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Acculturation and Diabetes among New York's Bangladeshi Immigrants

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Abstract

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Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

There are more than 3.4 million South Asians in the United States. Among this subgroup, Bangladeshis in New York have a high prevalence of Type 2 diabetes ranging from 15 to 24% compared to the general population. This study examined the effect of acculturation through length of stay in the United States and understanding of the English language, and the role of gender on self-efficacy (SE) and diabetes self-management among 336 New York Bangladeshi immigrants between the ages of 21 and 75 who had been diagnosed with type 2 diabetes with A1C $\geq$ 6.5%, as verified by their medical record for inclusion criteria in the original DREAM study. Health belief model was used as a theoretical framework. The key findings showed a significant relationship between gender and SE levels ($p \leq .0001$). Bangladeshi women were 79% less likely to have high SE levels compared to their male counterparts (*OR*= .212; 95%*CI*: .099-.453). Additionally, those who had low education attainment were 68% less likely to develop high SE levels (*OR* = .323, 95%; *CI*: .105-.998). The findings demonstrate the need to understand the influence of social and contextual factors on SE and underscore the importance of integrating a systems approach and ontological lens in the implementation of gender-specific innovative strategies. Such an understanding might help destigmatize diabetes, improve medication adherence, and enhance SE and coping skills for Bangladeshi women across the life span. The findings of this study might provide knowledge to public health practitioners that would help create gender-specific diabetes education and lifestyle management for equity-centered capacity building to alleviate the disproportionate burden of diabetes in Bangladeshi minority women in the United States, ultimately improving health outcomes and reducing healthcare expenditures.

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Dedication

This study is dedicated to the voiceless minority communities who are underrepresented, understudied, and are challenged by gender and health inequities.

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Introduction

Diabetes is the seventh leading cause of death in the United States with more than 100 million people living with diabetes and prediabetes (Centers for Disease Control and Prevention [CDC], 2017). The American Diabetes Association (ADA, 2018) stated that the financial burden of diagnosed diabetes was estimated at $327 billion in 2017. Evidence has shown that racial and ethnic minorities suffer disproportionately from diabetes-related morbidity and mortality compared to whites (Rosenstock, Whitman, West, & Balkin, 2014**).** There are over 3.4 million South Asians (Asian Indians, Pakistanis, Bangladeshis, Sri Lankans, Nepalese) living in the United States, and Bangladeshis are among the fastest-growing immigrant groups that have a high prevalence of type 2 diabetes in the country (Islam, Wyatt et al., 2018). The authors Islam, Wyatt et al. (2018) further state that Bangladeshis in New York have a higher prevalence of diabetes ranging from 15 to 24% compared to the general population. This high prevalence of diabetes across this population along with greater complications and mortality rates has significant health and financial implications. Although South Asians in the United States and elsewhere are genetically predisposed to diabetes and have a greater degree of insulin resistance, their disease management and prevention has remained poor, which leads to significant health disparities (Islam, Niessen et al., 2015; Kanaya, 2014; Sattar & Gill, 2015; Sohal, Sohal, King-Shier, & Khan, 2015).

It is essential to understand the association between acculturation, nutrition, and physical inactivity in immigrant communities and how family structure, social support

systems, education attainment, and socioeconomic status can mediate the influence of acculturation on diabetes management and health outcomes (Braveman & Gottlieb, 2014; Lagisetty et al., 2016; Shah, Vittinghoff, Kandula, Srivastava & Kanaya, 2015). Understanding causal pathways that may be outside the realm of standard medical care, and considering upstream social determinants across multilevel settings for immigrant communities can help in reducing diabetes inequities at intrapersonal, interpersonal, community, and political levels (Abraído-Lanza, Echeverría & Flórez, 2016; Dendup, Feng, Clingan & Astell-Bur, 2018; Trinh-Shevrin, Nadkarni, Park, Islam & Kwon, 2015). Studies in the South Asian community have examined diabetes, cardiovascular disease, and dietary patterns (Islam, Wyatt, et al., 2018; Lesser, Gasevic & Lear, 2014; Lopez et al., 2017; Shah et al., 2015; Sohal, Sohal, King- Shier, & Khan, 2015) but to the best of my knowledge, none have explored the impact of acculturation on diabetes self-management and self-efficacy in the Bangladeshi population living in New York City (Islam et al., 2018) since it is a relatively new phenomenon and there is a paucity of current literature on this understudied community. My study measured acculturation using two indicators: length of residence in the United States and English language proficiency of Bangladeshi immigrants living in New York City. Additionally, I looked at the role of gender and whether it was an important factor in self-efficacy and diabetes self-management in this vulnerable community. I hope my **s**tudy will help to promote social change and provide unique insights into how to manage diabetes in this at-risk population by understanding the acculturation process and role of gender for improved diabetes outcomes among New York's Bangladeshi immigrants.

Problem Statement

There are over 3.4 million South Asians in the United States (mainly from India, Bangladesh, and Pakistan) who are among the fastest growing immigrant groups with a high prevalence of type 2 diabetes amongst the subgroups of Asian Americans (Islam et al., 2018). According to the Pew Research Center (2017), the Bangladeshi population in New York City totaled 77,000 in 2015 with Bangladeshi women comprising 52.5% of the population (Asian American Federation, 2013). This population has a significantly higher insulin resistance and lower β-cell function than other ethnic groups (Kanaya et al., 2014). Additionally, many of these immigrants face major social and economic challenges and significant health disparities compared to other immigrant groups (Trinh-Shevrin, Nadkarni, Park, Islam & Kwon, 2015). About 85% of Bangladeshi New Yorkers are foreign-born and more than half of New York City Bangladeshis have limited English language proficiency and are among the poorest of Asian subgroups (Islam, Wyatt et al., 2018). Employment status, language, education attainment, and culture are important determinants of health and play a significant role in diabetes self-management leading to barriers in early care and utilization of medical services (Islam et al., 2018). Additionally, Islam et al. (2018) state that there are limited culturally and linguistically appropriate resources and health information on type 2 diabetes management for this community. Environmental factors such as unhealthy diet, limited physical activity, fatalistic beliefs, lack of trust, and lack of communication with providers can result in low medication adherence and further pose as barriers to the adoption of improved health behaviors and lifestyles in this population (Sohal et al., 2015).

Sixty-seven percent of this population has never been screened for diabetes, and consequently, women have the highest increase for gestational diabetes when compared to other groups [CSAAH], 2018). Additionally, Bangladeshi women have more limited English proficiency and are more vulnerable to health disparities such as obesity, cardiovascular diseases, and diabetes than their male counterparts (Kiwan, 2016). Furthermore, traditional beliefs regarding body weight and limited physical activity in this community can lead to an underestimation of these grave risk factors for obesity and diabetes and result in comorbidities and poor diabetes management (Dave et al., 2015; Sohal et al., 2015).

The high prevalence of diabetes across South Asian populations in the United States and in particular the Bangladeshi community has significant health and financial implications (Shah & Kanaya, 2014). The debilitating complications from diabetes can lead to cardiovascular diseases, cerebrovascular problems, chronic kidney disease, hypertension, obesity, nonalcoholic fatty liver disease, peripheral neuropathy, and retinopathy which puts serious health and economic burdens on society (Jelinek, 2017). A study by NYU Center for the Study of Asian American Health [CSAAH] (2018) reported that 67% of South Asians had never been screened for diabetes while 17% of those who had been screened were told by health professionals that they had diabetes. This underscores the need to understand the Bangladeshi community in its social and cultural context to lower the disproportionate burden of this chronic illness and reduce health disparities (Sohal, Sohal, King- Shier & Khan, 2015. Further, shifts in lifestyle behaviors due to acculturation can lead to unhealthy dietary patterns that exacerbate the risk factors

for diabetes and higher rates of mortality and comorbidities compared to other ethnic groups (Shah & Kanaya, 2014). There is a lack of information on type 2 diabetes management (DM) practices in this population (Islam et al., 2014; Islam, Wyatt et al., 2018), and there is a gap in research regarding New York's Bangladeshi immigrants regarding whether their acculturation status influences diabetes self-management and self-efficacy(Islam et al., 2018; Lesser, Gasevic & Lear, 2014; Shah et al., 2015).

To help address this gap in research, my study examined the relationship between acculturation and gender and its effect on diabetes self-management and diabetes self-efficacy in this understudied community. My study evaluated the importance of acculturative influences and their link with healthy behaviors which can help promote improved care coordination and social support services in different settings for New York Bangladeshi immigrants, and help bridge the gap in terms of diabetes outcomes.

Purpose of the Study

In this quantitative study, I examined the impact of acculturation through the lenses of length of stay in the United States and level of English language proficiency, as well as the role of gender on diabetes SE and diabetes self-management among Bangladeshi immigrants living in New York City. This study demonstrated the need to understand these multiple influences on behavior choices to reduce diabetes health inequities in this vulnerable community (Greenhalgh et al., 2015; Islam, Wyatt, et al., 2018; Lopez et al., 2017).

South Asian immigrants are at a greater risk of hospitalization for diabetes than other immigrant populations in New York City (Islam et al., 2018). Shah and Kanaya

(2014) assert that South Asians who are newly diagnosed with type 2 diabetes have a higher prevalence of debilitating complications compared to Europeans**, i**ncluding retinopathy and nephropathy as well as a higher mortality rate compared to other ethnic groups. Additionally, cultural and linguistic barriers lead to limited access to early diabetes care and diminished opportunities for A1C screenings (Adepoju, Preston, & Gonzales, 2015). These health disparities in the targeted community underscore the need to focus on health determinants for early intervention to reduce comorbidities and frequent hospitalizations, lower healthcare costs, and enhance quality of life (Peek, Ferguson, Bergeron, Maltby & Chin, 2014). Acculturation is believed to affect type 2 diabetes among certain ethnic groups in the United States because of lifestyle and environmental changes such as diet, physical activity, and exposure to environmental stressors (Shah & Kanaya, 2014).

Bangladeshi women of low socioeconomic status face poor diabetes outcomes in comparison to other racial and ethnic groups in New York City (Islam, Wyatt et al., 2018). Studies by Arnetz, Ekberg and Alvarsson (2014) and Kautzky-Willer, Harreiter and Pacini (2016) highlight gender differences in risk factors and outcomes and conclude that women have different perceptions, attitudes, and expectations towards diabetes management than men (Arnetz, Ekberg & Alvarsson, 2014; Kautzky-Willer, Harreiter & Pacini, 2016). Islam et al. (2015) observed that a majority of Bangladeshi men had more knowledge about the causes, but Bangladeshi women fared better with management and complications of diabetes. Since women typically assume primary responsibility as caregivers for their families, their attitudes and health behaviors towards diabetes can

have implications for the entire household (Baig, Benitez, Quinn & Burnet, 2015). Therefore, addressing gender inequality in diabetes outcomes is crucial for the prevention and management of diabetes in this community.

Acculturation is a multidimensional and multidirectional construct and functions both at the individual and societal level (Castro & Rudmin, 2017). Acculturation is a health risk factor for immigrant populations and linked to discrimination, poverty, and loss of beliefs and values, which can lead to poorer health outcomes and low access to early care (Allen et al., 2014). Acculturation can be measured either by using standardized scales or by proxy but is often examined using proxy variables such as speaking and writing the mainstream language and length of stay in the host country (Tiwari & Albino, 2017). These acculturation indicators may better explain poor health outcomes and limited access to early care for diabetes self-management and SE in this often understudied community (Lopez & Gordon, 2014).

Acculturation is a factor that should be considered when predictors of diabetes in racial/ethnic groups are examined (Abraído-Lanza, Echeverría & Flórez, 2016; Fialkowski et al., 2015; O'Brien, Shuman, Barrios, Alos & Whitaker, 2014). Many studies that have examined the relationships between acculturation and health behaviors have found that it has been associated with overweight/obesity among different ethnic groups such as Asians and Hispanics suggesting a "Diminished Healthy Migrant Effect" which could be due to economic disadvantage, consumption of convenience foods and sugared beverages, and adopting Western lifestyles (Alidu & Grunfeld, 2018; Delavari,

Sønderlund, Mellor, Mohebbi & Swinburn, 2015; Isasi et al., 2015; Ro, 2014; Shah et al., 2015; Lesser, Gasevic & Lear, 2014).

In this study, I examined the impact of acculturation (independent variable) in terms of length of stay in the United States (categorical variable) and English language proficiency (categorical variable), as well as the role of gender (nominal variable) on dependent variables diabetes self-efficacy and diabetes self-management among Bangladeshi immigrants living in New York City. Acculturation (length of stay in the United States and level of English language proficiency) along with diabetes self-management and SE levels were measured at baseline. Additionally, gender and its association with diabetes self-management and SE levels were also measured at baseline in this study. Mediator variables such as education attainment and employment status were adjusted in this study. Language and cultural barriers to early care, limited use of preventative services, and misinformation regarding the effectiveness of diabetes screenings are some factors explaining why minority communities such as the Bangladeshis receive late diagnosis of their health condition (Adepoju et al., 2015). The findings from this study can help to improve diabetes self-management and SE in this vulnerable community at micro and macro levels and can lead to enhanced provider and community engagement.

Research Questions and Hypotheses

The research questions were as follows:

RQ1: What is the relationship between acculturation and diabetes self- management and diabetes SE in New York Bangladeshis?

Null hypothesis: There is no relationship between acculturation and diabetes self-management and diabetes SE in New York Bangladeshis.

Alternative hypothesis: There is a relationship between acculturation and diabetes self-management and diabetes SE in New York Bangladeshis.

RQ2**:** What relationship exists between gender and diabetes self-management and diabetes SE among New York Bangladeshis when controlling for mediators such as education attainment and employment status?

Null hypothesis: No relationship exists between gender and diabetes self-management and diabetes SE among New York Bangladeshis when controlling for mediators such as education attainment and employment status.

Alternative hypothesis: A relationship exists between gender and diabetes self-management and diabetes SE among New York Bangladeshis when controlling for mediators such as education attainment and employment status.

The total number of Bangladeshi participants in the dataset collected from the CSAAH was 336. The median age was 57.5 for males and 52 for females. Age is a significant moderator of diabetes outcomes and hospitalization visits are higher among older diabetic patients (Ki et al., 2014). Although there are discrepancies between the age of the onset of diabetes and when it is actually diagnosed, the likelihood of developing diabetes in the United States increases significantly after the age of 45 (Gonzales, 2016). Cultural and linguistic barriers to early care and knowledge gaps regarding the availability of preventative services and diabetes screenings result in Bangladeshi-

Americans entering the healthcare system late (Adepoju, Preston & Gonzales, 2015). In this quantitative study, I looked at diabetes self-management and diabetes self-efficacy in Bangladeshi immigrants who were at high risk of developing complications if the barriers to improved outcomes were not addressed effectively (Islam, Wyatt, et al., 2018). Acculturation in this study was measured through two proxy variables: length of stay in the United States and level of English language proficiency which were coded as categorical variables. Additionally, I explored the association between the nominal categorical variable which was gender and the dependent variables which were SE and diabetes self-management. Mediator variables such as employment status and education attainment were adjusted in the study. Acculturation scores (length of stay in the United States and English language proficiency) along with diabetes management and SE levels were examined at baseline. Further, gender and its association with acculturation, diabetes self-management and diabetes self-efficacy levels along with mediators such as education attainment and employment status were measured in my study. By addressing these research questions, l clarified the influence of gender and acculturation levels on diabetes self-management and diabetes self-efficacy, and stimulated new conversations for culturally and linguistically tailored education among this vulnerable community.

Theoretical Foundation for the Study

Evidence indicates that theory can provide a framework within which health outcomes can be attributed through a burden of proof argument (Glanz, Rimer, & Viswanath, 2015***).*** Comparative population-based study in the United States shows the burden of diabetes to be higher in South Asians adults, 17% compared to 15% in Native

Americans/Alaskan natives, 13% in non-Hispanic blacks, 10% in Hispanic Latinos and 8% in non-Hispanic whites (Shah & Kanaya, 2014). Kanaya et al (2014) reported that South Asians had significantly higher age-adjusted prevalence of diabetes (23%) than other ethnic groups, 17% in Latinos, 18% in African Americans, 13% in Chinese Americans, and 6% in Whites. The study noted that the difference further increased after adjusting for potential confounders. Islam, Wyatt, et al. (2018) state that in New York City, South Asian immigrants are at a greater risk of hospitalization for diabetes than other immigrants. Additionally, the authors (Islam, Wyatt, et al., 2018) state that the analysis of 1.5 million New York City birth records registered between 1990 and 2001showed a high prevalence of diabetes (11.1%) in South Asian women which was the highest increase for gestational diabetes when compared to other groups. This health assessment is a clarion call to improve early access to quality health care in this disenfranchised population.

Islam, Wyatt, et al. (2018) and Zeng, Sun, Gary, Li, and Liu (2014) suggest a culturally appropriate theoretical model to guide type 2 diabetes self-management. The theoretical framework for the study was the application of the Health Belief Model **(**HBM). HBM provided a framework for examining perceptions and how to help change health behaviors underpinning a chronic illness such as diabetes (Glanz, Rimer & Viswanath, 2015). My study laid emphasis on healthy diet to modify ingrained perceptions and attitudes on normal weight by personalizing the association between overweight and diabetes to reduce the disproportionate burden of diabetes in this underserved community (Kuster & Villa, 2017). HBM guided the entire process in this

research for sustainability and reliability, and helped to determine similarities, and new insights gained from this study (Potschin-Young et al., 2018). Additionally, HBM helped to support the research questions and the hypothesis in the study and brought a deeper understanding of the relationship between the different variables such as the association between the independent variable, acculturation on the dependent variables, diabetes self-management and SE along with the role of gender on diabetes outcomes among New York's Bangladeshi immigrants.

The HBM is a psychological model that was first developed in the 1950s by Hochbaum, Rosenstock and Kegels to explain preventive health behaviors (Janz & Becker, 1984). The underlying concept of HBM is that health behaviors are determined by personal beliefs regarding illnesses and the strategies available to decrease their occurrence (Rosenstock, 1974). The theory was later revised to incorporate self-efficacy in the model (Rosenstock, Strecher, & Becker, 1988**)**. The HBM is based on six constructs: risk susceptibility, risk severity, benefits to action, barriers to action, self-efficacy, and cues to action (Janz & Becker, 1984). Cues to action are stimulants to take action, and self-efficacy refers to how confident a person is in executing the recommended action successfully. The theory posits that there can be an optimal behavior change if perceived barriers, benefits, self-efficacy, and threats to the target population are successfully targeted (Jones et al., 2015). Perceived barriers in the present study were diabetes-related comorbidities and unhealthy behaviors while perceived benefits were the reduction in AIC levels, weight loss, healthier behaviors, reduced hospitalization visits, and better health outcomes among the Bangladeshi community of

New York City. Risk perception is an important factor in self-care behaviors (Peek, Ferguson, Roberson & Chin, 2015), and perceived susceptibility and self-efficacy have been observed to have a positive effect on self-management (Dehghani-Tafti et al., 2015). When Bangladeshi immigrants believe that the recommended action of increased physical activity and improved nutrition intake can be protective factors in reducing their AIC levels, they will explore ways to eliminate or reduce barriers to the new lifestyle with culture and language-specific diabetes education, and consequently are more likely to achieve self-efficacy and go for regular screenings for early detection and better diabetes outcomes. Additionally, SE a construct of HBM is considered to be an important determinant of healthy behaviors, and helps to ensure adherence and success of educational programs with chronic illnesses such as diabetes (Dehghani-Taftiet et al., 2015; Romano & Scott, 2014; Shabibi et al., 2017; Subhi, Kendall, Shafaee, & Adawi, 2015). Further, the HBM has shown to be an efficient theoretical framework in education programs that are designed to enhance adherence to self-care behaviors in women (Karimy, Araban, Zareban, Taher, & Abedi, 2016).

Health behaviors and beliefs in diabetes self-management in the Bangladeshi community require attention toward not just observable overt behaviors but also underlying attitudes and belief systems which drive those behavioral patterns (Ro, 2014). A culture-specific and linguistically-appropriate curriculum can help facilitate the promotion of diabetes self-management and self-efficacy in this community that has systemic issues such as sedentary life style and navigating the complex health care system (Islam, Wyatt, et al., 2018). The triangulation of theory, evidence, and practice

can offer a concrete and systematic framework to help in understanding barriers and facilitators for better health outcomes in the target population (Ammerman, Smith & Calancie, 2014; Davidoff, Dixon-Woods, Leviton, Michie, 2015) and help in implementing culturally meaningful measures and care planning for effective diabetes care in this minority population (Wilkinson, Waqar, Sinclair & Randhawa, 2016). Therefore, the application of the HBM can help to optimize diabetes self-management and SE among New York City Bangladeshi immigrants (Islam et al., 2018).

Equally important for external validity is context and connectedness of the HBM, and incorporating mediators such as employment status and education attainment that influence behavior can bring more relevance and value to research (Davis, Campbell, Hildon, Hobbs & Michie, 2015). DM with effective knowledge and skills is important for self empowerment and enhancing health outcomes, especially in women (Kandula et al., 2016; Karasz et al., 2016). The quality of interaction between doctor and patient impacts self-management and health professionals need to acknowledge health beliefs, traditional customs, and norms to secure the trust and confidence of patients for effective diabetes management (Islam et al., 2018; Subhi et al., 2015). Community-based programs can explicitly address the social context in which behaviors occur and have the potential to modify norms and values to help generate collective impact and empowerment to produce a positive change in the social environment (Soler et al., 2016). The HBM model provided a theoretical causal pathway for improved health outcomes and reduced diabetes inequities among the Bangladeshi community of New York City.

Nature of the Study

To answer the research questions, the nature of the study was cross-sectional quantitative, and analyzed secondary data sources collected from the Diabetes Research, Education, and Action for Minorities (DREAM) intervention study dataset from CSAAH (2011-2016). The main focus of interest was acculturation and the characteristics of the participants at baseline in terms of their diabetes self-management and SE. In this study, I examined gender differences in terms of health behaviors, diabetes SE, and diabetes self-management outcomes among Bangladeshi immigrants living in New York City's urban setting. The research design in the study helped to advance the theoretical base and was relevant and representative of the target population (Martínez-Mesa, González-Chica, Duquia, Bonamigo & Bastos, 2016; Proctor et al., 2015). The quantitative focus helped to better understand the influence of acculturation on diabetes management and health outcomes, as well as the association between acculturation, nutrition, physical activity, and SE among the Bangladeshi immigrant community of New York City. The acculturation scores were developed from two commonly used proxies for acculturation: level of English language proficiency and duration of residence in the United States.

Literature Search Strategy

The literature search strategy involved primary sources such as peer-reviewed journals and research publications available through electronic databases. Search engines included Google Scholar, PubMed, Cinahl, and Medline. The scope of the search was on studies that were predominantly published between 2014 and 2018 with a few exceptions involving seminal literature, the application of theory, secondary sources, and census

statistics on Bangladeshis that were dated, since Bangladeshi immigrants are a relatively new phenomenon. Key search terms for the study were *diabetes, minorities, diabetes disparities*, *South Asians*, *Indians*, *Bangladeshis, acculturation, English as second Language*, *gender*, *glycemic control*, *culture and context*, *food behaviors*, *diabetes complications, diabetes management*, and *self-efficacy*. Literature regarding ethnicity, access to diabetes care, and cultural and linguistic competency from countries such as the United States, Canada, United Kingdom, Bangladesh, and India were referred to wherever appropriate in the study. Electronic search results were screened for duplication and relevance to the research questions. Participants who were recruited in the original study were those who self-identified as Bangladeshis residing in New York City, were between 21 and 75 years of age, and had been diagnosed with type 2 diabetes (A1C $\geq$ 6.5%), as verified by medical records (Islam, Wyatt, et al., 2018).

Literature Review

The purpose of the study was to examine the effect of acculturation in terms of length of stay in the United States and English language proficiency and the role of gender on diabetes self-management and SE among New York Bangladeshi immigrants. The following section provides a review of the current literature related to the present study constructs. It discusses previous research on the role of acculturation as well as gender in influencing diabetes self-management and diabetes SE. The topics presented are consistent with the study variables of diabetes, studies of race/ethnicity and acculturation.

Definitions of Acculturation: Anthropology to Psychology

Acculturation is a process that takes place both at an individual and societal level (Castro & Rudmin, 2017). It is a term used in anthropology and relates to the study of cultures and processes that transpire during cultural interactions when individuals or groups move from one sociocultural context to another (Leah, 2016). To better understand the acculturation construct, it is important to examine the anthropological literature on acculturation that goes back to the 1936 Memorandum by Redfield, Linton, and Herskovits (1936). Acculturation was defined by the authors as a phenomenon that results when groups of individuals from different cultures came into "continuous firsthand contact with subsequent changes in the original culture patterns of either or both groups" (Redfield, Linton, & Herskovits, 1936). This definition though unidimensional has provided a blueprint for research and is relevant to this day (Guarnaccia & Hausmann-Stabile, 2016). Additionally, Redfield, Linton and Herskovits (1936) defined three potential outcomes of the acculturation processes which were later echoed in the sociological and psychological literature (Guarnaccia & Hausmann-Stabile, 2016). These were acceptance of culture, behaviors, and inner values of the host community, which sociologists later labeled as assimilation, integration of new and original cultural features or conflicting elements, which came to be later known as hybridity or creolization, and, reaction to the new culture and a sense of pride in the older culture. As scholarly interest in acculturation increased with globalization and migration accelerating in 1990s of people from diverse backgrounds in new communities, and cultures (Schwartz, Unger, Zamboanga, & Szapocznik, 2010), it advanced the definition of acculturation to the

concepts of hybridity and bricolage which Redfield, Linton and Herskovits (1936) had defined as *integration*. However, this phenomenon did not occur at the same rate and same degree in all individuals (Berry, 1997; Cruz, Shore, Le Geros & Tavares, 2004).

As acculturation was adapted from anthropology to psychology, the construct underwent marked conceptual and operational changes (Fox, Thayer & Wadhwa, 2017). Earlier research had assumed that all individuals changed and maintained cultures, and the life course embraced pathways of acculturation that were categorical and essentially universal which had been the core components of Berry's model, namely, assimilation, integration, separation, or marginalization (Bornstein, 2017). Emerging literature has criticized the earlier definitions of acculturation and stated that the construct of acculturation is dynamic, complex, multidirectional, and multidimensional (Abraído-Lanza, Echeverría, & Flórez, 2016; Laroche, Kim, Hui, & Tomiuk, 2015; Ro, 2014). Fox, Thayer, and Wadhwa (2017) state that acculturation can be better understood by understanding the life trajectories, social interactions, events, and place of origin as the original environment could be influential in shaping the lifestyle behaviors of immigrants when they move to a host country. Gonzalez and Mendez-Pounds (2017) argue that acculturation is a balance between multiple identities in individuals, retaining religious and cultural traditions of the country of origin while integrating into the host culture.

O'Brien, Alos, Davey, Bueno, and Whitaker (2014) believe acculturation is an adjustment process that happens when two entities with different values came into direct contact with each other for an extended period. Additionally, acculturation is impacted by contexts such as socio-political climate and workplace and family environment (Ward &

Geeraert, 2016). This is consistent with the study by Bornstein (2017) who describes acculturation to be a subtle and differentiated process that is moderated by multiple factors where both individuals and their contexts impact the process and associated outcomes. The author highlights the Specificity Principle in acculturation which asserts that it is necessary to differentiate specific setting conditions for specific people at specific times and specific domains. Bornstein (2017) emphasized that this definition underscored the importance for researchers to consider contexts in which their participants were embedded. Allen et al. (2014) had also stated in their study the importance of contextual factors and their relationship with acculturation. Bornstein (2017) recommended a more nuanced approach to resolve inconsistencies and discrepancies in the acculturation literature to help tailor successful acculturation interventions and initiate more effective acculturation policies for immigrant communities.

A similar study by Ro (2014) states that inconsistencies will remain unless the definition of acculturation is non linear and multi dimensional and integrates contextual factors, environmental stressors, discrimination and disparities. Additionally, Ro (2014) attributed inconsistencies to inaccuracy in the array of acculturation scales and proxy measures. Further, the author argues that length of stay in the United States is not itself a causal health factor and situational contexts must be taken into consideration in which certain health risks appear for vulnerable communities. Ro's (2014) diverse conceptualization of acculturation encompasses a broader view of acculturation and heterogeneity in outcomes.

Acculturation and Health

Acculturation has been widely used as an important variable in research on health disparities among ethnic minorities (Fox, Thayer & Wadhwa, 2017). The transition in cultural changes can lead to coping behaviors and acculturative stress especially in racially and culturally diverse migrants which underscore the need to better understand adaptation strategies that impact the health of individuals and communities (Kuo, 2014; Ro, 2014). Both theory and evidence in earlier and more recent studies suggests that acculturation affects the health status of migrants (Abraído-Lanza, Echeverría & Flórez, 2016 ; Anderson et al., 2016; Berry, 1998; Chun et al., 2003; Organista et al., 2003; Lommel & Chen, 2016). Acculturation is a complex phenomenon that can cause conflict and stress within individuals and families because of the competing pressures of adopting new cultural norms and behaviors (Kuo, 2014; Ro, 2014). It is considered a health risk factor for immigrant populations and is linked to perceived discrimination, poverty, and loss of beliefs, and values which can lead to poorer health outcomes and low access to early care (Baldwin-White, Kiehne, Umaña-Taylor & Marsiglia, 2017; Berry & Hu, 2017; Castaneda et al., 2015). This suggests that there is a relationship between acculturation and selected health and behavioral outcomes among immigrant communities which can impact health outcomes (Allen et al., 2014; Hall & Cuellar, 2016; Okafor, Carter-Pokras & Zhan, 2014; Ro, 2014). Therefore, acculturation should be considered when predictors of diabetes in racial/ethnic groups are examined (Fialkowski et al., 2015).

Many studies that have examined the relationship between acculturation and health behaviors have found that it has been associated with overweight/obesity in different ethnic groups (Alidu & Grunfeld, 2018; Delavari, Sønderlund, Mellor, Mohebbi & Swinburn, 2015; Fialkowsk et al., 2015; Isasi et al., 2015; Lesser, Gasevic & Lear, 2014), Ro, 2014; Shah et al., 2015), yet there are inconsistencies in the literature on the relationship between acculturation and health outcomes (Abraído-Lanza, Echeverría & Flórez, 2016; Fox, Thayer & Wadhwa, 2017; Ro, 2014). Some studies have stated that the effects of acculturation can be beneficial to some health behaviors such as increased physical activity and increased help seeking behaviors for disease management but detrimental to others such as high body mass index (BMI), and decreased consumption of healthy foods (Abraído-Lanza, Echeverría & Flórez, 2016; Isasi et al., 2015; Kaplan et al., 2014; Larsen, Noble, Murray & Marcus, 2014; Lesser, Gasevic & Lear, 2014; Okafor, Carter-Pokras & Zhan, 2014; Stella et al., 2016).

Acculturation, Gender, and Self-Efficacy

Evidence indicates that gender plays a critical role in diabetes care, and men and women have different attitudes and orientations towards diabetes (Karasz et al., 2016). Reininger, Lee, Jennings, Evans and Vidoni (2017) noted a significant association between acculturation and gender in relation to the dietary patterns of Mexican Americans. The authors observed English-speaking Mexican American females to have a higher BMI and more likely to consume unhealthy foods and beverages than their Spanish-speaking counterparts who were less acculturated and had a higher Healthy Eating Index and healthier dietary patterns. Additionally, the findings revealed that

Mexican American men consumed unhealthy foods outside their homes. This study helps in understanding diabetes outcomes in a population that is in transition to the host culture in light of length of stay in the United States, English language proficiency, and gender. O'Brien, Shuman, Barrios, Alos and Whitaker (2014) recommend incorporating culture-specific health education that facilitate the adoption of healthy lifestyle behaviors in immigrant women, especially when food choices become affordable during the acculturation process.

Gender variations in the acculturation process may occur due to lifestyle differences or to the responses to social, economic and behavioral risk factors (Hilmers et al., 2016). A study by Mui, Bowie, Juon & Thorpe (2017) explored ethnic heterogeneity in Asians and other ethnic group living with type 2 diabetes in California. Poor health was reported higher among Vietnamese men compared to non-Hispanic Whites as well as diabetes rates were higher among Korean, Filipino, and other Asian Americans. Aoki, Yoon, Chong and Carroll (2014), and Leigh, Alvarez & Rodriguez (2016) explored gender differences among Asian adults and their studies found that Asian men were almost five times more likely than Asian women to have elevated LDL cholesterol and a higher prevalence of high BMI than their women counterparts Karasz et al. (2016) observed in their study that Bangladeshi American women were less acculturated than their male counterparts and increased acculturation was significantly associated with diabetes self-management and empowerment. These findings emphasize the need to investigate the dominant influence of contextual determinants and study Asian sub groups individually as well as stratified by gender. Islam, Wyatt et al. (2014) contend that

Bangladeshi women are more sensitive to illnesses, and more willing to seek health care. However, the traditional gender roles can become a hidden barrier to a woman's adherence to the diabetic regimen and result in a diminished positive attitude towards diabetes management compared to men **(**Baig, Benitez, Quinn & Burnet, 2015).

Chesla, Kwan, Chun, and Stryker (2014) stated that Chinese American women with type 2 diabetes are more vulnerable to diminished disease management opportunities and consequently suffer from poor diabetes outcomes than their male counterparts. The authors argue that gender differences intersect with factors such as immigrant status, ethnicity, and economic conditions in DM in first-generation Chinese American immigrants and argue that women benefit more from interventions. The study points to evidence-based gender differences that exist in diabetes self-management and underscores the need to design gender-specific tailored interventions that offer innovative opportunities to women to enhance their self management and SE. However, heterogeneous outcomes have been observed between gender and DM (Hassanein, Hassan, Abdrbo & Kazim, 2018). A study by Lemes Dos Santos, Dos Santos, Ferrari & Fonseca & Ferrari, (2014) showed that women had higher levels of DM than men while Islam, Chakrabarti, et al. (2014) stated that man had more knowledge about diabetes than women. On the other hand, a study by Bani (2015) revealed no gender differences in DM. This underscores the need to investigate the influences of gender on DM the New York Bangladeshi community.

Diabetes support from family members, especially from spouses is important for women in creating healthier social norms and expectations and empowering them with a

positive attitude (Chesla, Kwan, Chun & Stryker, 2014). This is echoed in the study by Karasz et al. (2016) who state that in South Asian cultures, social and family influences are an important consideration for disease management in women Kim, Kreps & Shin (2015) stress the importance of family structure, social networks and social support systems on disease management among immigrant communities that are confronted by cultural challenges. A study by Mansyur, Rustveld, Nash and Jibaja-Weiss (2016) indicates significant gender and language differences in Hispanic women and the authors recommend the involvement of the family to improve diabetes self-care in females to improve SE and diabetes health outcomes. Though prior studies have demonstrated that SE can help to improve self-management and diabetes outcomes (Karimy, Koohestani & Araban, 2018; Walker, Smalls, Hernandez-Tejada, Campbell & Egede, 2014; Wichit, Mnatzaganian, Courtney, Schulz & Johnson, 2016), and SE is a strong predictor of medication adherence, glycemic control and self management (Amer, Mohamed, Elbur, Abdelaziz & Elrayah, 2018, there has been a paucity of literature on the applicability of these findings in Bangladeshi and other South Asian women in the United States. My study expanded on literature and helped to understand the pathways that help bolster their self reliance, social support, and address health literacy issues.

Acculturation Measures: length of stay and English language and Health Outcomes

Acculturation measures such as speaking the mainstream language and length of stay in the host country may better explain disparities in health and access to early care for diabetes self-management and SE in this often understudied community. Castro and Rudmin (2017) argued that acculturation entails learning a second language and

Bornstein (2017) is of the opinion that immigrants who are proficient in the language of the culture of destination are more likely to fare better through the acculturation process. However, the level of acculturation for an individual goes beyond language use and preference which may not be constant across dimensions, and may differ across settings such as in home, work, and social environments (Abraído-Lanza, Echeverría & Flórez, 2016). A study on Chinese immigrants in United States by Zeng et al (2014) stated that those who were proficient in English language demonstrated higher levels of diabetes knowledge and self- management, and lower HbA1c levels than those who spoke Chinese and faced linguistic barriers and limited access to early care.

Acculturation, Ethnicity, and the Prevalence of Diabetes

While findings in literature have shown mixed results in acculturation studies of race/ethnicity and diabetes have consistently supported the conclusion that diabetes prevalence is higher for minority populations (Commodore-Mensah et al., 2016; Ferdinand & Nasser, 2015; Meng et al., 2016; Rodríguez & Campbell, 2017; Walker, Williams & Egede, 2016). However, research has found differing results depending on the immigrants' country of origin and the way acculturation is measured which may account for inconsistent results across and within studies (Perez et al., 2017). Vargas and Jurado (2016) observed that among Filipino Americans greater acculturation was associated with higher diabetes risk while Bertran et al. (2015) stated that among Arab Americans, the cultural traditions of food sharing, religious beliefs, and gender roles could impede DM.

Immigrants with diabetes and who are less acculturated are more likely to be disadvantaged in terms of access to care and health care providers while with greater acculturation enjoy better diabetes quality of life and more health seeking behaviors for DM (Lopez et al., 2016). Islam et al. (2018), Lesser, Gasevic and Lear (2014) and, Shah et al. (2015) observe that the association between the effects of acculturation with diabetes in the South Asian population have not been well studied and documented. This supports the need to study the relationship between the time spent in the United States and the prevalence of diabetes in minority communities (Commodore-Mensah et al., 2016).

Acculturation, Physical Activity, and Nutritional Behaviors

Acculturation influences health behaviors and has a direct effect on an individual's dietary choices (Allen et al., 2014) but not on physical activity which has been shown to increase with acculturation in Asians (Stella et al., 2016). Edwards & Sackett (2016) observed that males and females demonstrated differing levels of physical activity, and men had higher levels of physical activity, and self-efficacy compared to women and these differences could have health implications in women. There is a growing body of evidence that there may be significant heterogeneity in the association between acculturation, health behaviors, and chronic disease prevalence among ethnic groups due to differences in their social and cultural context, reasons for immigration, and connection to the country of origin (Abraído-Lanza, Echeverría & Flórez, 2016; O'Brien, Shuman, Barrios, Alos & Whitaker, 2014; Ro, 2014). Kanaya et al. (2014) stress the importance of acculturative influences on cultural beliefs and practices, and

their subsequent influence on health behaviors and chronic illnesses. This is important for tailoring health behavioral interventions and modifying nutritional behaviors in populations that are in transition to the host culture in light of English language proficiency and gender.

Greater acculturation has been associated with greater BMI in Hispanics especially of Mexican-origin. Reininger, Lee, Jennings, Evans and Vidoni (2017) observed that English-speaking Mexican American females had a higher BMI and were more likely to choose unhealthy eating patterns than Spanish-speaking females who were less acculturated and had a higher Healthy Eating Index. The findings indicate that females who are bilingual have healthier dietary patterns. Studies in Japanese and Chinese Americans have shown a more consistent relationship between acculturation and diabetes prevalence with a higher diabetes prevalence among Asians who were acculturated to a more Western lifestyle. A study by Khan, Jackson and Momen (2016) observed that South Asians who were more acculturated had a higher diet quality compared to those who were less acculturated. Therefore, in light of the heterogeneity in findings and mixed empirical evidence, it is of paramount importance to understand the complex and multiple pathways between acculturation, nativity, nutrition, and physical inactivity as well as culture and context among immigrants to produce better diabetes health outcomes (Ro, 2014).

Acculturation and Economic Circumstances

Acculturation and an individual's economic circumstances /employment status work in tandem to impact dietary choices (Allen et al., 2014). Abraído-Lanza, Echeverría

& Flórez, 2016; Ro, 2014) state that the socioeconomic, cultural, and personal factors affect health outcomes differently and economic indicators, such as income and employment and perceived opportunity are associated with mental and physical health. This is reinforced by O'Brien, Shuman, Barrios, Alos and Whitaker (2014) who explored the association between diabetes, gender, and acculturation among Hispanic women and found that improved economic conditions with acculturation led to increased consumption of unhealthy foods and beverages, sedentary lifestyle and changes in family roles and responsibilities. Allen et al. (2014) also state that low socioeconomic status, unemployment, and material hardship mediate the relationship between acculturation and dietary patters and underscore the need to promote healthy diets among low-income immigrant groups to reduce health disparities.

The aforementioned studies highlight the importance of gender-specific approaches in diabetes management in Asian communities and the role of family to address different attitudes and health behaviors towards diabetes (Gumber & Gumber, 2017; Harreiter, & Kautzky-Willer, 2018). Additionally, studies have shown that educational inequalities and low income can result in a significant decrease in diabetes care and self-management (Collier, Ghost, Hair & Waugh, 2014; Flatz et al., 2015; Grintsova, Maier & Mielck, 2014; Xu, Leung & Chau, 2018). By shifting the locus of control internally and empowering women to overcome barriers to optimal self-care can help reduce diabetes and gender disparities in minority health (Shawon et al., 2016; Tol, Alhani, Shojaeazadeh, Sharifirad & Moazam, 2015). The present study builds on the existing evidence on the impact of acculturation on minority health and as detailed from

the literature review aims to stimulate new conversations on New York City's Bangladeshi immigrants who are faced with a disproportionate burden of diabetes disparities and co morbidities.

Definitions

The acculturation variable was defined in this study using two commonly used proxies that are used for acculturation; length of stay in the United States, and English language proficiency (O'Brien, Alos, Davey, Bueno & Whitaker, 2014) to understand whether there was a positive, negative or neutral relationship between acculturation and diabetes self-management in the New York Bangladeshi community. The diabetes self management variable was assessed through the mean score of nine questions that were administered to the participants in the original study and were adapted from the Michigan Diabetes Knowledge Scale (Islam, Wyatt, et al., 2018). Diabetes SE variable was evaluated in the original study by using the mean scores of three scales to assess portion control, and self reported diet quality, while confidence in performing physical activity was adapted from a previous diabetes weight management study (Islam, Wyatt, et al., 2018). Additionally, self-management of diabetes was assessed in the original study with a medication adherence scale that was adapted from the Morisky Medication Adherence Scale (Islam, Wyatt, et al., 2018).

Gender plays a critical role in diabetes care, and men and women have different attitudes and orientations towards diabetes (Karasz et al., 2016; Kautzky-Willer, Harreiter & Pacini, 2016), and in this study I looked at gender (binary variable) and measured its impact on diabetes SE and diabetes self-management for improved diabetes strategies for

both sexes. Additionally, I looked at the mediating influence of the variables; education attainment (categorical variable) and employment status (dichotomous variable) since educational inequalities and low income can lead to a significant decrease in the quality of diabetes care and self-management (Flatz et al., 2015).

Assumptions

This was a cross-sectional quantitative study that analyzed the secondary dataset collected from DREAM intervention study from 2011- 2016 from the NYU Center for the Study of Asian American Health (CSAAH). The secondary dataset was assumed to be valid and reliable, and included all the needed variables that were significant to this study. Additionally, it was assumed that the participants answered the questionnaires honestly and their identities and responses were kept secure and confidential in the original study. It was important to recognize and acknowledge these assumptions in order to interpret findings in context and to ascribe credibility to the original study.

Scope and Delimitations

The scope of this study was limited to length of stay in the United States and proficiency in English in New York Bangladeshi immigrants living with diabetes. Acculturation (length of stay in the United States and English language proficiency) along with DM and SE levels were measured at baseline. Additionally, gender and its association with diabetes self-management and diabetes SE were measured at baseline in my study. The mediator variables such as education attainment and employment status were adjusted in this study for more rigor. The original study assessed self identified New York Bangladeshis for eligibility criteria between the ages of 21 and 75 and stratified

them by sex and age (≥50 or <50 years), (Islam, Wyatt, et al., 2018). Islam, Wyatt, et al. (2018) recruited 336 randomized patients from March 2011 through February 2016 from clinic and community settings.

The domain of my cross-sectional study was restricted to the impact of acculturation and gender on diabetes self-management and I did not look at the impact of culturally adapted diabetes education materials for the New York Bangladeshi community. The behavioral measures in the dataset were assessed through self-report which could have led to potential bias. Further, loss to follow up and incomplete follow-up data for some of the clinical outcomes in the original study could have compromised the validity and reliability of the measurements. The findings from this study can improve diabetes self-management and diabetes SE in this vulnerable community at micro, and macro levels for better diabetes outcomes and reduce health inequities. The original study had a total of 880 individuals; 11% did not meet the inclusion criteria, 12% declined to participate, while 27% did not participate for other reasons (Islam et al., 2018). In the end, the final number of participants in the original dataset were 336. Acculturation indicators through my study may better explain poor health outcomes and limited access to early care for diabetes self -management and self-efficacy in this often understudied community (Lopez & Gordon, 2014).

Significance

Evidence underscores the importance of acculturation when predictors of diabetes in racial and ethnic groups are examined (Abraído-Lanza, Echeverría & Flórez, 2016; Fialkowski et al., 2015; O'Brien, Shuman, Barrios, Alos & Whitaker, 2014) as it has been

associated with overweight and obesity among different ethnic groups. There is a lack of sufficient data on this subject in the New York Bangladeshi community. My cross-sectional quantitative study looked at diabetes self-management and SE in New York Bangladeshi immigrants who may have been at high risk of developing debilitating complications if the barriers to improved outcomes were not addressed effectively (Islam, Wyatt, et al., 2018).

Summary

The aim of this study was to examine and measure the impact of acculturation and gender through English language competence and length of stay in the United States in this target population, and its association with diabetes self-management and diabetes self-efficacy when controlling for mediators such as education attainment and employment status. With this study, I have filled the gap in literature on the importance of acculturative influences and their link to health behaviors in New York's Bangladeshi immigrants living with diabetes, thereby helping to promote improved care coordination and social support services at multi-level settings in this community and bridge the gap in health outcomes. The association between the effects of acculturation with diabetes in the South Asian population has not been well studied and documented (Islam, Wyatt, et al., 2018), and this study supported the need to study the relationship between the time spent in the United States and English language, and its association with gender, diabetes self-management, nutrition, physical activity, and self-efficacy in the New York Bangladeshi population.

Potential Social Change

Language and cultural barriers to early care, limited utilization of preventative services, and misinformation on the effectiveness of diabetes screenings play an important role as to the reason New York Bangladeshis receive late diagnosis of their health condition (Islam et al., 2018). Applying a theoretical framework, this study provided a better understanding of the causal pathways to optimize diabetes outcomes in this vulnerable community and to stimulate new frameworks for culturally tailored diabetes education to facilitate early access to care and fill the gap in literature. The findings from the study can help to improve the effectiveness of community based programs that explicitly address the social context in which behaviors occur and have the potential to modify norms and values to help generate collective impact and empowerment to produce a positive change in the social environment (Soler et al., 2016) at micro and macro levels (Islam, Wyatt, et al., 2015; Pérez-Escamilla et al., 2015).

Section 2: Research Design and Data Collection

Introduction

It is essential to understand the association between acculturation, nutrition, and physical inactivity among the New York City Bangladeshi community and how factors such as education attainment and socio-economic status can mediate the influence of acculturation on DM and subsequent health outcomes (Braveman & Gottlieb, 2014; Lagisetty et al., 2016; Shah, Vittinghoff, Kandula, Srivastava & Kanaya, 2015). The construct of acculturation has undergone conceptual and operational changes through the decades (Fox, Thayer & Wadhwa, 2017) from being unidimensional to nonlinear, dynamic, complex, multidirectional and multidimensional (Abraído-Lanza, Echeverría & Flórez, 2016 ; Laroche, Kim, Hui &. Tomiuk, 2015; Ro, 2014). The acculturation indicators may better explain poor health outcomes and limited access to early care for diabetes self -management and SE in this understudied community (Lopez & Gordon, 2014). The purpose of my study was to understand the relationship between acculturation, gender, SE, and the prevalence of diabetes among the New York City Bangladeshi community for a better understanding of the causal pathways to improve diabetes outcomes.

Research Design and Rationale

The nature of the study was quantitative and involved analyzing secondary data sources collected from DREAM intervention study dataset from between 2011 and 2016 from the NYU CSAAH). In quantitative research, designs can be descriptive, correlational, quasi experimental, or experimental (Creswell & Creswell, 2017).

Descriptive designs measure subjects only once whereas in experimental designs, subjects are measured before and after a treatment. The descriptive design establishes associations between variables of interest while the experimental design determines causality (Mitchell, 2015). The research design for this quantitative study was classified as descriptive and nonexperimental. It was a cross-sectional study since the data were collected at one point of time (Islam, Wyatt, et al., 2018). The study design numerically analyzed through statistical procedures the impact of acculturation and gender on diabetes self-management among Bangladeshi immigrants in New York City who were at high risk of developing complications if barriers to improved outcomes were not addressed effectively (Islam, Wyatt, et al., 2018). The study design was appropriate as it effectively answered the research questions for this study. The measurement of the variables acculturation, gender, diabetes management, and self-efficacy were taken at baseline and described levels of diabetes self-management and SE among this population. The design choice was consistent with the research designs and findings from the study could help to improve the effectiveness of community-based diabetes programs in this vulnerable community at micro and macro levels (Islam, Wyatt, et al., 2015; Pérez-Escamilla et al., 2015) and could lead to provider and community transformation and better diabetes outcomes (Lopez et al., 2017).

Methodology and Population

The Bangladeshi population in New York City totaled 77,000 in 2015 (Pew Research Center, 2017). A majority of Bangladeshi New Yorkers are foreign-born, face major social and economic challenges and significant health disparities (Trinh-Shevrin et

al., 2015) and 50% have limited English language proficiency (Islam et al., 2018). Additionally, the Bangladeshi community has a significantly higher insulin resistance and lower β-cell function compared to other ethnic groups (Anaya, 2014). A majority of this population has never been screened for diabetes, and consequently, women have the highest increase for gestational diabetes when compared to other groups (NYU CSAAH, 2018). There is a scarcity of literature on type 2 diabetes management and SE levels among the New York City Bangladeshi community, and the aim of my study was to investigate the relationship between acculturation through English language proficiency and time spent in the United States and their association with gender, diabetes self-management, and SE in this population. With this study, I hope I have filled a gap in literature by examining these variables and their relationship with health behaviors to promote improved diabetes care and reduce healthcare costs in this understudied community.

Sampling Procedures to collect data in secondary data materials

I signed a data sharing agreement with the CSAAH to gain access to the DREAM intervention study dataset (see Appendix A). The data were collected through surveys and questionnaires from 336 Bangladeshi participants living with diabetes, who in the sample represented the Bangladeshi community in New York City. The research questions looked at any associations between acculturation, gender, and diabetes self-management and SE among this population when controlling for mediators such as education attainment and employment status. Language and cultural barriers to early care play an important role as to the reasons why minority communities such as Bangladeshis

are unable to navigate the complexities of the healthcare system and enter the system late (Adepoju, Preston & Gonzales, 2015**).**

A quantitative cross-sectional design was selected because it was capable of measuring acculturative and gender influences on diabetes-related outcomes. A total of 880 self identified New York City Bangladeshis between the ages of 21 and 75 who had been diagnosed with type 2 diabetes with A1C $\geq$ 6.5%, as verified by their medical record were assessed for inclusion criteria in the original study (Islam, Wyatt, et al., 2018). Those who were excluded were individuals who had participated in a similar study earlier, were on renal dialysis, had a recent history of an acute medical problem or serious mental illness, or had long term plans of travel outside the United States (Islam, Wyatt, et al., 2018). Since my study used secondary data, all available cases meeting the inclusion criteria were analyzed, and therefore there was no need for an a priori power analysis.

After the completion of the study, a post hoc power analysis was conducted to confirm the adequacy of the study sample (see Figure 1). The time frame for the original study involved data from between 2011 and 2016. Multiple randomizations were conducted within each round of recruitment for a total of seven recruitment and intervention rounds (Islam, Wyatt, et al., 2018). Four trained bilingual Bangladeshi CHWs, two male and two female, delivered the intervention (Islam, Wyatt, et al., 2018). The original study involved getting consent from participants after completing a screening survey and were stratified by sex and age ($\geq$50 or $\leq$50 years) using IBM SPSS Statistics for Windows versions 21.0 and 22.0. All materials were delivered in Bengali

and held in clinical and community settings. The confidentiality and data property agreement to access the DREAM study dataset (2011-2016) for this study is located in Appendix B.

For an accurate evaluation of a study, it is important to understand the *p* value and confidence intervals. *P* values in research can determine whether a null hypothesis is to be accepted or rejected and if the findings are statistically noteworthy (Hirpara, Jain, Gupta & Dubey, 2015). For this study, *p* value, odds ratios (*OR*), and 95% confidence intervals were used to determine the statistical significance. *OR* presents strength of the association between risk factors and outcomes in research (Norton, Dowd & Maciejewski, 2018). A small *p* value signifies that the null hypothesis is less plausible (Hirpara, Jain, Gupta & Dubey, 2015). A 95% confidence interval can provide a test of the statistical hypotheses at the 5% level of significance denoted as alpha or α (Sedgwick, 2015). The level of significance of 0.05 (or 5%) was chosen for my study which meant that if the *p* value was less than this limit, the results would be significant, and if the null hypothesis was rejected, the alternative hypothesis was accepted. However, *p* values alone cannot determine the direction or size of the difference or the relative risk between different groups (Hirpara et al., 2015). Confidence intervals contain more information and provide information about a range in which the true value lies with a certain degree of probability, as well as the direction and strength of the demonstrated effect (Hirpara et al., 2015). My study used a 95% confidence level which is usually selected to indicate that the confidence interval covers the true value in 95 of 100 studies that are performed.

Additionally, confidence intervals provide upper and lower bounds of effects (Hirpara et al., 2015).

Instrumentation and Operationalization of Constructs

Evidence supports the conclusion that acculturation affects health in minorities (Fox et al., 2017), and it is important to look at acculturation from a multi dimensional and multi directional perspective (Ro, 2014). Appropriate assessment instruments and scales should be used for accuracy (Fox et al., 2017). Acculturation assessment instruments that inappropriately combine internality and externality may not be able to determine fully the mechanisms by which acculturation can impact health outcomes (Fox et al., 2017).

The variables; length of stay in the United States, English language Proficiency, Age, Education Attainment, Employment Status, Diabetes Self-Management and SE were defined as;

How well is English spoken: Categorical Variable (2 levels)

(1) Very Well, Well (2) Not Well or Not at All

Years lived in the US: Categorical Variable (2 levels)

(1) Below 13.1 Years (Mean) (2) Equal and Above 13.1 Years (Mean)

Age: Categorical Variable (3 levels)

(1) 18-44 (2) 45-54 (3) 55+

Employment Status (Mediator): Categorical Variable (2 levels)

1. Employed (full time, self employed, part time)
2. Unemployed (housewife, retired, unemployed, student)

Education Attainment (Mediator) Categorical Variable (3 levels)

(1). Less than High School (2). High School, Some College (3). College Graduate

Diabetes Self-Management and Diabetes SE: Binary Dependent Variables.

Plan to Provide Evidence for Reliability

Internal consistency reliability determines how well the items on a test that are proposed to measure the same construct produce similar results and consistent scores (Heale, & Twycross, 2015; Tang, Cui & Babenko, 2014). Reliability and validity are essential components in the critique of research and to ascertain whether the study findings can be implemented in similar populations (Heale, & Twycross, 2015). Therefore, it is important for measurements to be accurate and reliable in a well conducted quantitative study. Most errors occur in the measurement of scale variables which can impact the ability to find significant results and can damage the function of scores in good research (Mohajan, 2017). Methodological rigor is an essential element in research and can be achieved through measurement of reliability and validity to avoid any bias, reflexivity, assumptions and predispositions to ensure credibility in the study (Cypress, 2017). In my study, I took into account that the conclusion was drawn through an appropriate study design (cross sectional descriptive) and with a thorough analysis of the variables and objective interpretation of the findings. Additionally, my study looked if the changes in the independent variables (acculturation and gender) were responsible for the variation observed in the dependent variable (diabetes self-management and SE) and were not attributable to any other causes for a high degree of internal validity and for a strong evidence of causality (Cypress, 2017). Since this study used a secondary dataset,

issues of selection-maturation interaction and experimental mortality were addressed in the original study (Islam, Wyatt et al., 2018).

In their original study Islam, Wyatt, et al. (2018) established validity and reliability in their dataset with valid measures and test instruments. Diabetes knowledge was assessed with a questionnaire that was adapted from the Michigan Diabetes Knowledge Scale (Fitzgerald et al., 1998, as cited in Islam, Wyatt, et al., 2018). Self reported physical activity was assessed per the 2008 physical activity guidelines for Americans set by the United States Department of Health and Human Services. Islam, Wyatt, et al. (2018) referenced Bandura's guide for constructing SE scales for examining the confidence and barriers in participants in performing physical activity (Parajes & Urdan (Eds.), 2006, as cited in Islam, Wyatt, et al., 2018). Additionally, self-reported diet quality by using the mean scores of three scales to assess portion control and measures to determine confidence and barriers in maintaining a healthy diet was adapted from a previous diabetes weight management study (Nothwehr, Dennis, & Wu, 2007, as cited in Islam, Wyatt, et al., 2018). Further, self-management of diabetes was assessed with a medication adherence scale that was adapted from the Morisky Medication Adherence Scale (Morisky, Ang, Krousel-Wood & Ward, 2008, as cited in Islam et al., 2018). The Morisky Medication Adherence Scale is an assessment tool that measures medication adherence in patients and has been widely accepted in clinical settings and used in research studies for internal consistency (Chew, Hassan & Sherina, 2015; Janežič, Locatelli & Kos, 2017; Mohd, Phung, Sun & Monisky, 2016; Moon, Lee, Hwang, Hong & Morisky, 2017). It is extremely important to consider ethics in research studies to

ensure integrity, objectivity and appropriateness of methodological approaches (Mckenna & Gray, 2018). Additionally, ethical norms protect the rights of participants, animal care and use. Further, they promote accountability, and confidentiality and advocate social and moral responsibility in researchers (Mckenna & Gray, 2018). The authors of the original study, Islam, Wyatt, et al. (2018) ensured that their study was conducted with ethics and integrity. According to them, all participants gave written informed consent before they were enrolled in the study. Additionally, the authors, Islam, Wyatt, et al. (2018) obtained approval for Human subjects in 2011, and registered the trial at ClinicalTrials.gov (identifier: NCT02041598).

Data Analysis Plan

My cross-sectional quantitative study measured the association between Acculturation: English language and length of stay in the United States and its impact on gender, diabetes self-management, and SE in New York Bangladeshis. The data were entered into SPSS Statistics, v 25.0. The data were cleaned by removing irrelevant values in categorical and continuous variables and to label the clean variables. In this study, very little data manipulation was conducted since the variables of interest had the required values to test the target population.

RQ1: What is the relationship between acculturation and diabetes self-management and diabetes SE in New York Bangladeshis?

Null hypothesis: There is no relationship between acculturation and diabetes self-management and diabetes SE in New York Bangladeshis.

Alternative hypothesis: There is a relationship between acculturation and diabetes self-management and diabetes SE in New York Bangladeshis.

RQ2: What relationship exists between gender and diabetes self-management and diabetes SE among New York Bangladeshis when controlling for mediators such as education attainment and employment status?

Null hypothesis: No relationship exists between gender and diabetes self-management and diabetes SE among New York Bangladeshis when controlling for mediators such as education attainment and employment status.

Alternative hypothesis: A relationship exists between gender and diabetes self-management and diabetes SE among New York Bangladeshis when controlling for mediators such as education attainment and employment status.

Once the data were cleaned and coded, the next step was to calculate descriptive Statistics to understand the distribution of the dataset that was being studied and to describe the variables for inclusion in the study (Boslaugh, 2018). The three main types of descriptive Statistics are frequencies, measures of central tendency, also called averages, and measures of variability. Frequency statistics count the number of times that each variable occurs in the sample. Measures of central tendency give one number that represents the entire set of scores, such as the mean while measures of variability indicate the degree to which scores differ around the average. Frequency distributions in the sample provided the proportion of participants in each group in the categorical variable English (BL_A2a_ cat) and nominal variable Gender (BL_D1) as to whether the observations were high or low and if they were concentrated in one area or spread out

across the entire scale. The tables highlighted which was the most frequently occurring answer for the variable**.** Chi Square test examined if there was a significant association between the variables to test the hypothesis. Chi -square test provided evidence whether acculturation had an association with diabetes self-management and SE, and answered the RQ1.

A confounding variable, also known as a third variable or a mediator, can influence both the independent variable and dependent variable, and failing to control for such variables can lead to incorrect analysis of the results If these variables are not adjusted and controlled in this study, the results may show a false correlation between the dependent and independent variables which can threaten the internal validity and lead to an incorrect rejection of the null hypothesis. In this study, the mediator variables were education attainment and employment status that could cause mediation in the relationship (Katikireddi, Niedzwiedz & Popham, 2016), and therefore were controlled through logistic regression enabling my study to be more accurate and functional (Namazia & Namazib, 2016).

In SPSS, control variables were examined through logistic regression. Odds Ratio and 95% confidence interval were utilized to determine the statistical significance. Odds Ratio is a measure of association between an exposure and an outcome, and represents the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure (Norton, Dowd & Maciejewski, 2018). Additionally, Odds Ratio presents strength of the association between risk factors and outcomes in research (Norton, Dowd & Maciejewski, 2018). Further, 95%

confidence interval can provide a test of the statistical hypotheses at the 5% level of significance denoted as alpha or α, (Sedgwick, 2015). Thus, the alpha level was 0.5 or 5 %. Odds Ratio helped in answering the RQ2 and estimated the association between gender and diabetes self-management and SE. It determined the direction and strength of the relationship between gender, diabetes self-management and diabetes SE. Binary logistic regression model was used to analyze the dataset and determined the relationship between the dependent binary variables (diabetes self-management and SE) and independent variables acculturation and gender for two possible outcomes.

Threats to External and Internal Validity

The study used secondary data collected from Diabetes, Research, Education, and Action for Minorities (DREAM) intervention study dataset (2011-2016) from the NYU CSAAH. Validity refers to the credibility or believability of the research. There are two aspects of validity: Internal Validity and External Validity**.** For research data to be of value, it must be both reliable and valid and have internal validity which means it is free from all kinds of bias such as in bias in attrition, performance and the selection of the participants (Andrade, 2018). Additionally, it is of paramount importance to apply the right procedures to measure accurately the outcomes in a study for internal validity. The findings in my study were statistically tested to determine if any differences were due to chance alone. Further, internal validity was assessed with the research design and appropriate statistical analysis determined the association between the variables of interest, namely, acculturation and gender and diabetes self-management and SE. The

findings were conducted with rigor with the use of appropriate methodology, and were consistent in order to be reproducible for external validity (Andrade, 2018).

Ethical Procedures

Ethical norms and procedures in a study bring accountability, objectivity, integrity and help to garner public support for the research issue (McKenna, 2018). Additionally, ethical procedures, help to minimize harm and risks, maximize benefits, protect human dignity and privacy, and provide special precautions for vulnerable communities (McKenna, 2018; Yip, Han & Sng, 2016). Further, ethical norms distribute the benefits and burdens of research in a just and fair manner (McKenna, 2018). The original study was in compliance with the ethical procedures. The original study received written informed consent from all the participants before enrollment, and obtained the approval for human subjects approval and registered the trial at ClinicalTrials.gov (identifier: NCT02041598), (Islam et al., 2018). Additionally, no potential conflicts of interest and deviations from ethical conduct were reported in the original study. In order to gain access to the dataset, a data sharing agreement was signed with CSAAH which was included in the appendix section**.** The data were kept safe and confidential in my personal computer at all stages of my study. Further, my doctoral study was in compliance with Walden University's ethical standards as well as with United States federal regulations, and IRB approval was obtained for my research. The IRB approval number for this study was 02-06-19-0662195.

Summary

My quantitative cross-sectional study helped to accurately measure acculturative

and gender influences on diabetes related outcomes in New York Bangladeshis and ensured that the findings were valid and replicable. The study used appropriate methods and scientific rigor to prevent threats to validity, reliability, and internal consistency. A well designed data analysis plan helped in understanding the distribution of the dataset that was being studied and the variables for inclusion. Additionally, the mediator variables, education attainment and employment status were controlled in order for my study to be more accurate and functional. Further, *P* value of 0.05, 95% confidence interval, and alpha level of 0.5, or 5%. determined the statistical significance in the findings, and answered the research questions to reject or accept the null hypothesis. The findings from this study can help to build on the existing evidence on the impact of acculturation on minority health to facilitate social change. Additionally, my study can offer a unique insight into how diabetes can be effectively managed in the high risk New York Bangladeshi population with a better understanding of their acculturation process, and the significance of gender in self-management and SE for improved diabetes outcomes.

Section 3: Presentation of the Results and Findings

Introduction

South Asian immigrants are at a greater risk of hospitalization for diabetes than other immigrant populations in New York City (Islam et al., 2018). Additionally, this population has a higher prevalence of debilitating complications and a higher mortality rate compared to other ethnic groups (Shah & Kanaya, 2014). Further, cultural and linguistic barriers, limited utilization of preventative services, and misinformation regarding effectiveness of diabetes screenings lead to limited access to early diabetes care (Adepoju et al., 2015). These health disparities in the targeted community are a call to action for early intervention to reduce comorbidities and frequent hospitalizations, and lower healthcare costs (Peek, Ferguson, Bergeron, Maltby & Chin, 2014). Ro (2014) argued that length of stay has an impact on immigrant health, and literature has shown heterogeneity in health outcomes with duration patterns in Asian immigrants. The purpose of my quantitative study was to examine the impact of acculturation through length of stay in the United States and English language proficiency as well as the role of gender as predictors of SE and diabetes self-management among Bangladeshi immigrants living in New York City.

The first research question in my study was to investigate the relationship between acculturation and diabetes self-management and diabetes SE among New York Bangladeshis. RQ2 focused on the relationship between gender and diabetes self-management and diabetes SE among New York Bangladeshis while considering the effect of mediating risk factors such as education attainment and employment status. The

subsequent sections of this chapter include parameters involved in the selection and recruitment of participants in the original study, modifications of the data analysis plan, and the relationship between the independent and dependent variables to answer the research questions. The results for my study were analyzed using descriptive statistics as well as bivariate and regression analyses. Additionally, data that corresponded to the research questions were presented in tables.

Data Collection and Modifications in the Secondary Data Set

The time frame for the original study was 2011 through 2016. A total of 880 self identified New York Bangladeshis between the ages of 21 and 75 who had been diagnosed with type 2 diabetes with A1C $\geq$ 6.5%, as verified by their medical records were assessed for inclusion criteria in the original study. The actual number of participants was 336 and the sample represented the entire New York Bangladeshi community (Islam et al., 2018). Multiple randomizations were conducted within each round of recruitment for a total of seven recruitment and intervention rounds (Islam et al., 2018). The participants completed a screening survey and were stratified by sex and age ($\geq$50 or $\leq$50 years) using IBM SPSS Statistics for Windows versions 21.0 and 22.

As stated in the data analysis plan in Section 2, the data were cleaned for skipped and missing values for the variables of interest in this study. Some changes were made to the original data analysis plan in Section 2. To avoid duplicated analyses, RQ1 was revised to investigate the bivariate relationship between acculturation and DM without using the mediators education attainment and employment status. Instead, regression analysis was used for RQ2 in which all the control variables were included. Since the co-

variate age variable had too many levels with only a few cases in some of them, new nominal variable for age was created, years in US levels, with two levels: below 13.1 mean years in the US and equal and above 13.1 mean years in the US. There were 12 items in the (DM) variable in the original dataset which were repetitive in some places. To ensure the quality and validity of the variables for my analysis, I selected (in agreement with my supervisory committee) the sub questions in DM5 which were more appropriate for my research questions on DM. They were the following;

DM5 # 1. How do you manage your diabetes? Medication/Insulin

DM5 # 2. How do you manage your diabetes? Physical Activity

DM5 # 3. How do you manage your diabetes? Diet Control

DM4 # 4. How do you manage your diabetes? Traditional Practices

DM5 # 5. How do you manage your diabetes? No Management

The scores of the five subsections of DM5 (medication, physical activity, diet control and traditional practice, no management) were added to have a cumulative score of DM. In order to interpret my results more meaningfully, this new scale variable was transformed into a binary one (DM5 levels) with two levels, low and high level of DM.

The dataset had four self-efficacy (SE) questions:

SE 1. How often do you have to make your own health-related decisions?

SE 2. Do you feel comfortable asking your doctor about questions or health issues you don’t understand or know?

SE 3. Do you feel comfortable going to the doctor alone?

SE 4. Do you know where to get medical attention?

In order to facilitate the interpretation of the findings, the four questions were added to have a cumulative score and the composite SE variable was transformed into a binary variable with two levels, low and high level of SE.

To ensure validity and reliability of the results, and decrease the probability of type II errors, I conducted a post hoc power analysis of the obtained sample by using as effect size the significant regression *OR* for gender from RQ2 (.212) with G*Power Calculator. The output parameters showed a critical *z* value of -1.6448536 and the statistical power to be (1 − β err prob) 0.9954016 which meant that the null hypotheses was rejected.

Results of the Study

Descriptive Statistics

My analysis was conducted in three phases: descriptive statistics, bivariate (chi-square), and regression analysis. Descriptive statistics that appropriately characterized the participants' characteristics in the sample were run to understand the distribution of the dataset and describe frequencies). Tables 1 to 6 summarize demographic characteristics of the New York City Bangladeshi population. Participants who were proficient in English were 43.7% in my study, while those who did not speak English or spoke very little were 56.3% (see Table 1). Those who had lived 13.1 mean years or less in the US constituted 52.1% of the total population while 47.9% of the participants had been in the US for 13.1 mean years or more (see Table 2). Bangladeshi men comprised 59.8% in my study while women constituted 40.2% (see Table 3). Socioeconomic data showed college graduates to be at 32.8% (see Table 4) and 59.1% of participants as unemployed (see

Table 5). Fifty-two percent of the total participants were over 55 years of age (see Table 6).

Table 1

Acculturation Variable 1English Language Proficiency in Participants in the New York Bangladeshi Population study (N = 336)

		Frequency	Percent
Valid	Very Well/well	145	43.7
	Not well Or Not at All	187	56.3
	Total	332	100.0
Missing	Skipped	3	
	System	1	
	Total	4	
Total		336	

Table 2

Acculturation Variable 2: Length of stay in the United States in Participants in the New York Bangladeshi Population study (N = 336)

		Frequency	Percent
Valid	Below 13.1 Years (Mean)	174	52.1
	Equal and Above 13.1 Years (Mean)	160	47.9
	Total	334	100.0
Missing	System	2	
Total		336	

Table 3

Gender of Participants in the New York Bangladeshi Population study (N = 336)

		Frequency	Percent
Valid	Female	135	40.2
	Male	201	59.8
	Total	336	100.0

Table 4

Education Attainment in Participants in the New York Bangladeshi Population study (N = 336)

		Frequency	Percent
Valid	Less than High School	96	29.2
	High School/Some college	125	38.0
	College graduate	108	32.8
	Total	329	100.0
Missing	Skipped	7	
Total		336	

Table 5

Employment Status in Participants in the New York Bangladeshi Population Study (N=33

		Frequency	Percent
Valid	Employed (Full-time, Self-employed, or Part-time)	137	40.9
	Unemployed (Housewife, Retired, Unemployed, or Student)	198	59.1

	Total	335	100.0
Missing	Skipped	1	
Total		336	
			100.0

Table 6

Age Categories of Participants in the New York Bangladeshi Population Study N = 336)

		Frequency	Percent
Valid	18-44	60	18.2
	45-54	88	26.7
	55+	182	55.2
	Total	330	100.0
Missing	Skipped	6	1.8
Total		336	100.0

Chi Square test for independence was performed to test the statistical significance of the relationship of independent variables (IV), Acculturation #1, How well do you speak English) and Acculturation #2, Years lived in the US below, above 13.1 years (mean) with SE (Tables 7 and 8) and DM variables (see Tables 9 and 10). One of the assumptions in this test is that the observations are always assumed to be independent of each other. The chi square statistic determined whether or not a relationship existed between the two categorical variables. The bivariate analysis helped to gain a deeper insight into the association between these variables and answer unambiguously RQ1 in my study.

Table 7

Cross-tabulation and Ch-Square analysis: Acculturation # 1. How well do you speak English vs. SE) N = 336

			Self-Efficacy levels		
			Low level of Self Efficacy	High level of Self Efficacy	Total
How well do you speak English?	Very Well/well	N	13	98	111
		% within How well do you speak English?	11.7%	88.3%	100.0%
	Not well Or Not at All	N	63	92	155
		% within How well do you speak English?	40.6%	59.4%	100.0%
Total		N	76	190	266
		% within How well do you speak English? Recoded	28.6%	71.4%	100.0%
χ^2=26.532, p<0.0001; φ=-.316					

Table 8

Cross-tabulation and Ch-Square analysis: Acculturation# 2. Years in US levels vs. SE levels (N = 336).

			SE Levels		
			Low level of Self Efficacy	High level of Self Efficacy	Total
Years in US Levels	Below 13.1 Years (Mean)	N	52	92	144
		% within Years in US Levels	36.1%	63.9%	100.0%
	Equal and Above 13.1 Years (Mean)	N	25	98	123
		% within Years in US Levels	20.3%	79.7%	100.0%
Total		N	77	190	267
		% within Years in US Levels	28.8%	71.2%	100.0%
χ^2=8.055, p< .005, φ= .174					

Table 9

Cross-tabulation and Ch-Square analysis Acculturation# 1. How well do you speak English vs. DM5 score levels (N = 336)

			DM5_Score_Levels		
			Low_Level_ of_DM	High_Level_ of_DM	Total
How well do you speak English? recoded	Very Well/well	N	27	84	111
		% within How well do you speak English? Recoded	24.3%	75.7%	100.0%
	Not well Or Not at All	N	40	118	158
		% within How well do you speak English?	25.3%	74.7%	100.0%
Total		N	67	202	269
		% within How well do you speak English?	24.9%	75.1%	100.0%
χ^2=.034, $p \geq$.853; φ= -.011					

Table 10

Cross-tabulation and Ch-Square analysis: Acculturation# 2. Years in US levels vs. DM score levels (N = 336).

			DM5 Score_Levels		
			Low_Level_ of DM	High_Level of_DM	Total
Years in US Levels	Below 13.1 Years (Mean)	N	37	110	147
		% within Years in US Levels	25.2%	74.8%	100.0%
	Equal and Above 13.1 Years (Mean)	N	32	91	123
		% within Years in US Levels	26.0%	74.0%	100.0%
Total		N	69	201	270
		% within Years in US Levels	25.6%	74.4%	100.0%
χ^2= .025, $p \leq$.874, φ= -.010					

Results by Research Question

RQ1 was answered by the Chi Square test for independence to determine if there was an association between Acculturation and SE and DM levels. The statistical significance for Acculturation 1 "How well do you speak English" vs. SE was $p \leq .0001$ and Acculturation 2 "Years in US levels" vs. SE levels was $p \leq .005$, respectively. This indicated that there was a significant association between Acculturation and SE levels and illustrated evidence against null hypothesis. However, there was no statistical significance observed for Acculturation 1. "How well do you speak English" vs. DM ($p \leq .853$) and Acculturation 2. "Years in US levels" vs. DM levels ($p \geq .874$) which indicated that the null hypothesis was accepted for this part of RQ1.

For RQ2 two binomial regressions were conducted, one for DM levels and the second for SE levels to predict the probability that an observation fell into one of two categories of the dependent variable (DV) that was measured on a dichotomous scale, low or high SE and DM. In the first regression analysis (see Table 11), the DV was SE levels and the covariates; independent variable (IV) were Acculturation 1 (years in US, below; above 13.1 years), Acculturation 2 (speaking English, two levels) gender, educational attainment (mediator), and employment status (mediator). *CI* was set at 95% and the *P*-value at .005.

Table 11

Binomial Regression Analysis for SE Levels(Dependent variable) N= 336)

							95% C.I. for OR	
	B	S.E.	Wald	df	P	OR	Lower	Upper
<13. 1 Years in US	-.360	.352	1.048	1	.306	.697	.350	1.390
Speaking English Very Well/Well	.779	.447	3.037	1	.081	2.179	.907	5.230
Female	-1.553	.388	16.030	1	.000	.212	.099	.453km
Education			5.143	2	.076			
Less Than High School	-1.129	.575	3.855	1	.050	.323	.105	.998
High School/Some college	-.401	.523	.589	1	.443	.670	.240	1.866
Unemployed	-.161	.440	.133	1	.715	.852	.359	2.019
Constant	2.479	.627	15.617	1	.000	11.929		

The model for binomial regression analysis for SE levels (DV) correctly classified 81.1% of the cases in the classification table. Nagelkerke R^2 value explained 35% of the variance in SE levels. Additionally, the Hosmer-Lemeshow (HL) goodness of fit test that is based on dividing the sample up according to their predicted probabilities assessed goodness of fit in the binary regression analysis. The HL *p*-value for a chi-squared statistic of 10.723 with df = 7 was $p \leq .151$ which showed that it was a good fit. Binary Regression analysis showed a significant relationship between the gender variable and SE

levels ($p \leq .0001$). Women compared to men had 79 % less odds of having high SE levels (*OR*= .212; 95% *CI*: .099-.453). Further, there was a significant relationship between mediator of low education attainment variable and SE levels. More specifically, those who had less than high school education were 68% less likely to have high SE levels compared to college graduates (*OR*= .323, 95% *CI*: .105-.998). Thus, the null hypothesis for this part of RQ2 was rejected.

The second binominal regression analysis was conducted on dependent variable, DM levels (see Table 12). The covariates (IV) were Acculturation 1. (years in US, below, above 13.1 years), Acculturation 2. (speaking English, two levels) gender, educational attainment (mediator) and employment status (mediator).

Table 12.

Binominal Regression Analysis for Diabetes Management Levels(Dependent variable)

N=336

							95% C.I. for OR	
	B	S.E.	Wald	df	p	OR	Lower	Upper
<13. 1 Years in US	.073	.310	.055	1	.814	1.076	.586	1.975
Speaking English Very Well/Well	-.276	.372	.552	1	.458	.758	.366	1.573
Female	-.454	.355	1.632	1	.201	.635	.317	1.274
Education			1.075	2	.584			
Less Than High School	-.480	.485	.979	1	.322	.619	.239	1.601

High School/Some college	-.353	.397	.790	1	.374	.703	.323	1.530
Unemployed	-.094	.368	.065	1	.798	.910	.442	1.873
Constant	1.722	.493	12.202	1	.000	5.598		

The model correctly classified 74.8 % of the cases and Nagelkerke R^2 value explained 31% of the variance in DM levels. The HL goodness of fit test showed the *p*-value for a chi-squared statistic of 13.547 with df = 7 to be p ≤.060 which showed that the test was a moderate fit. There were no significant results for DM as a dependent variable in the regression analysis (*p* ≤.201; *OR*= .635; 95% *CI*: .317 -1.274), and the null hypothesis was accepted for this part of RQ2.

Summary

Research questions for my study were answered through statistical tests to help accept or reject the null hypotheses. According to regression analysis a significant relationship between gender and SE levels, *p* ≤ .0001 was found. Women compared to men had 79% less odds of having high SE levels (*OR*= .212, 95%*CI*: .099-.453). Additionally, there was a significant relationship between mediator of low education attainment variable and SE levels. Those who had less than high school education were 68% less likely to have high SE levels compared to college graduates (*OR*= .323; 95% *CI*: .105-.998.) Thus, the null hypothesis for the part of RQ 2 that there is no relationship between gender and SE levels was rejected. However, regression analysis did not reveal

any significant results for DM as DV. Therefore, the null hypothesis that there is no relationship between gender and DM levels was accepted for this part of RQ2.

Section 4: Implications for Social Change

Introduction

The purpose of my quantitative study was to examine the effects of acculturation through length of stay in the United States and English language proficiency, as well as explore the role of gender on diabetes SE and diabetes self-management among Bangladeshi immigrants living in New York City. My study applied a theoretical framework to get a better understanding of the causal pathways to optimize diabetes outcomes and SE levels, and get a deeper understanding of the multiple influences on behavior choices in order to reduce the disproportionate burden of diabetes inequities in this disenfranchised community. The key findings showed significant results for RQ1 and revealed an association between acculturation and SE levels. Additionally, the findings for RQ2 showed a significant relationship between gender and SE levels ($p \leq .0001$). Women compared to men had 79% less odds of having high SE levels (*OR*= .212; 95% *CI*: .099-.453). SE is related to making one's health-related decisions, asking a doctor about health issues that are difficult to understand, or going unaccompanied to a healthcare provider. My findings revealed a significant relationship between mediators of low education attainment and SE levels. Those who had less than high school education were 68% less likely to have high SE levels compared to college graduates (*OR*= .323, 95% *CI*: .105-.998). The findings show that Bangladeshi immigrants do not differ from the norm that higher education leads to higher SE levels (Flatz et al., 2015), and men tend to have higher SE levels compared to women (Edwards & Sackett, 2016. Further, my findings revealed that there is a significant association between acculturation

and SE levels. Hence, the null hypotheses that there was no relationship between gender and SE as well as between Acculturation and SE were both rejected. However, the results were mixed since my study did not find any significant results for DM as a dependent variable, and the null hypothesis that there was no relationship between gender and DM levels as well as between acculturation and DM was accepted.

Interpretations of the Findings

In my study, both gender and acculturation were found to be significant predictors of SE levels among New York Bangladeshis. The findings in my study confirm what has been demonstrated in peer reviewed literature that males tend to have higher SE levels compared to women (Chesla, Kwan, Chun & Stryker, 2014). Previous studies have shown that acculturation is multi dimensional and multi directional (Ro, 2014) and has an impact on health in minorities (Fox, Thayer & Wadhwa, 2017**)**. I found in my study that low SE levels in Bangladeshi women were significantly linked with acculturation. My study did not find any significant association between acculturation and diabetes management which is consistent with the previous body of literature that has shown mixed results regarding acculturation in ethnic populations. Perez et al. (2017) state that acculturation is a complex phenomenon and the association between acculturation, physical activity, and health behaviors remains unclear and inconsistent depending on the immigrants' country of origin and the way acculturation is measured. Moreover, heterogeneity in the association between acculturation, health behaviors, and chronic diseases such as diabetes among ethnic populations can be attributed to the differences in the social and cultural context, reasons for immigration, and connection to the country of

origin (Ro, 2014). The results from my study on acculturation and diabetes management confirm the findings from earlier research. Additionally, my study revealed no significant relationship between gender and diabetes management. This was in agreement with previous research that has shown heterogeneous outcomes between gender and DM (Hassanein, Hassan, Abdrbo & Kazim, 2018). Lemes Dos Santos, Dos Santos, Ferrari, Fonseca and Ferrari, (2014) observed that women had higher levels of DM than men, while Islam, Chakrabarti et al. (2014) stated that men had more knowledge about DM than women, and Bani (2015) found no gender differences regarding the level of knowledge in DM.

My findings regarding the New York Bangladeshi community support earlier research that has shown that men and women have different attitudes and orientations towards diabetes (Karasz et al., 2016), and gender variations in the acculturation process could be attributed to lifestyle differences (Hilmers et al., 2016). Additionally, my study like previous research states that traditional gender roles can become hidden barriers and can result in a diminished positive attitude towards diabetes management and self-efficacy compared to men (Baig, Benitez, Quinn & Burnet, 2015). Evidence has proven that men and women have different attitudes and orientations towards diabetes (Karasz et al., 2016), and gender variations in the acculturation process could be attributed to lifestyle differences (Hilmers et al., 2016). Further, research has indicated that traditional gender roles can become hidden barriers that can result in diminished positive attitudes towards DM and SE compared to men **(**Baig et al. 2015). My gender-specific study was consistent with earlier findings by Edwards and Sackett (2016) and showed Bangladeshi

women whose median age in the study was 52 to have 68% lower SE levels than Bangladeshi men. Additionally, my study confirmed the findings in literature that low SE levels can lead to poor diabetes outcomes (Posthumus, Schölmerich, Steegers, Kawachi & Denktas, 2015). I found in my study that Bangladeshi women with low SE were not comfortable going unaccompanied to the doctor, asking about pertinent health issues, did not know where to get medical attention, and found it a challenge to make health-related decisions. These factors contribute to disadvantages Bangladeshi women face when making a late entry into care in the United States which results in poor diabetes outcomes.

Research has indicated that educational inequalities and low income can lead to a significant decrease in diabetes care and self-management (Collier et al., 2014). My study offered support to earlier research and showed that low education attainment was significantly related to low SE levels in Bangladeshi women. These results are indicative of gender and health inequities and can lead to poor diabetes outcomes and unnecessary healthcare costs. Prior research has demonstrated that SE can help to improve diabetes outcomes (Karimy et al., 2018), and is an important determinant of medication adherence, glycemic control, and self care behaviors (Amer et al., 2018). The results of my study were linked to the thematic structure of the HBM whose basic tenet is when individuals perceive the severity of their illness, they are motivated in obtaining perceived benefits through lifestyle changes and enhanced SE. SE is one of the most important constructs of the HBM and high SE levels have been reported to have a positive correlation with diabetes self-management behaviors with the application of this

theory (Subhi et al., 2015). Karimy et al. (2016) state that the HBM is an efficient framework and lay emphasis on SE in the implementation of diabetes health education strategies through the HBM to promote adherence to self-care behaviors in women. My study was in line with previous research and diabetes health education through HBM can influence sustainable self-care behaviors.

Limitations of the Study

My cross-sectional study examined the relationship between acculturation and gender on diabetes self-management and SE among New York Bangladeshis. It was confined to baseline measurements of acculturation, gender, SE, and DM. The study did not investigate the impact of culturally-adapted gender-specific diabetes education materials for enhanced SE to help manage food behaviors, physical exercise, and medication for early detection and improved self-care diabetes outcomes in this community. Another limitation in the study was that the behavioral measures in the original dataset were assessed through self-reporting, and incomplete follow up data could have affected the measurements (Islam et al., 2018). More research is warranted to explore the association between self-efficacy, family participation, social support, and diabetes self-management among Bangladeshi women in New York City while taking into consideration their health beliefs, traditional customs, norms, and lifestyle trajectories.

Recommendations

The financial drain of treating diabetes and comorbidities in the United States necessitates the need to lay an increased emphasis on prevention strategies.

Based on the findings of my study that explored gender-specific SE and DM among New York Bangladeshi, future research should address and enhance diabetes SE and bolster self reliance for improved outcomes in Bangladeshi women so that they can live healthier and more productive lives. Additionally, the application of an appropriate theoretical framework is recommended to assess the effectiveness of patient-centric, gender-specific approach for enhancing SE to optimize diabetes outcomes at multiple levels of influence to reduce inequities in this population. I helped to extend knowledge in the discipline with the use of a theoretical framework, the HBM which stipulates that there can be an optimal behavior change if perceived barriers, benefits, and threats to the target population are successfully targeted (Jones et al., 2015). Perceived barriers in my study were diabetes related co morbidities and unhealthy behaviors while perceived benefits were reduction in AIC levels, healthier behaviors, reduced hospitalization visits and better health outcomes in the New York Bangladeshis. Bangladeshi women should be given culture specific diabetes education to help them eliminate or reduce barriers to a healthy lifestyle to enhance their SE, and motivate and empower them to go for regular screenings for early detection and better diabetes outcomes. Future research should also explore the influence of family interventions in this community and how social and family support can reinforce healthy behaviors that can impact SE in Bangladeshi and other South Asian women. Additionally, research should also investigate the efficacy of traditional healing herbs with appropriate scientific methodologies especially where modern healthcare, and early screenings and management become challenging to penetrate in minority populations living in low resource environments.

Implications for Social Change

I investigated the influence of gender and acculturation on diabetes self-efficacy and diabetes self-management among New York Bangladeshis. Hopefully, my study can generate a dialogue on gender and diabetes self-efficacy management for a policy change to address health challenges in vulnerable and minority communities. The findings from my study can facilitate the creation of additional community resources and social support services for gender-specific, culturally and linguistically appropriate diabetes education to be made more accessible and available to those from low socio economic status to enhance self-efficacy, and to prevent debilitating complications from this chronic illness. Along with upstream preventative measures, policies that promote and encourage lifestyle behavioral changes can help at the micro and macro levels and foster a healthier environment that is conducive to the reduction of diabetes in the New York Bangladeshis. My study suggests the importance of implementing strategies to overcome the challenges of culture, communication, stigma, and trust to facilitate timely entry into health care with preventive diabetes screenings for early detection and better health outcomes. This necessitates concerted efforts to empower Bangladeshi women with SE management tools to improve their adherence to diabetes self-care activities, and strengthen their capacity through the dissemination of gender and culture-specific diabetes education for improved outcomes. The study calls for the development and expansion of innovative dimensions in self efficacy to address the issues of health literacy, psychological stress, and trust in health care providers to increase the effectiveness of gender-specific diabetes interventions. My study underscores the importance of empowering Bangladeshi and

South Asian women by shifting their locus of control internally in order for them to surmount barriers to optimal self-care, and making incremental changes to improve their health behaviors while caring for family members to reduce diabetes and gender inequities in this population. A realistic goal for a positive social change will be to halt the progression of diabetes at multiple levels and provide an enhanced community engagement to decrease the risk of co morbidities, hospitalization visits, and inequities. My study provides a rationale that is supported by the literature to implement innovative preventive strategies that are acceptable to this population and provide early access to diabetes care, peer support and counseling, education in regular physical activity, healthy food preparation along with an active family participation to improve SE, psychological well being and self esteem. These preventative measures would help to facilitate the reduction of unnecessary costs in the nation's volatile healthcare landscape.

Conclusion

The primary aim of my study was to contribute to the understanding of the relationship between acculturation and gender and its effect on diabetes self-management and SE in New York's at risk Bangladeshi population. Results from my study indicate that there is a nexus between acculturation, gender and diabetes SE in this vulnerable community. Hence, it is important to de stigmatize diabetes and overcome these critical challenges by targeting gender-specific strategies for improved early access, and promote healthy lifestyle behavioral changes to help lower healthcare expenditures and reduce the disproportionate burden of diabetes in this population. Both theory and evidence demonstrate that women from disadvantaged backgrounds face barriers to early diabetes

care. Future research should integrate an ontological approach and measure both objective and subjective outcome measures to enhance mental health related quality of life, increase patient-provider communication and trust, and facilitate equity centered capacity building in at risk women from minority communities.

References

Abraído-Lanza, A. F., Echeverría, S. E., & Flórez, K. R. (2016). Latino immigrants, acculturation, and health: Promising new directions in research. *Annual Review of Public Health, 37,* 219-236. doi:10.1037/rmh0000008

Adepoju, O. E., Preston, M. A., & Gonzales, G. (2015). Health care disparities in the post-Affordable Care Act era. *American Journal of Public Health, 105*(5), S665–S667. doi:10.2105/AJPH.2015.302611

Al-Haj Mohd, M., Phung, H., Sun, J., & Morisky, D. E. (2016). Improving adherence to medication in adults with diabetes in the United Arab Emirates. *BMC Public Health, 16*(1), 857. doi:10.1186/s12889-016-3492-0

Allen, J. D., Caspi, C., Yang, M., Leyva, B., Stoddard, A. M., Tamers, S. ... Sorensen, G. C. (2014). Pathways between acculturation and health behaviors among residents of low-income housing: The mediating role of social and contextual factors. *Social Science & Medicine, 123,* 26-36. doi:10.1016/ 54

Alidu, L**.,** & Grunfeld, E. A. (2018). A systematic review of acculturation, obesity and health behaviours among migrants to high-income countries. *Psychology & Health, 3*(6), 724-745. doi:10.1080/08870446.2017.1398327

Amer, F. A., Mohamed, M. S., Elbur, A. I., Abdelaziz, S. I., & Elrayah, Z. A. (2018). Influence of self-efficacy management on adherence to self-care activities and treatment outcome among diabetes mellitus type 2. *Pharmacy Practice*, *16*(4), 1274. doi:10.18549/PharmPract.2018.04.1274

American Diabetes Association. (2018). The cost of diabetes. Retrieved from http://www.diabetes.org/advocacy/news-events/cost-of-diabetes.html

Ammerman, A., Smith, T. W., & Calancie, L. (2014). Practice-based evidence in public health: Improving reach, relevance, and results. *Annual Review of Public Health 35*(1), 47-63.

Anderson, C., Zhao, H., Daniel, C. R., Hromi-Fiedler, A., Dong, Q., Gbito, K. Y. E., ... & Chow, W-H. (2016). Acculturation and diabetes risk in the Mexican American mano a mano cohort. *American Journal of Public Health, 106*(3), 547-549. doi: 10.2105/AJPH.2015.30300

Andrade, C. (2018). Internal, external, and ecological validity in research design, conduct, and evaluation. *Indian Psychiatric Society, 40*(598), 498-499. doi: 10.4103/IJPSYM.IJPSYM_334_18

Arnetz, L., Ekberg, N. R., & Alvarsson, M. (2014). Sex differences in type 2 diabetes: Focus on disease course and outcomes. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, *7*, 409–420. doi:10.2147/DMSO.S51301

Aoki, Y., Yoon, S. S., Chong, Y., & Carroll, M. D. (2014). Hypertension, abnormal cholesterol, and high body mass index among non-Hispanic Asian adults: United States, 2011-2012. *NCHS Data Brief, 140*, 1-8.

Asian American Federation Census Information Center. (2013). Profile of New York City's Bangladeshi Americans: 2013 Edition. Retrieved from ww.aafny.org/cic/briefs/bangladeshi2013.pdf

Baig, A. A., Benitez, A., Quinn, M. T., & Burnet, D. L. (2015). Family interventions to improve diabetes outcomes for adults. *Annals of the New York Academy of Sciences*, *1353*(1), 89–112. doi:10.1111/nyas.12844

Bakan, A. B., & Erci, B. (2018). Comparison of the effect of trainings based on the transtheoretical model and the health belief model on nurses' smoking cessation. *International Journal of Caring Sciences*, *11*(1), 213-224.

Baldwin-White, A. J. M., Kiehne, E., Umaña-Taylor, A., Marsiglia, F. F. (2017). In pursuit of belonging: acculturation, perceived discrimination, and ethnic–racial identity among Latino youths. *Social Work Research*, *41*(1), 43–52. https://doi.org/10.1093/swr/svw029

Bandura, A. (2005). Guide for constructing self-efficacy scales. In Parajes, F., & Urdan, T. (Eds.), *Adolescence and education: Volume 5, Self-efficacy beliefs of adolescents* (307–337). Greenwich, CT: Information Age Publishing.

Bani, I. A. (2015). Prevalence, Knowledge, Attitude and Practices of Diabetes Mellitus among Jazan Population, Kingdom of Saudi Arabia (KSA). *Journal of Diabetes Mellitus, 5*(2), 115-122. doi: 10.4236/jdm.2015.52014

Berry, J. W., & Hu, F. (2017). Acculturation, discrimination and wellbeing among second generation of immigrants in Canada. *International Journal of Intercultural Relations, 61*, 29-39. https://doi.org/10.1016/j.ijintrel.2017.08.003

Bertran, E. A., Fritz, H., Abbas, M., Tarakji, S., DiZazzo-Miller, R., Pociask, F. D., Lysack, C. L., Arnetz, J., & Jaber, L. A. (2015). Patient perspectives on the impact of Arab American culture on diabetes self-management. *The Diabetes Educator*, *41*(6), 748-754.

Bornstein, M. H. (2017). The specificity principle in acculturation science. *Perspectives on Psychological Science*, 12, 3– 45. http://dx.doi.org/10 .1177/1745691616655997

Boslaugh, S. (2018). (2018). chapter 4. Descriptive statistics and graphic displays. Retrieved from https://www.safaribooksonline.com/library/view/statistics-in-a/9781449361129/ch04.html

Braveman, P., & Gottlieb, L. (2014). The social determinants of health: it's time to consider the causes of the causes. *Public Health Reports, 129* (2), 19–31.

Buckingham, S. L., & Suarez-Pedraza, M. C. (2018, June 14). "It has cost me a lot to adapt to here": The divergence of real acculturation from ideal acculturation impacts Latinx immigrants' psychosocial wellbeing. *American Journal of Orthopsychiatry*. Retrieved from: https://www.ncbi.nlm.nih.gov/pubmed/29902027

Caprio, S., Daniels, S. R., Drewnowski, A., Kaufman, F. R., Palinkas, L. A., Rosenbloom, A. L., & Schwimmer, J. B. (2008). Influence of race, ethnicity, and culture on childhood obesity: implications for prevention and treatment: A consensus statement of shaping America's health and the obesity society. *Diabetes Care*, *31*(11), 2211–2221. http://doi.org/10.2337/dc08-9024

Castañeda, H., Holmes, S. M., Madrigal, D. S., Young, M. E. D., Beyeler, N., & Quesada, J. (2015). Immigration as a social determinant of health. *Annual Review of Public Health, 36*, 375–92. https://doi.org/10.1146/

Castro, J., & Rudmin, F. W. (2017). Acculturation, acculturative change, and assimilation: A research bibliography with URL links. *Online Readings in Psychology and Culture, 8*(1). https://doi.org/10.9707/2307-0919.1075

Centers for Disease Control and Prevention (2017). New CDC report: More than 100 million Americans have diabetes or prediabetes. Retrieved from https://www.cdc.gov/media/releases/2017/p0718-diabetes-report.html.

Center for the Study of Asian American Health (2018). Assessing the burden of diabetes in the South Asian community. Retrieved from https://webcache.googleusercontent.com/search?q=cache:t7ddTKFUVzEJ:https://med.nyu.edu/asian-health/research/dream/community-health-needs-assessment**.**

Champion, V. L., Monahan, P. O., Springston, J. K., Russell, K., Zollinger, T. W., Saywell, R. M., & Maraj, M. (2008). measuring mammography and breast cancer beliefs in African American women. *Journal of Health Psychology, 13*(6), 827–837. http://doi.org/10.1177/1359105308093867

Chen, J., Vargas-Bustamante, A., Mortensen, K., & Ortega, A. N. (2016). Racial and ethnic disparities in health care access and utilization under the affordable care act. *Medical Care*, *54*(2), 140-6.

Chesla, C. A., Kwan, C. M. L., Chun, K. M., & Stryker , L. (2014). Gender differences in factors related to diabetes management in Chinese American immigrants**.** *Western Journal of Nursing Research, 36(9),* 1074 –1090.

Chew, B., Hassan, N., & Sherina, M. (2015). Determinants of medication adherence among adults with type 2 diabetes mellitus in three Malaysian public health clinics: a cross-sectional study. *Dove Medical Press, 2015*(9), 639–648. doi: https://doi.org/10.2147/PPA.S81612

Collier, A., Ghosh, S., Hair, M., & Waugh, N. (2014). Impact of socioeconomic status and gender on glycaemic control, cardiovascular risk factors and diabetes complications in type 1 and 2 diabetes: A population based analysis from a Scottish region. Diabetes & Metabolism, *41*(2), 1451–51. https://doi.org/10.1016/j.diabet.2014.09.004

Creswell, J. W., & Creswell, J. D. (2-017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Cypress, B.S. (2017). Rigor or reliability and validity in qualitative research: Perspectives, strategies, reconceptualization, and recommendations. *Dimensions of Critical Care Nursing,* 36(4), 253–263. doi: 10.1097/

Davidoff, F., Dixon-Woods, M., Leviton, L, Michie, S. (2015). Demystifying theory and its use in improvement. *BMJ Quality & Safety, 24***,** 228–238. doi:10.1136/bmjqs-2014-003627

Davis, R., Campbell, R., Hildon, Z., Hobbs, L., & Michie, S. (2015). Theories of behaviour and behaviour change across the social and behavioural sciences: A scoping review. *Health Psychology Review*, *9*(3), 323–344. http://doi.org/10.1080/17437199.2014.941722

Delavari, M., Sønderlund, A. L., Mellor, D., Mohebbi, M., & Swinburn, B. (2015). Migration, acculturation and environment: determinants of obesity among Iranian migrants in Australia. *International Journal of Environmental Research and Public Health*, *12*(2), 1083–1098. http://doi.org/10.3390/ijerph120201083

Dehghani-Tafti, A., Mazloomy Mahmoodabad, S. S., Morowatisharifabad, M. A., Afkhami Ardakani, M., Rezaeipandari, H., & Lotfi, M. H. (2015). Determinants of Self-Care in Diabetic Patients Based on Health Belief Model. *Global journal of health science*, *7*(5), 33–42. doi:10.5539/gjhs.v7n5p33

Dendup, T., Feng, X., Clingan, S., & Astell-Bur, T. (2018). Environmental risk factors for developing type 2 diabetes mellitus: A systematic review. *International Journal of Environmental Research and Public Health, 15*, 78.

Fialkowski, M. K., Ettienne, R., Shvetsov, Y. B., Rivera, R. L., Van Loan, M. D., Savaiano, D. A., & Boushey, C. J. (2015). Ethnicity and acculturation: Do they predict weight status in a longitudinal study among Asian, Hispanic, and non-Hispanic White early adolescent females? *Adolescent Health, Medicine and Therapeutics*, *6*, 1–7. http://doi.org/10.2147/AHMT.S67511

Fitzgerald, J. T, Funnell, M. M., Hess, G. E., Barr, P. A., Anderson, R. M., Hiss, R. G., Davis, W. K. (1998). The reliability and validity of a brief diabetes knowledge test. Diabetes Care, 21(5), 706–710.

Flatz, A., Casillas, A., Stringhini, S., Zuercher, E., Burnand, B., & Peytremann-Bridevaux, I. (2015). Association between education and quality of diabetes care in Switzerland. *International Journal of General Medicine*, *8*, 87–92. doi:10.2147/IJGM.S77139

Fox, M., Thayer, Z., & Wadhwa, P. D. (2017). Assessment of acculturation in minority health research. *Social Science & Medicine*, *176*, 123–132. http://doi.org/10.1016/j.socscimed.2017.01.029

Glanz, K., Rimer, B. K., & Viswanath, K (2015) *Health behavior and health education: Theory, research, and practice* (4th ed.). San Francisco: Jossey-Bass.

Gonzales, S. (2016). How has diabetes care in the U.S. changed over time? Retrieved from https://www.healthsystemtracker.org/chart-collection/diabetes-care-u-s-changed-time/#item-start.

Graham, G. (2015). Disparities in cardiovascular disease risk in the United States. *Current Cardiology Reviews, 11*(3), 238–245. http://doi.org/10.2174/1573403X11666141122220003

Greenhalgh, T., Clinch, M., Afsar, N., Choudhury, Y., Sudra, R., Campbell-Richards, D., ... & Finer, S. (2015). Socio-cultural influences on the behaviour of South Asian women with diabetes in pregnancy: Qualitative study using a multi-level theoretical approach. *BMC Medicine, 13,* 120. doi:10.1186/s12916-015-0360-1

Grintsova, O., Maier, W., & Mielck, A. (2014). Inequalities in health care among patients with type 2 diabetes by individual socio-economic status (SES) and regional deprivation: a systematic literature review. *International journal for equity in health, 13*, 43. doi:10.1186/1475-9276-13-43

Gumber, A., Gumber, L. (2017). Improving prevention, monitoring and management of diabetes among ethnic minorities: Contextualizing the six G's approach. *BMC Research, 10*(1) 774-747.

Hall, E., & Cuellar, N. G. (2016). Immigrant health in the United States: A trajectory toward change. *Journal of Transcultural Nursing, 27*(6), 611–626. doi: 0.1177/1043659616672534 tcn.sagepub.com

Harreiter, J., & Kautzky-Willer, A. (2018). Sex and gender differences in prevention of type 2 diabetes. *Frontiers in Endocrinology,* Article ID 6905697, 2 pages.

Hassanein, S., Hassan, E. G. Abdrbo, A. A., & Kazim, F. A. (2018). Type 2 Diabetes Mellitus Profile: Is there a gender difference? *Nursing & Healthcare International Journal, 2*(1).

Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-Based Nursing, 18,* 66–67. doi:10.1136/

Hirpara, N., Jain, S., Gupta, A., & Dubey, S. (2015). Interpreting research findings with confidence interval. *Journal of Orthodontics & Endodontics, 1*(1), 8.

Hassanein, S., Hassan, E. G. Adobo, A. A., & Kazim, F. A. (2018). Type 2 Diabetes Mellitus Profile: Is there a gender difference? *Nursing & Healthcare International Journal, 2*(1),

Isasi, C. R., Ayala, G. X., Sotres-Alvarez, D., Madanat, H., Penedo, F., Loria, C. M., ... Schneiderman, N. (2015). Is acculturation related to obesity in Hispanic/Latino adults? Results from the Hispanic Community Health Study/Study of Latinos. *Journal of Obesity, Vol. 2015*. doi:10.1155/2015/186276

Islam, N., Riley, L. Wyatt, L., Tandon, S.D., Tanner, M., Ratnam-Mukjerji, R., Rey, M., Trinh-Shevrin, C. (2014). Protocol for the DREAM Project (Diabetes Research, Education, and Action for Minorities): a randomized trial of a community health worker intervention to improve diabetic management and control among Bangladeshi adults in NYC. *BMC Public Health. 14*(1):177.

Islam, N. S., Wyatt, L. C., Taher, M. D., Riley, L., Tandon, S. D., Tanner, M., ... Trinh-Shevrin, C. (2018). A culturally tailored community health worker intervention leads to improvement in patient-centered outcomes for immigrant patients with type 2 diabetes. *Clinical Diabetes, 36*(2), 100-111. https://doi.org/10.2337/cd17-0068

Islam, S. M. S., Niessen, L. W., Seissler, J., Ferrari, U., Biswas, T., Islam, A., & Lechner, A. (2015). Diabetes knowledge and glycemic control among patients with type 2 diabetes in Bangladesh. *Springer Plus*, *4*, 284. http://doi.org/10.1186/s40064-015-1103-7with type 2 diabetes

Islam, F. M.A., Chakrabarti, R., Dirani, M., Islam, M. T., Ormsby, G., ...Finger, R. P. 2014). Knowledge, Attitudes and Practice of Diabetes in Rural Bangladesh: The Bangladesh Population Based Diabetes and Eye Study (BPDES). *Plos One*, *9*(10): e110368. https://doi.org/10.1371/journal.pone.0110368

Jalilian, F., Motlagh, F. Z., Solhi, M., & Gharibnavaz, H. (2014). Effectiveness of self-management promotion educational program among diabetic patients based on health belief model. *Journal of education and health promotion*, *3*(14). doi:10.4103/2277-9531.127580

Janežič, A., Locatelli, I., & Kos, M. (2017). Criterion validity of 8-item Morisky Medication Adherence Scale in patients with asthma. *Plos One*, *12*(11), e0187835. doi:10.1371/journal.pone.0187835Janz, N. K., & Becker, M. H. (1988). The health belief model: A decade later. *Health Education Quarterly*, *11*(1), 1–47.

Janz, N. K., Becker, M. H. (1984). The health belief model: A decade later. *Health, Education & Behavior*, *11*(1), 1–47. doi: 10.1177/109019818401100101

Jelinek, H. F., Osman, W. M., Khandoker, A. H., Khalaf, K., lee, S., Almahmeed, W., & Alsafar, H. S. (2017). Clinical profiles, comorbidities and complications of type 2 diabetes mellitus in patients from United Arab Emirates. *BMJ Open Diabetes Research and Care, 5*, e000427. https://doi.org/10.1136/bmjdrc-2017-000427

Jones, C. L., Jensen, J. D., Scherr, C. L., Brown, N. R., Christy, K., & Weaver, J. (2015). The health belief model as an explanatory framework in communication research: Exploring parallel, serial, and moderated mediation. *Health Communication*, *30*(6), 566–576. http://doi.org/10.1080/10410236.2013.873363

Kanaya, A. M., Herrington, D., Vittinghoff, E., Ewing, S. K., Liu, K., Blaha, M. J., Dave, S. S., Qureshi,F., & Kandula, N. R. (2014). Understanding the high prevalence of diabetes in U.S. South Asians compared with four racial/ethnic groups: the MASALA and MESA studies. *Diabetes Care, 37*, 1621–1628. doi 10.2337/dc13-2656

Kanaya, A., Ewing, S., Vittinghoff, E., Herrington, D., Tegeler, C., Mills, C., Kandula, N. (2014). Acculturation and subclinical atherosclerosis among U.S. South Asians: Findings from the MASALA study. *Journal of Clinical and Experimental Research in Cardiology, 1* (1), 1-10. doi: 10.15744/2394-6504.1.102

Karimy, M., Koohestani, H. R., & Araban, M. (2018). The association between attitude, self-efficacy, and social support and adherence to diabetes self-care behavior. *Dialectology & Metabolic Syndrome.* https://doi.org/10.1186/s13098-018-0386-6

Katikireddi, S. V., Niedzwiedz, C. L., & Popham, F. (2016). Employment status and income as potential mediators of educational inequalities in population mental health. *European Journal of Public Health*, *26*(5), 814-816.

Kautzky-Willer, A., Harreiter, J., & Pacini, G. (2016). Sex and gender differences in risk, pathophysiology and complications of type 2 diabetes mellitus. *Endocrine Reviews*, *37*(3), 278–316. http://doi.org/10.1210/er.2015-1137

Ki, M., Baek, S., Yun, Y., Kim, N., Hyde, M., & Na, B. (2014). Age-related differences in diabetes care outcomes in Korea: A retrospective cohort study. *BMC Geriatrics, 14*, 111. http://doi.org/10.1186/1471-2318-14-111

Kim, W., Kreps, G. L., & Shin, C-N. (2015). The role of social support and social networks in health information–seeking behavior among Korean Americans: A qualitative study. *International Journal for Equity in Health, 14*, 40. https://doi.org/10.1186/s12939-015-0169-8

Kiwan, M-P. (2016). Geographies *of health, disease and well-being: Recent advances in theory and method*. New York: Routledge.

Küster, I., & Vila, N. (2017). Healthy lifestyle and eating perceptions: correlations with weight and low-fat and low-sugar food consumption in adolescence, *Frontiers in Life Science, 10*(1), 48–62. doi: 10.1080/21553769.2017.1329170

Lagisetty, P. A., Wen, M., Choi, H., Heisler M., Kanaya, A. M., & Kandula, N. R. (2016). neighborhood social cohesion and prevalence of hypertension and diabetes in a South Asian population. *Journal of Immigrant and Minority Health, 18*(6), 1309 –1316.

Laroche, M., Kim, C., Hui, M. & Tomiuk, M. A. (2015) A multidimensional perspective on acculturation and its relative impact on consumption of convenience foods. *Journal of International Consumer Marketing, 10*(1-2), 33-56. doi: 10.1300/J046v10n01_03

Leigh, J. A., Alvarez, M., & Rodriguez, C. J. (2016). Ethnic minorities and coronary heart disease: An update and future directions. *Current Atherosclerosis Reports, 18*(2), 9. http://doi.org/10.1007/s11883-016-0559-4

Lemes Dos Santos, P. F., Dos Santos, P. R., Ferrari, G. S., Fonseca, G. A., & Ferrari, C. K. (2014). Knowledge of diabetes mellitus: does gender make a difference? *Osong Public Health and Research Perspectives*, *5*(4), 199-203.

Lesser, I. A., Gasevic, D., & Lear, S. A. (2014). The association between acculturation and dietary patterns of South Asian Immigrants. *PLOS ONE*, *9*(2), e88495. http://doi.org/10.1371/journal.pone.0088495

Lommel, L. L., & Chen, J-L. (2016). The relationship between self-rated health and acculturation in Hispanic and Asian Adult immigrants: A systematic review. *Journal of Immigrant and Minority Health, 18*(2), 468–478.

Lopez, P. M., Zanowiak, J., Goldfeld, K., Wyka, K., Masoud, A., Beane, S., … Islam, N. (2017). Protocol for project IMPACT (improving millions of hearts for provider and community transformation): A quasi-experimental evaluation of an integrated electronic health record and community health worker intervention study to improve hypertension management among South Asian patients. *BMC Health Services Research*, *17*(1), 810. http://doi.org/10.1186/s12913-017-2767-1

López, L., Grant, R. W., Marceau, L., Piccolo, R., McKinlay, J. B., & Meigs, J. B. (2016). Association of acculturation and health literacy with prevalent dysglycemia and diabetes control among Latinos in the Boston Area Community Health (BACH) Survey. *Journal of Immigrant and Minority Health 18*(6), 1266–1273.

Lopez, L., & Golden, S. H. (2014). A new era in understanding diabetes disparities among U.S. Latinos—All are not equal. *Diabetes Care, 37*(8), 2081-2083**.** https://doi.org/10.2337/dc14-0923

Mansyur, C. L., Rustveld, L. O., Nash, S. G., & Jibaja-Weiss, M. L. (2016). Hispanic acculturation and gender differences in support and self-efficacy for managing diabetes. *The Diabetes Educator, 42(*3), 315–324. https://doi.org/10.1177/0145721716640905

Messina, R., Rucci, P., Sturt, J., Mancini, T., & Fantini, M. P. (2018). Assessing self-efficacy in type 2 diabetes management: Validation of the Italian version of the Diabetes Management Self-Efficacy Scale (IT-DMSES). *Health and Quality of Life Outcomes*, *16*(1), 71. doi:10.1186/s12955-018-0901-3

McKenna, L., & Gray, R. (2018). The importance of ethics in research publications. *Collegian*, *25*(2), 147–148. https://doi.org/10.1016/j.colegn.2018.02.006

Mitchell, O. (2015). Experimental research design**.** In, W. G. Jennings, G. E. Higgins, M. M. Maldonado-Molina, & D. N. Khey (Eds.) *The Encyclopedia of Crime and Punishment* (p). New York: Wiley. https://doi.org/10.1002/9781118519639.wbecpx113

Mohajan, H. (2017) Two criteria for good measurements in research: Validity and reliability. *Annals of Spiru Haret University*, *17*(4), 56–82. https://mpra.ub.uni-muenchen.de/83458/

Moon, S. J., Lee, W. Y., Hwang, J. S., Hong, Y. P., & Morisky, D. E. (2017). Accuracy of a screening tool for medication adherence: A systematic review and meta-analysis of the Morisky Medication Adherence Scale-8. *Plos One*, *12*(11), e0187139. doi:10.1371/journal.pone.0187139

Mui, P., Bowie, J. V., Juon, H.-S., & Thorpe, R. J. (2017). Ethnic group differences in health outcomes among Asian American men in California. *American Journal of Men's Health*, *11*(5), 1406–1414. http://doi.org/10.1177/1557988316664508

Namazia, M., & Namazib, N-R. (2016). Conceptual analysis of moderator and mediator variables in business research. *Procedia Economics and Finance, 36,* 540 – 554.

Nothwehr, F., Dennis, L., & Wu, H. (2007). Measurement of behavioral objectives for weight management. *Health Education & Behavior*, *34*(5), *7*93–809.

Norton, E. C., Dowd, B. E., & Maciejewski, M. L. (2018). Odds ratios-current best practice and use. *The Journal of the American Medical Association, 320*(1), 84-85. doi: 10.1001/

NYU School of Medicine. (2018). Primary area of focus. Retrieved from https://med.nyu.edu/ctsi/community-engagement/about-us/primary-areas-focus.

NYU Center for Asian American Health. (2018). Diabetes among South Asians Americans. Retrieved from https://med.nyu.edu/asian-health/research/dream/diabetes-and-south-asian-communities.

O'Brien, M. J., Shuman, S. J., Barrios, D. M., Alos, V. A., & Whitaker, R. C. (2014). A qualitative study of acculturation and diabetes risk among urban, immigrant Latinas: Implications for diabetes prevention efforts. *The Diabetes Educator, 40*(5), 616–625. http://doi.org/10.1177/0145721714535992

Okafor, M-T. C., Carter-Pokras, O. D., & Zhan, M. (2014). Greater dietary acculturation (dietary change) is associated with poorer current self-rated health among African immigrant adults. *Journal of Nutrition Education and Behavior, 46*(4) 226–235. doi.org/10.1016/j.jneb.2013.11.015

Peek, M. E., Ferguson, M. J., Roberson, T. P., & Chin, M. H. (2014). putting theory into practice: a case study of diabetes-related behavioral change interventions on Chicago's

south side. *Health Promotion Practice, 15*(20), 40S–50S. http://doi.org/10.1177/1524839914532292

Peek, M. E., Ferguson, M., Bergeron, N., Maltby, D., & Chin, M. H. (2014). Integrated community-healthcare diabetes interventions to reduce disparities. *Current Diabetes Reports, 14*(3), 467. http://doi.org/10.1007/s11892-013-0467-8

Pérez-Escamilla, R., Damio, G., Chhabra, J., Fernandez, M. L., Segura-Pérez, S., Vega-López, S., ... & D'Agostino, D. (2015). Impact of a community health workers-led structured program on blood glucose control among Latinos with type 2 diabetes: The DIALBEST trial. *Diabetes Care 38* (2), 197-205. doi: 10.2337/dc14-0327

Perez, L. G., Chavez, A., Marquez, D. X., Soto, S. C., Haughton, J., & Arredondo, E. M. (2017). Associations of acculturation with self-report and objective physical activity and sedentary behaviors among Latinas. *Health education & behavior: the official publication of the Society for Public Health Education, 44*(3), 431–438.

Pew Research Center (2017). Bangladeshis in the U.S. Retrieved from http://www.pewsocialtrends.org/fact-sheet/asian-americans-bangladeshis-in-the-u-s/.

Posthumus, A. G., Schölmerich, V.L. N., Steegers, E. A. P., Kawachi, I., & Denktas, S. (2015). The Association of Ethnic Minority Density with Late Entry into Antenatal Care in the Netherlands. *Plos One*. https://doi.org/10.1371/journal.pone.0122720

Proctor, E., Luke, L., Calhoun, A., McMillen, C., Brownson, R., McCrary, S., & Padek, M. (2015). Sustainability of evidence-based healthcare: Research agenda, methodological advances, and infrastructure support. *Implementation Science, 10*, 88. https://doi.org/10.1186/s13012-015-0274-5

Reininger, B., Lee, M., Jennings, R., Evans, A., & Vidoni, M. (2017). Healthy eating patterns associated with acculturation, sex and BMI among Mexican Americans. *Public Health Nutrition, 20*(7), 1267–1278. doi: 10.1017/S1368980016003311.

Ro, A. (2014). The longer you stay, the worse your health? a critical review of the negative acculturation theory among Asian immigrants. *International Journal of Environmental Research and Public Health, 11*(8), 8038–8057. http://doi.org/10.3390/ijerph110808038

Rosenstock, I. M. (1974). The health belief model and preventive health behavior. *Health Education & Behavior, 2*(4), 354-386. https://doi.org/10.1177/109019817400200405

Romano, V., & Scott, I. (2014). Using health belief model to reduce obesity amongst African American and Hispanic populations. *Procedia-Social and Behavioral Sciences, 159,* 707-711.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health Education Quarterly, 5*(2), 175-83.

Rosenstock, S., Whitman, S., West, J. F., & Balkin, M. (2014). Racial disparities in diabetes mortality in the 50 most populous US cities. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, *91*(5), 873–885. http://doi.org/10.1007/s11524-013-9861-4

Sattar, N., & Gill, J. M. R. (2015). Type 2 diabetes in migrant south Asians: mechanisms, mitigation, and management. *Lancet Diabetes and Endocrinology*, *3*(12), 1004–1016. doi: 10.1016/S2213-8587

Sedgwick, P. (2015). Confidence intervals, P values, and statistical significance. Retrieved from: https://www.bmj.com/content/350/bmj.h1113

Sentell, T. L., Juarez, D. T., Ahn, H. J., Tseng, C.-W., Chen, J. J., Salvail, F. R., … Mau, M. K. (2014). Disparities in Diabetes-Related Preventable Hospitalizations among Working-Age Native Hawaiians and Asians in Hawai‘i. *Hawai’i Journal of Medicine & Public Health*, *73*(12 Suppl 3), 8–13.

Shabibi, P., Zavareh, M., Sayehmiri, K., Qorbani, M., Safari, O., Rastegarimehr, B., & Mansourian, M. (2017). Effect of educational intervention based on the Health Belief Model on promoting self-care behaviors of type-2 diabetes patients. *Electronic physician*, *9*(12), 5960–5968. doi:10.19082/5960

Shah, A. D., Vittinghoff , E., Kandula, N. R., Srivastava, S., & Kanaya, A. M. (2015). Correlates of prediabetes and type II diabetes in US South Asians: findings from the Mediators of Atherosclerosis in South Asians Living in America (MASALA) study. *Annals of Epidemiology*, *25*(2):77-83. doi: 10.1016/

Shah, A., & Kanaya, A. M. (2014). Diabetes and Associated Complications in the South Asian Population. *Current Cardiology Reports*, *16*(5). http://doi.org/10.1007/s11886-014-0476-5mn

Shah, S. M., Loney, T., Dhaheri, S. A., Vatanparast, H., Elbarazi, I., Agarwal, M.,...Ali, R. (2015). Association between acculturation, obesity and cardiovascular risk factors among male South Asian migrants in the United Arab Emirates – a cross-sectional study. *BMC Public Health*, *15*, 204.http://doi.org/10.1186/s12889-015-1568-x

Sohal, T., Sohal, P., King-Shier, K. M., & Khan, N. A. (2015). Barriers and facilitators for type-2 diabetes management in South Asians: A systematic review. *Plos One*, *10*(9). http://doi.org/10.1371/

Soler, R., Orenstein, D., Honeycutt, A., Bradley, C., Trogdon, J., Kent, C. K., ... Bunnell, R. (2016). community-based interventions to decrease obesity and tobacco exposure and reduce health care costs: outcome estimates from communities putting prevention to work for 2010-2020. *Preventing Chronic Disease 13*(e47) 150272. doi: http://dx.doi.org/10.5888/pcd13.150272

Subhi, L. A., Kendall, P., Shafaee, M. A., Adawi, S. A. (2015). Health Beliefs of People with Type 2 Diabetes in Primary Health Care in Muscat, Oman: A Qualitative Approach. *International Journal of Clinical Nutrition & Dietetics 2,* 106. doi: http://dx.doi.org/10.15344/ ijcnd/2016/106

Tang, W., Cui, Y., & Babenko, O. (2014). Internal consistency: Do we really know what it is and how to assess it? *Journal of Psychology and Behavioral Science. 2*(2), 205–220.

Trinh-Shevrin, C., Nadkarni, S., Park, R., Islam, N., & Kwon, S. C. (2015). Defining an integrative approach for health promotion and disease prevention: A population health equity framework. *Journal of Health Care for the Poor and Underserved*, *26*(2 0), 146–163. http://doi.org/10.1353/hpu.2015.0067

U.S. Department of Health and Human Services. (2008). physical activity guidelines for Americans. Available from https://health.gov/paguidelines/pdf/paguide.pdf.

Vandan, N., Wong, J. Y-H, & Fong, D. Y-T. (2018). Accessing health care: experiences of South Asian ethnic minority women in Hong Kong. *Nursing & Health Sciences, 21*(1), 93-10. https://doi.org/10.1111/nhs.12564

Vargas, P., & Jurado, L. F. (2016). Dietary acculturation among Filipino Americans. *International Journal of Environmental Research and Public Health, 13*(1), 16. http://doi.org/10.3390/ijerph13010016

Ward, C., & Geeraert, N. (2016). Advancing acculturation theory and research: the acculturation process in its ecological context. *Current Opinion in Psychology, 8*, 98–104. https://doi.org/10.1016/j.copsyc.2015.09.021

Walker, R. J., Smalls, B. L., Hernandez-Tejada, M. A., Campbell, J. A., & Egede, L. E. (2014). Effect of diabetes self-efficacy on glycemic control, medication adherence, self-care behaviors, and quality of life in a predominantly low-income, minority population. *Ethnicity & Disease*, *24*(3), 349–55.

Wichit, N., Mnatzaganian, G., Courtney, M., Schulz, P., & Johnson, M. (2016). Randomized controlled trial of a family-oriented self-management program to improve self-efficacy, glycemic control and quality of life among Thai individuals with Type 2 diabetes. *Diabetes Research And Clinical Practice, 123*, 37–48. doi: https://doi.org/10.1016/j.diabres.2016.11.013

Wilkinson, E., Waqar, M., Sinclair, A., & Randhawa, G. (2016). Meeting the challenge of diabetes in ageing and diverse populations: A review of the literature from the UK. *Journal of Diabetes Research, 2016*, 1-15. https://doi.org/10.1155/2016/8030627

Xu, X., Leung, A. Y. M., & Chau, P. H. (2018). Health literacy, self-efficacy, and associated factors among patients with diabetes. *Health Literacy Research and Practice, 2*(2) e67-e77. doi: 10.3928/24748307-20180313-01

Yi, S. S., Thorpe, L. E., Zanowiak, J. M., Trinh-Shevrin, C., & Islam, N. S. (2016). clinical characteristics and lifestyle behaviors in a population-base sample of Chinese and South Asian immigrants with hypertension. *American Journal of Hypertension*, *28*(8) 491-497. doi:10.1093/ajh/hpw014

Yip, C., Han, N. R., & Sng, B. L. (2016). Legal and ethical issues in research. *Indian journal of Anesthesia*, *60*(9), 684–688.

Appendix A: Figures

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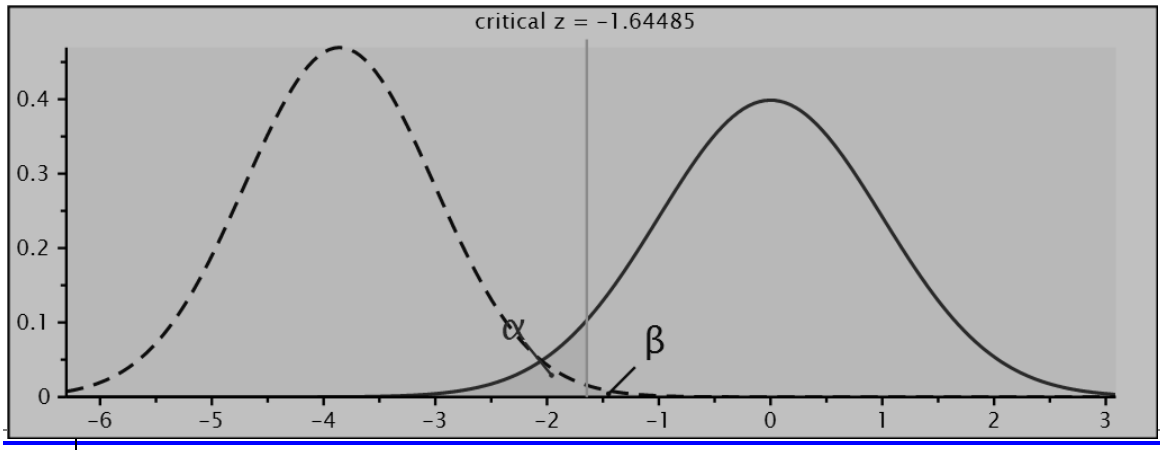

Figure 1. *Post Hoc Analysis*

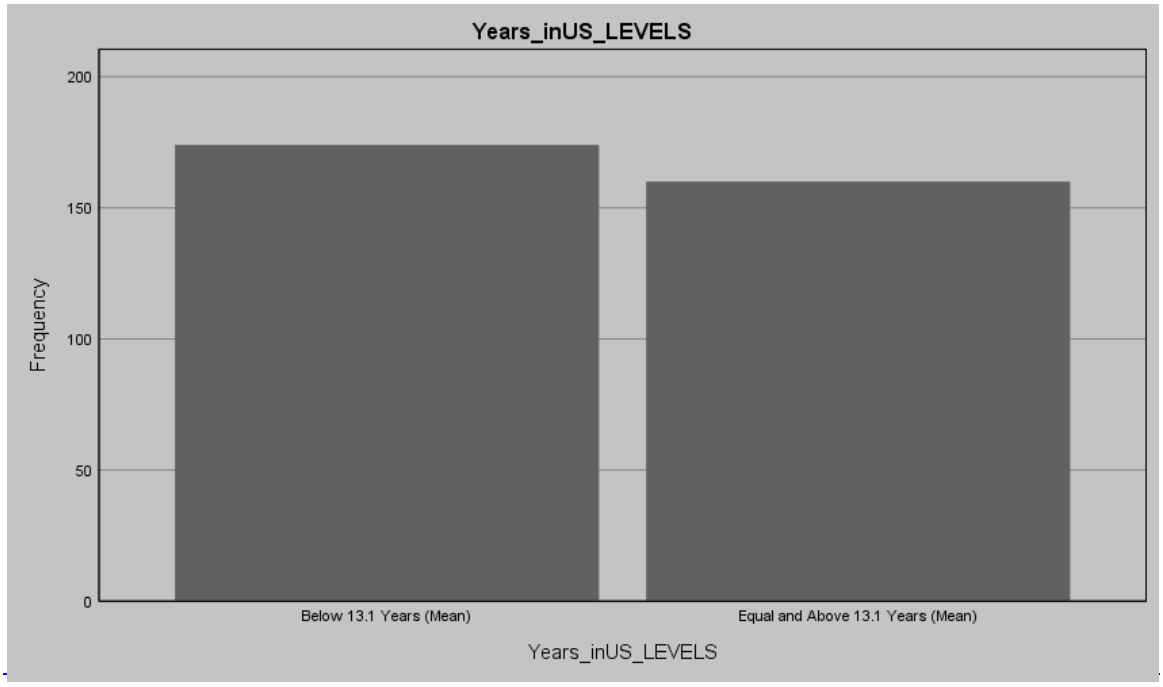

Figure 2. *Years in US levels*

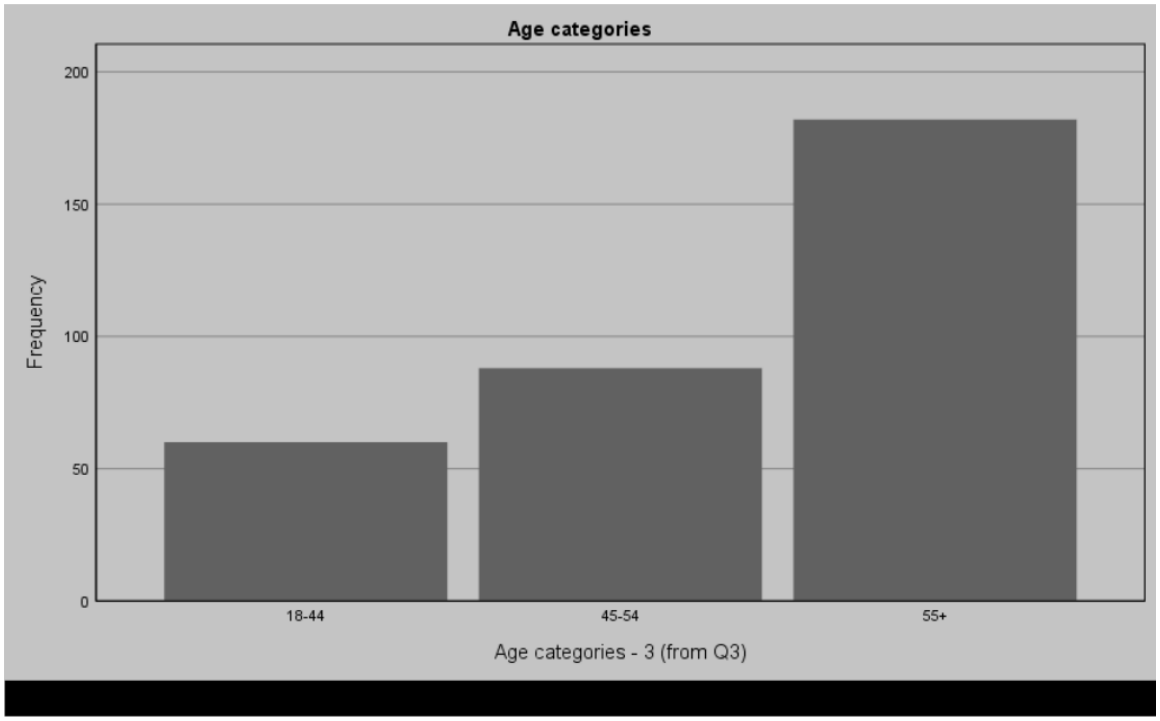

Figure 3. *Age Categories*

Figure 4. *How well do you speak English*

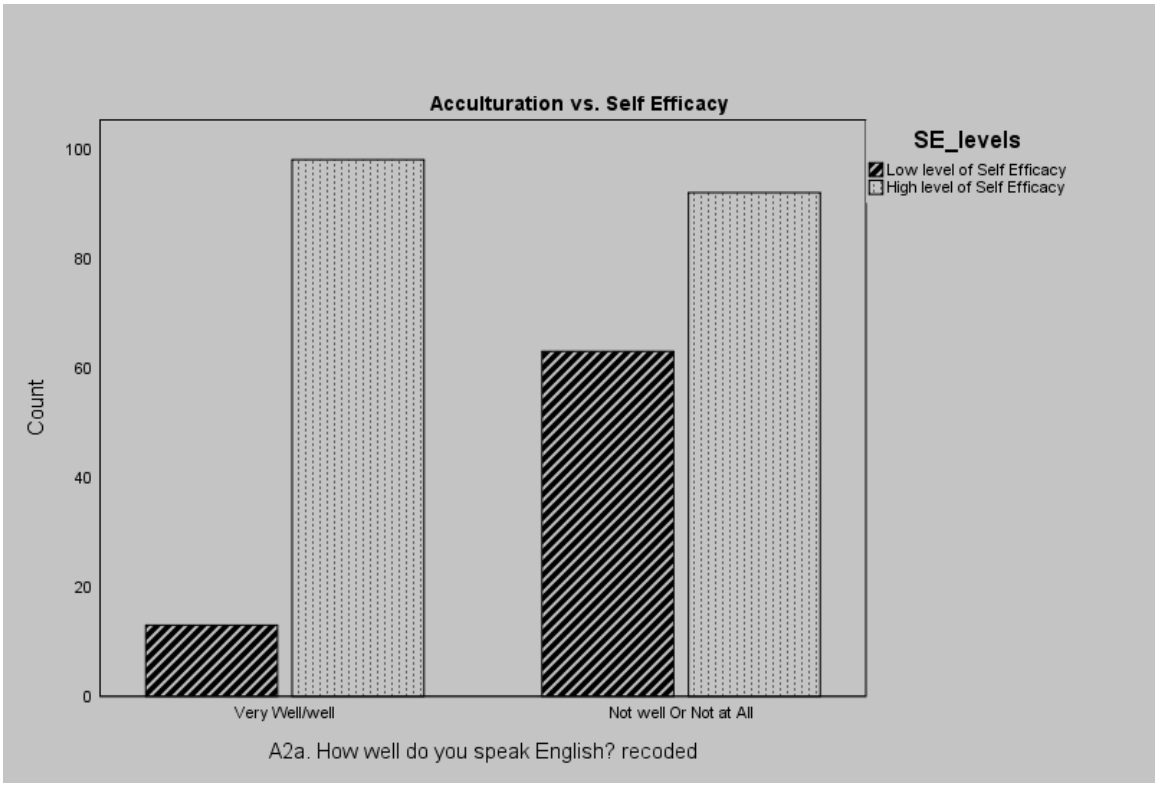

Figure 5. *Acculturation vs. Self Efficacy*

Appendix B: Confidentiality and Data Usage Agreement

Confidentiality and Data Usage Agreement
for Scientific Collaborators

Center for the Study of Asian American Health
NYU School of Medicine

Overview

Starting in 2003, the National Institutes of Health introduced a data sharing policy to encourage collaboration across researchers.[1] The Center for the Study of Asian American Health (CSAAH) is a partnership of the NYU School of Medicine, Department of Population Health, Section for Health Equity, several healthcare and public hospital organizations and more than 55 community and government partners serving the Asian American community. The mission of CSAAH is to reduce health disparities in the Asian American community through research, training, and partnership. CSAAH has put in a significant investment in all aspects of the datasets it houses, from study design, to collection, analysis and dissemination. CSAAH is interested in making the best possible use of the data and furthering collaborations with both internal researchers and external colleagues at other academic centers and institutions. We are providing access to CSAAH data so that all parties may benefit from any products and reports.

Confidentiality and Data Property Agreement
This agreement, between Renee Mehrra and NYU CSAAH concerns the use of the DREAM Intervention Study.

I, RENEE MEHRRA, the Collaborator, understand and agree to maintain the confidentiality of the CSAAH data at all times including, but not limited to, the examples cited below. I agree to:

- Keep CSAAH data in my possession from review by any unauthorized person;
- Store CSAAH data securely;
- Use the CSAAH data for the research purposes specified in this agreement, only;
- Not copy, reproduce, use, disclose or discuss CSAAH data with unauthorized persons;
- Not provide computer or other access to CSAAH data to unauthorized persons;
- Make no attempt to determine the identity of any person included in the database.

I understand and agree that I am bound to limit analyses to the original research plan outlined on the following page. In addition, I agree to the following:

- CSAAH staff may participate in the analysis and publication of study results. In this process, the collaborating groups must reach mutually agreeable decisions regarding data to be analyzed,

[1] More information on the NIH Data Sharing Policy may be found here:
http://grants2.nih.gov/grants/policy/data_sharing/data_sharing_brochure.pdf

protocols to be followed, and participation in data analysis.

- CSAAH staff will be given the opportunity to review research findings resulting from this collaboration prior to data presentation or publication. This includes, but is not limited to, abstracts, manuscripts and presentations, as well as other formats (e.g. electronic documents). CSAAH staff will review these documents in a timely manner.
- Authorship list of any scientific papers submitted for publication as an outcome of this project will be jointly discussed with CSAAH staff prior to the writing of the paper and shared understanding reached between the Collaborator and CSAAH staff.
- I agree to acknowledge in all communications that the source of the data is CSAAH, and to correctly cite the parent grant that funded the data collection/study.[2] Previous publications on the dataset should be cited, if relevant.
- I agree to obtain approval for secondary data analysis from the NYU Institutional Review Board, if needed.
- CSAAH makes no representations or guarantees regarding the files and/or the data they provide. They are provided "as is" without warranty of any kind. The entire risk to the quality and performance of the data is assumed by the Collaborator. I agree that I will not hold, or attempt to hold, CSAAH responsible for any damages, including incidental or consequential damages arising from the use of, or inability to access the requested data files.
- I acknowledge and agree that a breach of this agreement could cause CSAAH to suffer damage that could not be adequately remedied by an action at law. Accordingly, I agree that NYU shall have the right to seek specific performance of (enforce) this agreement. The above rights are in addition to any other rights available to NYU

If changes to the approved research analysis plan are desired, the Collaborator is required to resubmit an analysis plan for approval to the Senior Investigator within thirty (30) calendar days of receiving the datasets. Failure to notify CSAAH and/or obtain approval of changes to original analysis plan may void this agreement.

The term of this agreement and authorization to use this data is the shorter of 1 year from the data indicated on this agreement or upon written notice of termination by the parties. CSAAH may terminate this agreement at any time by providing formal written notice to the Collaborators as a group, or any one of them may, at any time, terminate this agreement by notifying the CSAAH designee with a formal written notice, of such termination. We require that once you receive the data sets, you provide us a 1-2 page update of your research progress every six months. If you do not make demonstrable progress with your analyses within 12 months of receiving the CSAAH data, we reserve the right to void this agreement.

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[2] Example acknowledgement language: The NYU Center for the Study of Asian American Health is supported by the NIH/NIMHD cooperative agreement number P60MD000538.

Summary of research study protocol:

Briefly describe your planned research including the following components (limit to one page single spaced):

1. **Title:** Examining the Association of Acculturation Levels with Diabetes Self-management and Self-efficacy among Bangladeshi Immigrants in New York City: Is Gender a Factor?

2. **Purpose:** The study aims for a better understanding of acculturative influences on diabetes self-management and self-efficacy and helps to provide a new framework to further improve the effectiveness of CHW diabetes interventions in this community.

3. **Background Information:** Diabetes is more widespread in racial and ethnic minority populations in the United States. These groups often receive poorer quality of care and consequently are challenged with health barriers that lead to negative outcomes. Bangladeshis are among the fastest growing immigrant groups that have the highest prevalence of type 2 diabetes, which underscores the need to understand the consequences of the dynamic process of acculturation in this community. Trans theoretical Theory of Change, Health Belief Model Theory and Community Health Education Theory will be applied in the study. These theories are sufficient for the study and aligned with the research questions.

4. **Specific Aims:** Understanding the association between acculturation proxies (length of stay and English language proficiency) and how it impacts the management of diabetes and self efficacy in Bangladeshi immigrants in New York City.

5. **Methods of Data Analysis and Design**
    a. Data source: DREAM Intervention study data from the NYU Center for the Study of Asian American Health
    b. Main exposures of interest: Acculturation
    c. Outcome of interest: Diabetes self-management (DM1 through DM12) and self-efficacy (SE, PA6, PA7, FB5, FB6, FB10, FB11)
    d. Other indicators: These would include socioeconomic factors, level of education, financial income, employment status, food and health behaviors, physical activity and access to care.
    e. Anticipated start and completion dates: The doctoral study will commence in July 2018 and is anticipated to be completed within 12 months.
    f. Limitations: Though this is the first study to look at the self-reported data on acculturation proxies and diabetes self-management and self-efficacy in Bangladeshi immigrants in New York City, there are some limitations. The paper looks at proxies and not acculturation and the findings may not be generalizabe to the Bangladeshi population. Additionally, studies are needed that take into account the life experiences

or Bangladeshi immigrants before moving to the United States to fully understand the impact of acculturation on diabetes self-management and self-efficacy. Furthermore, stress-related processes implicated in the development of diabetes needs to be further investigated.

How results will be reported: The paper will be for dissertation and presented without bias and actionable recommendations will be suggested in light of the significance of the findings. The paper will be published in a peer reviewed journal.

Data Management and Security: The confidentiality data sharing agreement would be adhered to in the study. The data shared by NYU Langone will be kept strictly confidential and secure at all stages of the research in my personal laptop that is only accessible to me .

Collaborating institution: Walden

Signatures from programmers, investigators and any others designed to have access to CSAAH data are required. The Senior Investigator is responsible for overseeing observance of this agreement:

Senior Investigator	7/23/18 Date	
RM Collaborator	7/23/18 Date	Author Role in project
Jaana Leyatt Collaborator	7/24/18 Date	co-investigator Role in project
Collaborator	Date	Role in project
Collaborator	Date	Role in project

FOR CSAAH USE ONLY:

Jaana Leyatt Approver CSAAH	7/24/18 Date