central tendencies were first conducted with this data set to summarize it (see Cooksey, 2020). For RQ1, a logistic regression was performed to examine the relationship between two categorical outcome variables: (a) educational status and (b) DM. A stacked bar chart demonstrated the association between educational status and DM. A *t*-test was appropriate because it determined the relationship between IV (educational status) and DV (diabetes). The results would be considered significant if the *p*-value was less than 0.05. The alternative hypothesis (there is a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income) would fail to be accepted. If the *p*-value was higher than 0.05, I would fail to reject the null hypothesis (there is no

relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income).

For RQ2, a moderation analysis examined marital status as a moderating variable and how it influences educational status and DM. The results would be considered significant if the *p*-value was less than 0.05. The alternative hypothesis (marital status moderates the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income) would be accepted. If the *p*-value was higher than 0.05, I would fail to reject the null hypothesis (marital status does not moderate the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income).

Threat to Validity

An external threat to the validity of my study was the use of self-reported cross-sectional surveys. Responses to the survey could have been misreported, which could have caused the data to be an inaccurate representation of the population (see Andrade, 2018). Threats to internal validity in my study, such as missing data, improper randomization, and selection bias, could have resulted in inaccurate results (see Andrade, 2018). Using a broad inclusion criterion to resemble real-life patients/populations to improve external validity was essential. To enhance internal validity, I needed adequate quality control regarding data collection, analysis, and sample size (see Patino & Ferreira, 2018).

Ethical Procedures

For this study, I obtained secondary data from the MMP website. MMP has been conducting surveys among Mexican migrants since 1982. Many data sets are available through the MMP website, and I used the most recent data set, which was from February 2021 and was named MMP174. These data sets consist of extensive ethnosurveys administered yearly in Mexico and the United States to gather social and economic information regarding Mexican-U.S. migration. The MMP data are available for public use and are free of charge for research and educational purposes. Participants in the surveys were protected confidentially. I had no conflict of interest and did not anticipate having problems gaining access to MMP174.

Summary

Section 2 discussed how I used secondary data from MMP174 to examine the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income. I also discussed how I used these data to evaluate whether marital status moderates the relationship between educational status and DM in Mexican migrants on the Northern Mexican border, adjusted for age, gender, and income. I discussed my RQs and hypotheses, identified each variable used in my RQs, and reviewed the research design for my RQs. I also identified the target population, sampling procedure, instruments and operationalization of constructs, and data analysis plan. I also identified threats to validity and ethical procedures. In Section 3, I discuss the study results.

Section 3: Presentation of the Results and Findings Section

The purpose of this quantitative cross-sectional study was to examine the role of educational status on DM among Mexican migrants and whether marital status can modify the relationship between having diabetes and DM. The results could inform public health officials, health care workers, and significant others of their role in DM among Mexican migrants. The results could also be used to improve health outcomes among diabetic patients. The RQs and hypotheses for this study were the following:

RQ1: Is there a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income?

H_o1: There is no relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

H_a1: There is a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

RQ2: Does marital status moderate the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income?

H_o2: Marital status does not moderate the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

H_a2: Marital status moderates the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

In Section 3, I discuss the secondary data set, demographic data for the sample, statistical assumptions, logistic regression results, and moderation analysis results.

Accessing the Data for Secondary Analysis

Data Collection

After approval from the Walden University Institutional Review Board (11-06-23-1026298) on November 6, 2023, I registered and made an account with the Data Archive at the Office of Population Research (see Princeton University, n.d.). This allowed me to download the February 2021 data set on November 9, 2023, the most recent data set available for public use by Princeton University and the University of Guadalajara. The data set includes 9,052 observations and 612 variables (MMP, 2021).

Discrepancies of Data Set

There were no discrepancies. The data analysis plan continued as planned.

Demographic Characteristics of the Sample

Data were collected from migrants in the Northern Mexican border (MMP, 2021). Age, marital status, educational status, and income were recorded. The categories for age were represented as 10–20 years = 1, 21–30 years = 2, 31–40 years = 3, 41–50 years = 4, 51–60 years = 5, 61–70 years = 6, 71–80 years = 7, 81–90 years = 8, 91–100 years = 9, and 101–200 years =10. The categories for marital status were represented as 1 = *never married*, 2 = *married* (civil or religious), 3 = *consensual union*, 4 = *widowed*, 5 = *divorced*, and 6 = *separated*. The categories for educational status were 1–5 years = 1, 6–10 years = 2, 11–15 years = 3, 16–20 years = 4, 21–25 years = 5, and 26–30 years = 6. The categories for income annually were represented as $1–$1,000 = 1, $1,001–$2,000 =

2, $2,001–$3,000 = 3, $3,001–$4,000 = 4, $4,001–$5,000 = 5, $5,001–$6,000 = 6, $6,001–$7,000 = 7, $7,001–$8,000 = 8, $8,001–$9,000 = 9, $9,001–$10,000 = 10, and $10,001–$20,000 = 11. Table 1 summarizes the demographic characteristics of age and gender of the study's sample, which included 9,052 participants. There were *n* = 2,411 31–40-year-olds, which represented the largest age group to participate in this study, while *n* = 15, 91–100-year-olds represented the smallest age group to participate in this study. More females (*n* = 8,622, 95.2%) than males (*n* = 430, 4.8%) participated in this study.

Table 1

Demographic Characteristics of the Sample

	Age in years	Frequency	Percentage
Valid	10–20	36	0.4
	21–30	1,242	13.7
	31–40	2,411	26.6
	41–50	2,081	23.0
	51–60	1,540	17.0
	71–80	520	5.7
	81–90	146	1.6
	91–100	15	0.2
	Total	9,049	100.0
Missing	System	3	0.0
Total		9,052	100.0
	Gender	Frequency	Percentage
Valid	Female	8,622	95.2
	Male	430	4.8
	Total	9,052	100.0

As shown in Table 2, *n* = 7,650 participants represented the most significant group under the married marital status compared to *n* = 88, representing the smallest group under the divorced marital status.

Table 2

Martial Status Distribution

	Marital status	Frequency	Percentage
Valid	Never married	207	2.3
	Married	7,650	84.5
	Consensual union	596	6.6
	Widowed	328	3.6
	Divorced	88	1.0
	Separated	179	2.0
	9999	4	0.0
	Total	9,052	100.0

As shown in Table 3, *n* = 3,974 (43.9%) participants represented the largest group in this study who completed 6–10 years of school. There were *n* = 3,043 (33.6%) participants who finished 1–5 years of school. There was *n* = 1 (0%) participant representing the smallest group of participants in this study who completed 26–30 years of school.

Table 3

SYC Distribution

	SYC	Frequency	Percentage
Valid	1–5 years	3,043	33.6
	6–10	3,974	43.9
	11–15	691	7.6
	16–20	243	2.7
	21–25	2	0.0
	26–30	1	0.0
	Total	7,954	87.9
Missing	System	1,098	12.1
Total		9,052	100.0

As shown in Table 4, *n* = 3,393 (37.5%) participants represented the largest group of participants in this study who earned an income of $1–$1,000 annually. There were *n* = 2,692 (29.7%) participants representing this study's second-largest group with an

income between $9,001 and $10,000 annually. The annual income groups with the smallest number of participants in this study were for income $7,001–$8,000 (*n* = 1, 0.0%) and $10,001–$20,000 (*n* = 1, 0%).

Table 4

Income Distribution

Income	Frequency	Percentage
$1–$1,000	3,393	37.5
$1,001–$2,000	1,714	18..9
$2,001–$3,000	388	4.3
$3,001–$4,000	114	1.3
$4,001–$5,000	38	0.4
$5,001–$6,000	22	0.2
$6,001–$7,000	27	0.3
$7,001–$8,000	1	0.0
$8,001–$9,000	336	3.7
$9,001–$10,000	2,692	29.7
$10,001–20,000	1	0.0
Missing system	326	3.6
Total	9,052	100

As shown in Table 5, *n* = 257 (2.8%) participants reported having experienced high blood sugar/diabetes, while *n* = 2074 (22.9%) participants reported not having experienced high blood sugar/diabetes

Table 5

DM

	Diabetes status/management	Frequency	Percentage
Valid	Yes	257	2.8
	No	2,074	22.9
	9,999	8	0.1
	Total	2,339	25.8
Missing	System	6,713	74.2
Total		9,052	100.0

Sample Representativeness

Researchers used a two-stage cluster sampling method to gather data representing participants from 10 to 100 years of age on the Northern Mexican border. A two-stage cluster helps collect data from various populations (Galway et al., 2012). A two-stage cluster commonly estimates household parameters (Baquero et al., 2018). The MMP collected data from participants with different educational statuses, income levels, and marital statuses. This made the findings more generalized among Mexican migrants living on the Northern Mexican border.

Univariate Analysis

The univariate analysis table (see Table 6) represents the mean results for each variable tested in the study. The mean finding for the moderating factor (marital status) was 6.64 with a standard deviation (*SD*) of 210.111, and the IV (educational status) was 1.7667 with an *SD* of 0.7359 (see Table 7). The test of normality on marital status was performed using the Kolmogorov-Smirnov test. Results showed that marital status was not normally distributed ($p = <.001$, see Table 8). Skewness and kurtosis showed that the data for educational status and diabetes were positively (correct) skewed (skewness statistics for educational status = .892 and skewness for diabetes = 17.022; see Table 9). The histogram in Figure 4 demonstrates marital status as distributed normally within the study sample.

Table 6

Univariate Analysis

Variables	Estimate	SE	95% CI		*p*
			Lower level	Upper level	
(Constant)	1.217	.058	1.103	1.331	<.001
Age	.018	.012	-.004	.041	<.001
Gender	.014	.040	-.092	.064	<.001
Income	.006	.055	-.101	.113	<.001
SYC_D	.040	.077	-.111	.191	<.001
DBT_D	.069	.055	-.038	.176	<.001
(Constant)	1.508	.082	1.346	1.669	<.001
Age	.000	.012	-.023	.024	<.001
Gender	.001	.039	-.073	.082	<.001
Income	.001	.022	-.092	.622	.001
SYC_D	.000	.077	-.111	.191	<.001
DBT_D	.000	.055	-.038	.176	.001
MStatus	.000	.016	-.109	-.047	<.001
(Constant)	1.467	.091	1.289	1.645	<.001
Age	.001	.012	-.023	.025	<.001
Gender	-.003	.039	-.080	.074	<.001
Income	-.056	.185	-.419	.307	<.001
SYC_D	.279	.132	.019	.538	.001
DBT_D	.087	.137	-.181	.355	<.001
MStatus	-.065	.020	-.105	.025	<.001
SYC_X MStatus	.038	.058	-.077	.152	<.001
DBT_X MStatus	-.068	.042	-.151	.014	<.001

Table 7

Univariate Analysis

Characteristics	*N*	%	Mean	*SD*
Age in years			4.0964	1.51554
10–20	36	0.4		
21–30	1,242	13.7		
31–40	2,411	26.6		
41–50	2,084	23.0		
51–60	1,540	17.0		
61–70	1,058	11.7		
71–80	520	5.7		
81–90	146	1.6		
91–100	15	0.2		
SYC			1.7667	0.73590
1–5	3,043	33.6		
6–10	3,974	43.9		
11–15	691	7.6		
16–20	243	2.7		
21–25	2	0.0		
26–30	1	0.0		
DM			36.08	583.786
Yes	257	2.8		
No	2,074	22.9		
Gender			1.05	0.213
Male	8,622	95.2		
Female	430	4.8		
Income			4.4597	4.02974
$1–$1,000	3,393	37.5		
$1,001–$2,000	1,714	18.9		
$2,001–$3,000	388	4.3		
$3,001–$4,000	114	1.3		
$4,001-$5,000	38	0.4		
$5,001-$6,000	22	0.2		
$6,001-$7,000	27	0.4		
$7,001-$8,000	1	0.0		
$8,001-$9,000	366	3.7		
$9,001-$10,000	2,692	29.7		
$10,001-$20,000	1	0.0		
Marital status			6.64	210.111
Never married	207	2.3		
Married	7650	84.5		
Consensual union	596	6.6		
Widowed	328	3.6		
Divorced	88	1.0		
Separated	179	2.0		

Table 8

Test of Normality Kolmogorov Smirnov

	Statistic	Df	Sig.
Marital status	.023	1	<.001

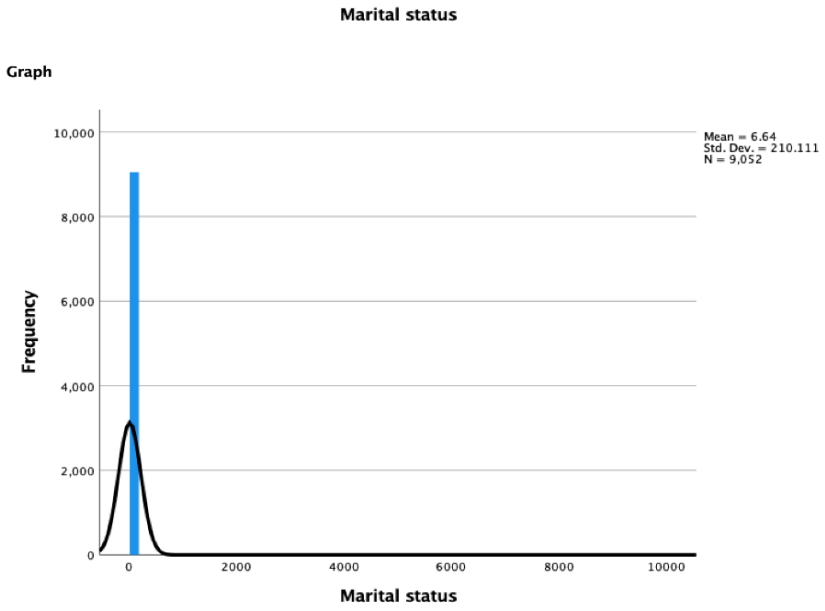
Table 9

Skewness and Kurtosis Statistics for Educational Status and Diabetes

r	*N*	Minimum	Maximum	SD		Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Educational status (SYV)	7954	1.00	6.00	1.7667	.73590	.892	.027	.966	.055
Diabetes or high sugar	2339	1.00	9999	36.08	583.786	17.022	.051	287.996	.101
Valid *N* listwise)	2163								

Figure 4

Marital Status



Results

Descriptive Statistics

Nine thousand fifty-two participants were included in this study. Means and standard deviations were calculated for each variable. Table 10 provides the means and standard deviation for each variable; gender (*M*=1.05, *SD*=0.213), marital status (*M*=6.64, *SD*=210.111), age (*M*=4.0964, *SD*=1.51554)), income (*M*=4.4597, *SD*=4.02974), educational status (*M*=1.7667, *SD*=0.7359), and diabetes/high sugar levels (*M*=36.08, *SD*=583.786).

Table 10

Descriptive Statistics of the Variables

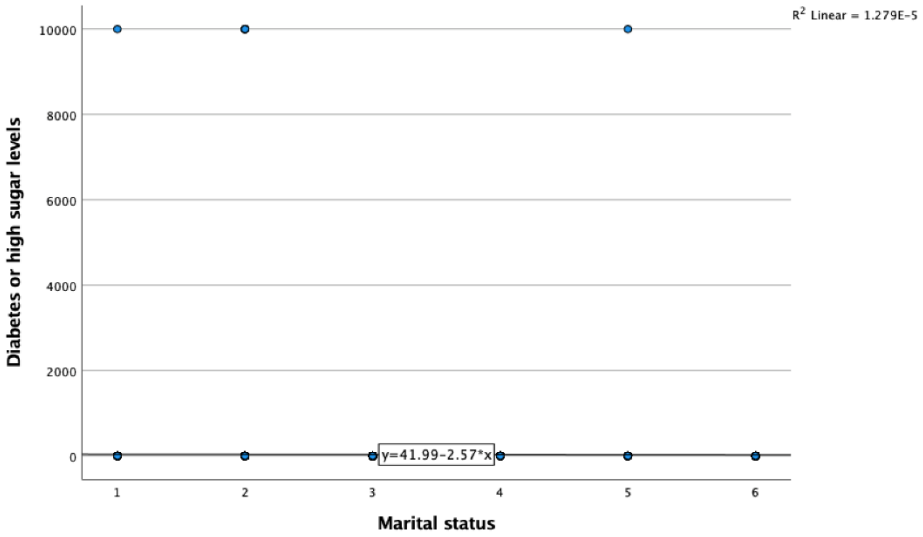
Characteristics	Mean	*SD*	*N*
Gender	1.05	.213	9,052
Marital status	6.64	210.111	9,052
Age	4.0964	1.51554	9,049
Income	4.4597	4.02974	8,726
SYC	1.7667	.73590	7,954
Diabetes or high sugar levels	36.08	583.796	2,339

Statistical Assumptions

Using a scatterplot, I checked the statistical assumptions required for linear regression by assessing the linearity of the relationship between continuous IVs and the DV. I checked the relationship between marital status and DM. I checked the relationship between marital status and DM for linearity. A straight line was added to the scatterplot in Figure 5, demonstrating no strong relationship between marital status and DM. The relationship between age in years (covariate) and DM (DV) was also examined to test the assumption of linearity.

Figure 5

Association Between Marital Status and DM

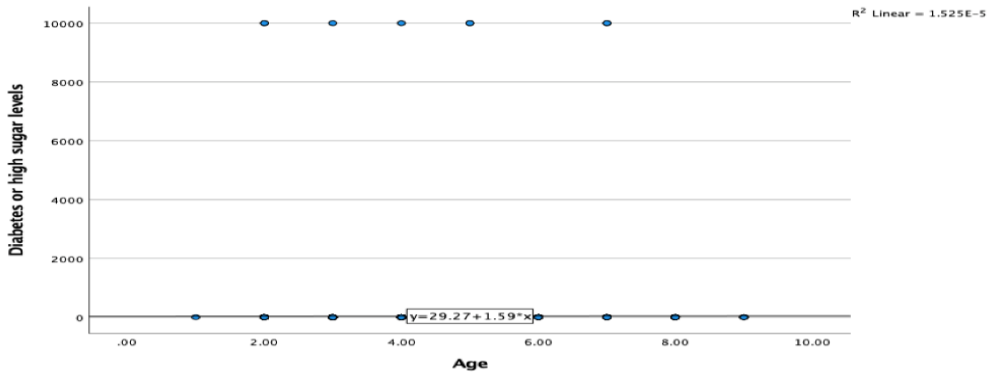


Note. Each dot represents marital status, a moderator variable, and DM, a DV.

A straight line was added to the scatterplot in Figure 6, which demonstrated no strong relationship between age in years and DM.

Figure 6

Association Between Age in Years and DM



Note. Each dot represents age in years, a covariate variable, and DM, a DV.

Statistical Analysis Findings for RQ1: Logistic Regression

The results are presented according to the RQs being used for the study. Table 1 noted the measurement levels used for each study variable. The findings from the covariates are also discussed.

RQ1: Is there a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income?

H_o1: There is no relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

H_a1: There is a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

For RQ1, the variance inflation factor (VIF) assessed and measured the multicollinearity assumption. The reported VIFs were below 2, with the highest VIF of 1.168 representing the age group and the lowest being 1.013 for income (see Table 11). This shows low multicollinearity, which indicates a low correlation between the educational qualification represented by SYC, which is independent of the other predictors while controlling for age, gender, and income.

Table 11

VIF for RQ1

Variable	Tolerance	VIF
Age group	.962	1.168
Gender	.863	1.116
Education status (SYC)	.895	1.138
DM	.860	1.144
Income	.853	1.013

The findings suggest that the predictors were highly correlated because the residuals were evaluated for independence, determined by the Durbin-Watson statistic, which was 2.004 (see Table 12).

Table 12

Durbin-Watson Test

Model	R	R square	Adjusted R square	Std. Error of the Estimate	Change statistics					
					R square change	F change	Df1	Df2	Sig. F change	Durbin-Watson
1	.018[a]	.000	.000	480.237	.000	.735	1	2161	.391	2.004

a. Predictors: (Constant), SYC new
b. Dependent variable: Diabetes or high sugar levels

Logistic regression (see Table 13) was sensitive to outliers by examining Cook's Distance, which had a minimum value of 0 and a maximum value of .041. The difference in Cook's distance looks at the logistic regression to outliers, which means the difference in the predicted value for the observations and observable changes made. The small value between 0 and 0.001 indicates a significant value on the observations made to determine the logistic regression to outliers where values below 1.00 show residuals were well predicted (Wagner, 2020). The null hypothesis was rejected due to a relationship between DM and educational status among Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

Table 13

Logistic Regression of Association Between DM and Educational Status

Variable	*B*	S.E.	Wald.	Df	*p*	Odds ratio	95% C.I. for odds ratio	
							Lower	Upper
DM								
Yes	-.208	.000	.662	1	<.001	.667	.222	.601
No	-.114	.000	.842	1	<.001	.523	.102	.445
Gender								
Male	-.104	.000	.705	1	<.001	.344	.662	.873
Female	0	-	-	0	-	-	-	-
Income								
$1–1,000	-.061	.124	.735	1	<.001	.910	.662	1.175
$1,001–$2,000	.022	.134	.735	1	<.001	.919	.662	1.175
$2,001–$3,000	-.061	.124	.735	1	<.001	.966	.662	1.175
$3,001–$4,000	-.022	.134	.096	1	.782	1.042	.801	1.357
$4,001–$5,000	-.061	.124	.387	1	.534	.931	.745	1.162
$5,001–$6,000	.022	.134	.096	1	.782	1.042	.801	1.357
$6,001–$7,000	-.061	.124	.387	1	.534	.931	.745	1.165
$7,001–$8,000	.022	.134	.096	1	.782	1.042	.801	1.357
$8,001–$9,000	-.061	.124	.387	1	.534	.931	.745	1.165
$9,001–$10,000	.022	.134	.096	1	.782	1.042	.801	1.357

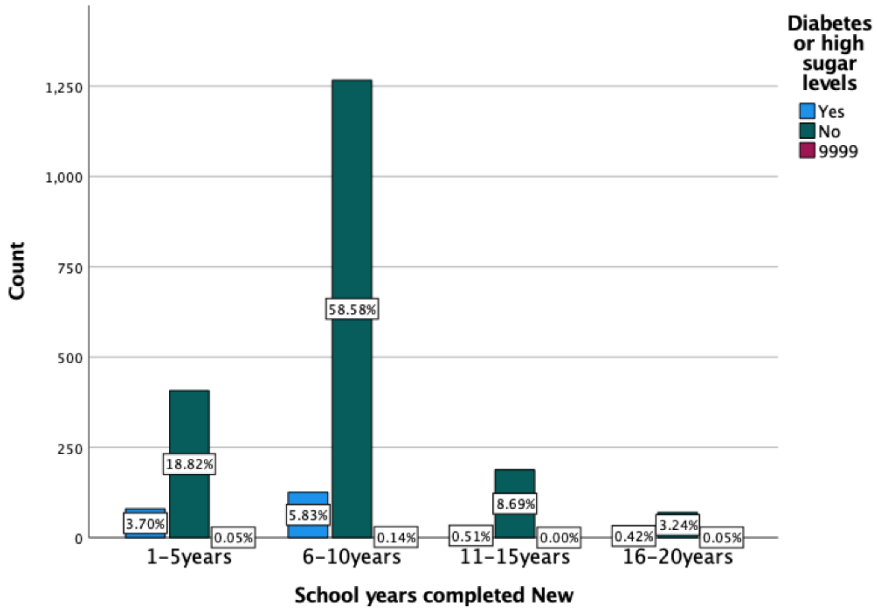
Table 13 continued

Variable	*B*	S.E.	Wald.	Df	*p*	Odds ratio	95% C.I. for odds ratio	
							Lower	Upper
Educational Status								
1-5 years	-.003	.000	.614	1	<.001	.852	.662	1.115
6-10 years	-.125	.000	.735	1	<.001	.910	.662	1.185
11-15 years	-.018	.000	.945	1	<.001	.647	.487	.861
16-20 years	-.120	.000	.863	1	<.001	.919	.662	1.105
21-25 years	-.137	.000	.738	1	<.001	.966	.662	1.133
26-30years	-.223	.000	.935	1	<.001	.946	.662	1.175
31-35 years	-.802	.000	.948	1	<.001	.966	.558	.843
35-40 years	-.506	.000	.468	1	<.001	.367	.342	.711

A bar chart was conducted to display the number of school years (educational status) and DM (see Figure 7). Participants who completed 6–10 years had 58.58% of participants that reported “no” to diabetes/high blood sugar, and 5.83% of participants said “yes” to diabetes/high blood sugar. Those who had 16–20 years of schooling had the lowest number of participants who reported “yes” to diabetes/high blood sugar (0.42%).

Figure 7

Bar Chart Displaying SYC DM



Statistical Analysis Findings for RQ2: Moderation Analysis

RQ2: Does marital status moderate the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income?

H_o2: Marital status does not moderate the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

H_a2: Marital status moderates the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

RQ2 explored if marital status moderates the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income.

The moderator analysis (see Table 13) summarizes the analysis for the RQ2. The table shows the control variables (i.e., age, gender, and income) and the variables educational status (SYC) and DM moderated by marital status into the model, yielding statistically significant results. The model was statistically significant when marital status was included (b = .000, p =<.001). Model 1 consisted of the control, dependent, and IVs. The results showed that the controlling variables were statistically significant for DM among Mexican migrants. When marital status was added to model 2, there was a high statistical significance of p<0.05. As marital status changed, DM increased among Mexican migrants (b=.000, p=<.001).

Adding the three interaction terms (shown in Table 14) also yielded statistically significant results. These findings indicate that educational qualification, age, gender, and income have a profound influence on the management of diabetes among Mexican migrants at the Northern borders. Marital status moderates the relationship between

educational qualification (SYC) in the Northern Mexican border. There is sufficient evidence to accept the alternative hypothesis that marital status moderates the relationship between educational status and DM in Mexican migrants in the Northern Mexican border adjusted for age, gender, and income.

Table 14

Moderator Analysis: Marital Status and DM

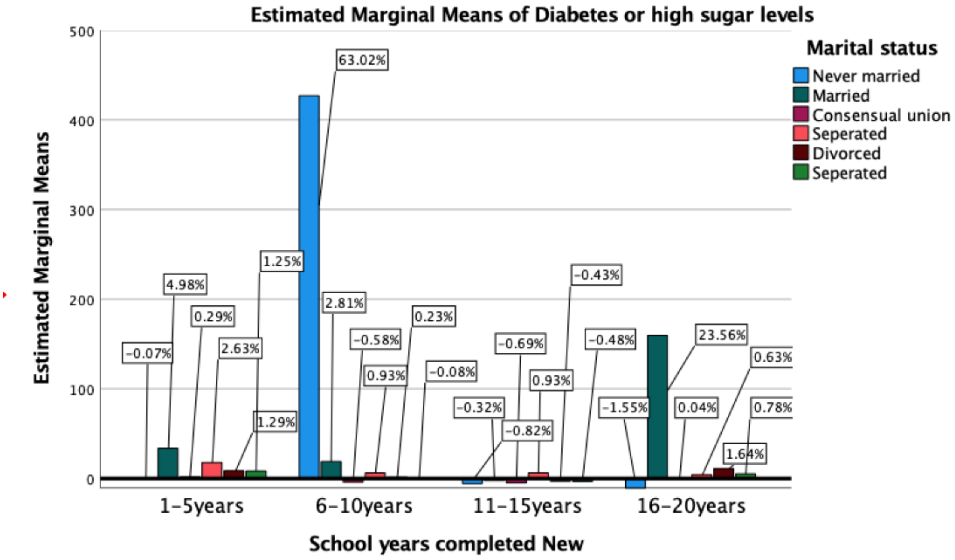
Variables	Estimate	*SE*	95%CI		*p*
			Lower level	Upper level	
(Constant)	1.217	.058	1.103	1.331	<.001
Age	.018	.012	-.004	.041	<.001
Gender	.014	.040	-.902	.064	<.001
Income	.006	.055	-.101	.113	<.001
SYC_D	.404	.077	-.111	.191	<.001
DBT_D	.069	.055	-.038	.176	<.001
(Constant)	1.508	.082	1.346	1.669	<.001
Age	.000	.012	-.023	.024	<.001
Gender	.001	.039	-.073	.082	<.001
Income	.000	.022	-.092	.622	.001
SYC_D	.000	.077	-.111	.191	<.001
DBT_D	.000	.055	-.038	.176	.001
MStatus	.000	.016	-.109	-.047	.000
(Constant)	1.467	.091	1.289	1.645	<.001
Age	.001	.012	-.023	.025	<.001
Gender	-.003	.039	-.080	.074	<.001
Income	-.056	.185	-.419	.307	<.001
SYC_D	.279	.132	.019	.538	.001
DBT_D	.087	.137	-.181	.355	<.001
MStatus	-.065	.020	-.105	-.025	<.001
SYC_X MStatus	.038	.058	-.077	.152	<.001
DBT_X MStatus	-.068	.042	-.151	.014	<.001

A bar chart was conducted to display marital status and DM by SYC (educational status; see Figure 8). Married participants had the highest rate of diabetes (4.98%) compared to other marital statuses in the 1–5-year SYC. Never-married participants had the highest rate of diabetes (63.02%) compared to different marital statuses in the 6–10-year SYC. Separated participants had the highest rate of diabetes (0.93%) compared to

other marital statuses in the 11–15-year SYC. Lastly, married participants had the highest rate of diabetes (23.56%) compared to different marital statuses in the 16–20-year SYC.

Figure 8

Bar Chart Displaying Marital Status and DM Per SYC



Summary

In this chapter, I examined the association between DM and educational status. I also analyzed the role of marital status in influencing the association between DM and academic status. A logistic regression was conducted for RQ1: Is a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income? A moderation analysis was conducted for RQ2: Does marital status moderate the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income? Significant statistical findings in RQ1 suggested a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender,

and income. There were also significant statistical findings in RQ2, suggesting that marital status moderates the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income. Chapter 4 will include an introduction, interpretation of the findings, limitations of the study, and recommendations for future research.

Section 4: Application to Professional Practice and Implications for Social Change

The purpose of this quantitative cross-sectional study was to examine the role of educational status on DM among Mexican migrants and whether marital status can modify the relationship between having diabetes and DM. Secondary data were retrieved from the MMP (2021) to answer the RQs. Two RQs were assessed in the study:

RQ1: Is there a relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income?

RQ2: Does marital status moderate the relationship between educational status and DM in Mexican migrants on the Northern Mexican border adjusted for age, gender, and income?

Key findings demonstrated that both RQs were significant in that educational status influences DM among Mexican migrants, including the moderating factor of marital status.

Key Findings

Secondary data were retrieved from the MMP (2021) to examine marital status moderating the relationship between DM and educational status. The IV was educational status measured as SYC. The DV was DM, which measured the history of diabetes or high sugar. The moderator variable was marital status. For this quantitative cross-sectional study, I used the latest data set from February 2021 and included 9,052 participants (see MMP, 2021).

Kposowa et al. (2021) demonstrated that marital status and gender differences increase the risk of death from diabetes. Research has also shown that immigrants are

challenged with obstacles in managing their diabetes, validating the importance of addressing Mexican migrants' educational status and the importance of marital status in DM (Martinez-Cardoso et al., 2020). Although researchers had investigated these issues, no empirical studies were found on the relationship between educational status and DM among Mexican migrants on the Northern Mexican border, considering the moderating effect of marital status.

For the data analysis, I used the latest data set from February 2021 (see MMP, 2021) to answer the two RQs. Insufficient data are available regarding DM among the migrant population (Quandt et al., 2018). Ramezankhani et al. (2019) emphasized the need for further research to understand the role of marital status in DM as it varies by gender. During the literature review, no empirical studies were found on the relationship between educational status and DM among Mexican migrants on the Northern Mexican border, considering the moderating effect of marital status. I aimed to fill the gap and provide valuable insight into this understudied area regarding the influence of educational status on DM among Mexican migrants residing on the Northern Mexican border while also considering the potential moderating effects of marital status. Results from the study showed a statistically significant relationship between DM and educational status among Mexican migrants residing on the Northern Mexican border. The study also demonstrated a statistically significant finding that marital status moderates the relationship between diabetes and educational status among Mexican migrants living on the Northern Mexican border.

For this quantitative cross-sectional study, the analysis for RQ1 showed low multicollinearity, indicating a low correlation between the educational qualification represented by school years completed, independent of the other predictors, while controlling for age, gender, and income. Logistic regression demonstrated a significant relationship between DM and educational status. For RQ2, the moderation analysis model showed statistical significance in which marital status moderated the relationship between DM and educational status (b = -.001, p = <.001; see Table 14).

Interpretation of Findings

For RQ1, I examined whether there is a relationship between DM and educational status among Mexican migrants on the Northern Mexican border, adjusted for age, gender, and income. The finding was a significant relationship between DM and educational status among Mexican migrants on the Northern Mexican border: 1–5 years of school (b =-.003, p = <.001, 95% C.I. [.662–1.115], 6–10 years of school (b = -.125, p = <.001, 95% C.I. [.662–1.185], 11–15 years of school (b = -.018, p = <.001, 95% C.I. [.487–.861], 16–20 years of school (b = -.12, p = <.001, 95% C.I. [.662–1.105], 21–25 years of school (b = -.137, p <.001, 95% [.662–1.133], 26–30 years of school (b = -.223, p <.001, 95% C.I. [.662–1.175], 31–35 years of school (b = -.802, p <.001, 95% C.I. [.558–.843], and 35–40 years of school (b = -.506, p <.001, 95% C.I. [.342–.711]. Findings also showed those who reported having diabetes/high blood sugar (b = -.208, p <.001, 95% C.I. [.222–.601] and those who reported not having diabetes/high blood sugar (b = -.114, <.001, 95% C.I. [.102–.445]. These findings support a statistically significant relationship between DM and educational status.

For RQ2, I examined whether marital status moderates the relationship between DM and educational status among Mexican migrants on the Northern Mexican border, adjusted for age, gender, and income. The finding was significant in that marital status moderates the relationship between DM and educational status among Mexican migrants on the Northern Mexican border, adjusted for age, gender, and income. The moderation analysis was statistically significant when marital status was included (b = -.001, p <.001). Adding in the other variables showed that the results were statistically significant and had a profound influence on DM among Mexican migrants, age (b = .001, p <.001), gender (b = -.003, p <.001), income (b = -.056, p <.001), and educational status (b = .279, p = .001).

Findings and Knowledge Extension

In Section 1, I discussed inadequate levels of health literacy among the migrant population, demonstrating that educational status may play a significant role in Mexican migrants managing their diabetes (see Medina et al., 2022). The migrant population suffers from high vulnerability and low levels of health literacy (Medina et al., 2022). The National Health Plan 2012–2016 stated low levels of health literacy are identified as barriers to achieve equal health care (Medina et al., 2022). These studies confirm the current study's findings, which showed a relationship between DM and educational status. The current study supports Medina et al.'s findings. The current study showed that participants with 1–10 years of schooling have a considerable risk of diabetes compared to those with more than 10 years of education.

In Section 1, I discussed that studies have shown different marital statuses, such as divorced and separated individuals, have a higher risk of death due to diabetes compared to those who are widowed (see Kposowa et al., 2021). Studies have shown a relationship between marital status and the outcome of diabetes but have emphasized the need for further research to understand the role of marital status and DM (Ramezankhani et al., 2019). These studies confirm the findings from the current research, which showed that marital status moderates the relationship between DM and educational status (SYC). Never-married participants had the highest rate of diabetes (63.02%) compared to other marital statuses in the 6–10-years SYC. The second highest rate of diabetes was among married participants (23.56%) compared to other marital statuses in the 16–20-years SYC. When marital status was added to model, there was a high statistical significance of $p < .001$. Marital status as a moderator confirms and extends knowledge when it comes to DM by informing and educating public health officials on the Northern Mexican border, health care workers, and significant others of their role in DM among Mexican migrants.

Interpretation of Findings in the Context of the HBM

Rosenstock's (1974) HBM is a theoretical model that promotes health and disease prevention and predicts health behavior changes among individuals. Rosenstock's HBM consists of six constructs: (a) perceived susceptibility, (b) perceived severity, (c) perceived benefits, (d) perceived barriers, (e) cue to action, and (f) self-efficacy (LaMorte, 2022). I analyzed the RQs based on Rosenstock's HBM. The model was appropriate for determining whether Mexican migrants understand the potential risk factors that make them susceptible to becoming diabetic and the complications that can

result from poor DM. Pezeshki et al. (2022) noted that HBM constructs with educational intervention significantly improved eye care practice among diabetic patients. Education and health promotion are beneficial for the self-care management of diabetic patients (Pezeshki et al., 2022). The current study's analysis revealed that education status is significant in DM. The current study also supports Pezeshki et al.'s (2022) study that it is essential to implement educational programs regarding DM, specifically among Mexican migrants on the Northern Mexican border with fewer SYC (10 years or fewer).

Modifying factors (i.e., age, gender, ethnicity, socioeconomic status, and education) can also influence an individual's ability to engage in prevention and health behavior change. I examined the educational and marital status and their relationship to DM. Miranda et al.'s (2021) findings demonstrated that barriers to participating in healthy behaviors include poor understanding regarding diabetes and appropriate nutrition and obtaining health information from unreliable sources, which highlights the importance of addressing educational status in the management of diabetes among Mexican migrants. The current study with marital status as a moderator supports Martinez-Cardoso et al.'s (2020) study, validating the importance of addressing Mexican migrants' educational status and the importance of marital status in DM through educational intervention. It is necessary to raise awareness among Mexican migrants that marital status can increase the risk of diabetes. It is vital to increase self-efficacy among Mexican migrants. Without this, Mexican migrants' management of their diabetes may not occur. Educational programs for individuals and their partners (if applicable) can help: (a) mitigate the risk of developing diabetes and the severity of diabetes, (b) promote

health behavior changes to lower the risk of diabetes, (c) explain how to address barriers that may impede a positive behavior change such as environmental and social factors, (d) promote behavior change, and (e) increase an individual's willingness to keep up with the behavior change for a better quality of life and health. Screening and prevention programs that promote education can also be effective in increasing Mexican migrants' self-efficacy and their belief in their ability to manage their diabetes (Hayden, 2019).

Limitations of the Study

The first limitation was that no specification about the type of diabetes (Type I or Type 2) was documented for the study. The codebook did not specify the level of milligrams per deciliter for the participants who were considered diabetic/high blood sugar. Also, the severity of the diabetes was not reported, such as whether prediabetic participants were included in the secondary data. There was no report of whether the participants were on any medication to manage their diabetes. This is important because this could have demonstrated whether participants adhered to their prescribed diabetes medication. Finally, the data were collected through the anthropological research method, which consists of objective and subjective data in which participants could have underreported their responses during the surveys.

Recommendations for Future Research

Diabetes is an increasing public health concern among certain racial and ethnic groups, including Hispanics (CDC, 2022a). Uncontrolled diabetes is a health issue that faces Mexican immigrants crossing the Northern border of Mexico (Bonfiglio et al., 2020). The current study's findings are significant and consistent with existing literature

demonstrating that diabetes is a growing public health concern (Bonfiglio et al., 2020). Current findings also validate the importance of developing educational programs to screen, prevent, and manage diabetes. The HBM is appropriate for practicing diabetes self-care management, which can lead to increased adherence to diabetes medication and regular monitoring of blood sugar levels (Melkamu et al., 2021). Incorporating the HBM within the educational program may help Mexican migrants understand the potential risk factors that make them susceptible to becoming diabetic and complications that can result from poor DM. Shabibi et al. (2017) confirmed that the HBM paired with the educational intervention significantly promotes health care behavior among diabetic patients, improving perceived susceptibility and self-efficacy scores.

Health professionals (i.e., primary care physicians and nutritionists) could also play a significant role in educational interventions for the diabetic Mexican community. The primary care physicians could promote knowledge about diabetes, medication adherence, and screening to the patients and their spouses (if applicable). It is also essential to provide these educational programs and interventions in English and Spanish to reduce poor health literacy, which is common among the Mexican migrant community (Medina et al., 2022). Nutritionists play a significant role in proper food choices for managing blood sugar levels. Poor nutrition and poor understanding of diabetes are some barriers the migrant community faces when participating in healthy behaviors (Miranda et al., 2021).

Further studies are advised to understand specific factors in a marital role that influence DM, including understanding whether men who were never married have a

higher rate of diabetes compared to widowed women (Ramezankhani et al., 2019). Addressing specific factors that influence the rate of diabetes in marital status may decrease overall rates of diabetes among the Mexican migrant community. Incorporating diabetes educational programs and interventions, alongside future research, could reduce diabetes, increase diabetes knowledge and medication adherence, and improve overall health outcomes among the Mexican migrant community.

Implications for Social Change

Diamond et al. (2020) stated that diabetes is one of the noncommunicable diseases overlooked due to a lack of health screenings. Low health literacy is known to be a threat to equity and health care access among the migrant population, which has resulted in worse health status and vulnerability (Medina et al., 2022). A diabetes educational program for individuals and their partners (if applicable) that focuses on diabetes screening, management, and medication adherence may help reduce the burden of diabetes and promote a healthier lifestyle. Incorporating a diabetes educational program that is bilingual may help those who are not fluent in English understand diabetes prevention and management in their native language, which for the current study was Spanish. A diabetes educational program that allows the individual's partner/family (if applicable) to participate could help promote healthy habits (i.e., proper diet, exercise, and medication adherence) at home. Family support is known to have a positive influence on health outcome among diabetic patients with blood sugar control, medication adherence, and social and environmental support with healthy diet and exercise (Baig et al., 2015).

Addressing barriers such as low levels of health literacy and income gaps may reduce the burden of diabetes among the migrant community. The results of this study may contribute to improved diabetic prevention and management programs by public health officials, primary care physicians, and dieticians to provide to patients and their families. In conclusion, the findings from this study may contribute to positive social change by reducing the burden of diabetes rates among the Mexican migrant community, improving overall health outcomes, and improving knowledge and skills for DM.

Conclusion

Uncontrolled diabetes is a health issue that faces Mexican immigrants crossing the Northern border of Mexico (Bonfiglio et al., 2020). The prevalence of diagnosed and undiagnosed diabetes was higher in Hispanics compared to non-Hispanic adults (CDC, 2018). The purpose of this quantitative cross-sectional study was to examine the role of educational status on DM among Mexican migrants and whether marital status can modify the relationship between having diabetes and DM. The study's findings demonstrate a significant relationship between DM and educational status among Mexican migrants on the Northern Mexican border, adjusted to age, gender, and income. The study's findings also demonstrate that marital status moderates the relationship between DM and educational status among Mexican migrants on the Northern Mexican border, adjusted to age, gender, and income. The findings from the current study demonstrate the importance of a diabetes educational program and intervention paired with the constructs of the HBM that is bilingual and the support of primary care physicians and nutritionists among the Mexican migrant community. Findings from this

study added to research on specific factors of marital status that influence diabetes among the migrant community.

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