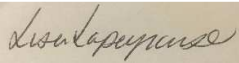**How stress impacts physical functioning among Latino adults residing in Flint, Michigan**
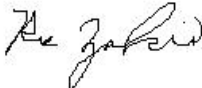
By

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Abstract

The purpose of this research is to analyze how different types of stress impact physical functioning among Latino adults residing in Flint, Michigan. Data used for this analysis was obtained from CASPER-Latinx, a cross-sectional study that consisted of n= 98 unique households. Participants of the study were 18 years of age or older, self-identified as Hispanic/Latino, and resided in the city of Flint, Michigan. The Flint CASPER-Latinx study was conducted to obtain a better understanding of how the Latino population was affected by the Flint Water Crisis (FWC). Existing research shows a strong connection to race/ethnicity and health disparities. T-test and Pearson coefficient analyses were conducted for independent (water crisis stressors and chronic financial stress) and covariate (age, gender, and acculturation) variables with physical functioning. A multivariate stepwise linear regression analysis was used to determine the most predictive variables for physical functioning. The only significant predictor found was age (p=.014, β=.184). The findings of this research did not conclude a significant relationship between stress and physical functioning. Future research which analyzes the relationship between stress and physical functioning should look at age-specific populations (i.e., elderly or middle age) to determine if stress is associated with physical functioning. This study emphasizes the importance of resources made available to the Latino population that would assist with minimizing physical functioning limitations as age was found as a predictor of physical functioning.

Word count: 228

Keywords: physical functioning, chronic stress, Latinos, minority populations

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Introduction

In April of 2014, government officials decided to switch Flint's water source from Lake Huron and the Detroit River to the Flint River. Flint was not prepared to treat such water, which led to the exposure of lead and other hazardous materials in the pipes. After exposing nearly 100,000 people to lead and other hazardous materials, the water was eventually switched back towards the end of the year in 2015. As an outcome of the Flint Water Crisis (FWC), the Centers for Disease Control and Prevention (CDC), state and local officials, community residents, and local academic partners conducted a Community Assessment for Public Health Emergency Response (CASPER) with Flint residents (Sneed, Dotson, Brewer, Pugh, Johnson-Lawrence, 2019). CASPER is an epidemiological tool designed to collect and measure household-based information. Results from these types of studies can be utilized by public health professionals to examine how a community has been impacted by a public health emergency (CDC, 2012). Although Flint CASPER is a great data surveillance mechanism for the FWC, it did not address the impact on minority groups such as the Latino population. Through its random sampling technique, very few Latino households were captured in the Flint CASPER studies. In 2019, the Flint CASPER-Latinx study was conducted to obtain a better understanding of how the Latino population was affected. Using data from Flint CASPER-Latinx, the primary objective of this study is to examine the relationship between FWC-based stressors and physical functioning among Latino adults residing in Flint. Understanding the relationship between FWC-based stressors and physical functioning among Flint's Latino population will allow public health professionals to have a better understanding of the FWC impacted health and how to develop and delegate resources to address ongoing community needs.

Literature Review

Physical functioning and psychological health (stress) are primary factors that contribute to an individual's overall quality of life (QOL) (WHOQOL Group, 1995). Physical functioning can be described as the ability to carry out basic and instrumental activities of daily living which are essential for maintaining one's independence (Garber et al., 2010; Painter, Stewart, and Carey, 1999). According to the WHOQOL Group (1995), physical functioning is used as an indicator to measure QOL. Existing literature shows limitations of physical functioning can decrease QOL (Tomey & Sowers, 2009).

Stress is a naturally occurring instinct of the body (American Psychological Association, 2013). Long-term stress is also known as chronic stress which originates from unrelenting feelings of despair or hopelessness and can have serious consequences on a person's health (American Psychological Association, 2012). Chronic stress adversely affects the body in three major ways: (1) physical changes as well as alteration of physiological processes in the body, (2) an increased likelihood of maladaptive behaviors and/or poor lifestyle choices, and (3) a change in subjective symptomology (what might cause someone to overuse or underuse the healthcare system) (Farley et al., 2005). Long-term stress is associated with diseases like heart disease, depression, obesity, cognitive impairment, inflammatory disorders, and autoimmune diseases (American Psychological Association, 2013; American Psychological Association, 2012).

QOL can be described as a comprehensive, multidimensional concept that is based on a person's perception of their position in life (WHOQOL Group, 1995; CDC, 2018). QOL surveillance data gives researchers the ability to detect patterns among populations and help guide interventions to prevent declined QOL (CDC, 2018). Measuring physical functioning and stress levels for Flint Latinos are important indicators to determining QOL for one of the

minority populations residing in Flint. Additional data will better assist public health officials in addressing health disparities among the Latino population.

Latino Demographic Data

For decades, research has documented a relationship between Latinos and lower socioeconomic status (SES) (Morales, Lara, Kington, Valdez & Escarce, 2002). SES incorporates three main factors: education, income, and occupation, and is a primary determinant of health (Adler & Newman, 2002). The CDC (2020) notes, differences among racial/ethnic groups in their ability to achieve optimal health are considered health disparities. Health disparities are often related to the burden of preventable diseases, violence, and injuries experienced by socially disadvantaged populations (CDC, 2020). In the United States (U.S.), ethnic minority groups have been shown to have poorer health outcomes among treatable or preventable diseases as well as worse overall health when compared to non-Latino white Americans (Jackson & Gracia, 2014; American Psychological Association, 2012). The Latino population makes up the second-largest racial/ethnicity group in the U.S., thus the quality of their health is a significant factor in the overall quality of the nation's health (Pew Research Center, 2020).

According to the U.S. Census Bureau, an estimated 58.8 million Latinos were living in the U.S. in 2019 (18.5% of the total population). Latinos make up 5.2% of Michigan's population and 3.9% of Flint's population (United States Census Bureau, 2020). The 2017 United States census reported 31.5% of Latinos were under the age of 18 years old compared to 18.8% of non-Latino whites. In the same census report, the largest Latinx subgroup were Mexicans (62.3%) followed by Puerto Ricans (9.5%). The U.S. Department of Health and Human Services Office of Minority Health (2019) indicates that nearly three-fourths of Latinos

speak a language other than English at home (72%). Among this group, almost 30% stated they were not fluent in English. Minority languages have been found to be a barrier to the quality of care for smaller racial/ethnic groups (de Moissac & Bowen, 2019). Furthermore, poverty rates for Latino families in Michigan are three times higher (24%) than non-Latino whites (8%) (Kaysitsinga, 2015). As previously discussed, income is a primary factor in an individual's SES. On average, non-Latino white Michiganders were reported to make roughly $12,000 more than Latino Michiganders (MiCalhoun, 2020). Poverty rates for Latino female-headed families with children under 18 years old are two and a half times greater (53%) than married Latino families with children below the age of 18 years old (20%) (Kayitsinga, 2015). Finally, the Joint Economic Committee (2019) reports Latinos who reside in Michigan are 1.7 times more likely to live in poverty when compared to whites.

Physical Functioning

- HA: It is hypothesized that there will be a relationship between chronic stress and physical functioning, such that Latino respondents who experience higher stress levels will have lower physical functioning.

In the U.S. Latinos are predicted to have a longer life expectancy but are found to live with higher rates of physical functioning limitations (Pebley, Goldman, Andrasfay, & Pratt, 2021). Physical activity is associated with lowering risks of physically debilitating chronic diseases such as diabetes, heart disease, obesity, cancer, etc. (U.S. Department of Health and Human Services, 2008). Research shows Latinos are prone to experience more health comorbidities with poorer rates of diagnosis and medical treatment when compared to the general population (Arredondo et al., 2016). According to a study by Hummer & Hayward (2015), when compared to white Americans over the age of 65 years old, Latinos have worse

physical functioning levels. Physical limitations are less prevalent for foreign-born Latinos but out of out all foreign-born populations, Latinos had the most limitations (Pebley et al., 2021). Additionally, foreign-born Latino women have the highest disability rates in comparison to U.S.-born white, blacks, and Latinos (Hummer & Hayward, 2015).

In a telephonic survey conducted by the American Psychological Association (2006), researchers examined the effects of stress on the mind and body. Results showed 44% of Latinos used exercise to cope with stress. In another study by Farley, Galves, Dickinson, & Maria de Jesus (2005), investigators examined the relationship between stress, coping style, and health related QOL. Findings concluded that Mexican immigrants and Mexican Americans reported higher levels of physical functioning, better stress coping mechanisms, and fewer health diagnoses when compared to the non-Latino whites. Within groups, differences in physical functioning also exist. For example, foreign-born Mexicans were more likely to report physical limitations during midlife (50-64 years old) compared to U.S.-born citizens (Garcia & Reyes, 2018). However, these trends reverse later in life, where U.S.-born citizens, 65 and older, report higher rates of physical limitations (Garcia & Reyes, 2018). Other data which supports the theory of older U.S. living Latinos being less active as they age exists in a study by Larsen, Noble, Murray, & Marcus (2015), who found that Latinos 50 years old and older, are the least active population for their age bracket (33%) when compared to non-Latino whites (26%). Researchers suggest these finding might be contributed to factors of living with lower SES such as neighborhood safety, culturally appropriate exercise regimens, gender norms and the cost of a gym membership (Larson et al., 2015).

As previously noted, physical functioning influences a person's overall QOL (WHOQOL Group, 1995). In a study that examined physical functioning, psychosocial-cultural predictors

(acculturation, familismo, and ethnic identity), and depression among older Latinos who lived in metropolitan areas of the Midwest, a relationship between decreased physical functioning and increased levels of depression were found (Chavez-Korell, Benson-Flórez, Rendón, & Farías, 2014). Additionally, the study also found a relationship between acculturation and higher levels of depression (Chavez-Korell, et al., 2014). Acculturation is the adjustment of a person's values, beliefs, identity, and/or behaviors of a minority culture as a result of prolonged time in a major culture environment (Fox, Thayer & Wadhwa, 2017). The relationship between acculturation and depression is important to note because Latinos typically have strong cultural ties (Chavez-Korell, et al., 2014). Latinos who are more acculturated may be at an increased risk of depression which may ultimately lead to lower levels of physical functioning (Fox, Thayer & Wadhwa, 2017; Chavez-Korell, et al., 2014).

The U.S. Department of Health and Human Services Office of Minority Health (2019) reports Latinos are 1.7 times more likely to be diagnosed with diabetes compared to non-Latinos. Other concerning health trends for Michigan's Latino population include higher risks of heart disease, obesity, depression, and cancer (Hekman, Weir, Fussman Lyon-Callo, 2014; U. S. Department of Health and Human Services Office of Minority Health, 2020). Research by Graham et al. (2007) analyzed the physical and mental functioning of older Latinos who were diagnosed with or without diabetes. Latinos who were diabetic were more likely to report poorer health related QOL due to lower levels of physical functioning. A higher risk of certain chronic diseases puts Latinos at a heightened risk for reduced physical functioning, as obesity and diabetes can impede mobility (Burrows et al., 2021). The negative impact that chronic disease can have on mental health for Latinos is important to note as research indicates it is likely to decrease physical functioning levels (Graham et al., 2007).

Chronic Stress

- HA: It is hypothesized that water crisis stressors will be associated with physical functioning among Latino adults, such that as water crisis stressors increase, physical functioning decreases.

- HA: It is hypothesized that chronic financial stress will be associated with physical functioning among Latino adults, such that as chronic financial stress increases, physical functioning decreases.

Some of the leading causes of stress documented by the American Psychological Association (2006) for Latinos are the health status of a family member or loved ones, personal health, money, safety, and work. Latino men and women both reported their biggest stressors stemmed from work and/or home (American Psychological Association, 2006). Among both genders, Latinos reported greater concerns regarding the health of their family or loved ones when compared to the general population. In the same study, Latino women were found to show stress symptoms with feelings of nervousness or headaches whereas men reported symptoms such as irritability, muscle tension, and trouble sleeping (American Psychological Association, 2006).

Stress can have a negative impact on physical functioning for Latinos (Graham et al., 2007). Adler & Newman (2002) found that race/ethnicity by itself can be a risk factor for experiencing chronic stress for the Latino population due to consequences of poor SES. In a study that assessed stressors that affect sleep among Latinos residing in the U.S., it was found that chronic psychosocial stress, acculturation stress, and ethnic discrimination are associated with poor sleep habits (Alcántara et al., 2017). In another study that analyzed the relationship between stress and sedentary behaviors in Latinos, researchers found that those who recounted

more than one traumatic lifetime stressor, reported more daily sedentary minutes compared to those who did not recount for any stressors (Vásquez et al., 2016). These studies indicate that being of Latino descent puts a person at a heightened risk for stress which may result in participating in less physical activity.

Contradicting to the previous research discussed, Farley et al. (2005) discusses that Mexican immigrants process stress in more beneficial ways compared to non-Latino whites. In addition, the American Psychological Association (2006) found that Latinos often use better methods to manage stress such as spending time with family, listening to music, exercising, reading, and watching TV compared to behaviors like smoking. A common feature discussed in the literature was familialism. Familialism is described as strong feelings of solidarity, loyalty, and reciprocity among family members (Comeau, 2012; Chavez-Korell et al., 2014). Strong values of familialism among Latinos are noted to positively impact psychological and physical health which may be a contributing factor to the Latino population having better stress management skills when compared to other racial/ethnic groups (Chavez-Korell et al., 2014).

Methods

Study Design

CASPER is an epidemiological tool provided by the CDC that is used to generate individual and household-level data regarding physical and behavioral outcomes in communities impacted by public health disasters, such as the Flint Water Crisis (CDC, 2012). The first CASPER assessment conducted in Flint was in May of 2016. Flint CASPER assesses individual and household-level physical and behavioral health concerns but also water-related resource and service needs (Fortenberry et al., 2018). Since 2016, CASPER assessments have been conducted

annually to evaluate changes in physical and behavioral health concerns and water-related needs (Sneed et al., 2020).

Each of Flint's CASPER assessments employs a two-stage cluster sampling design to obtain a representative sample of Flint households (Sneed et al., 2020). While this sampling technique is valuable, it fails to capture the experiences of Latino residents, who represent a small and understudied population in Flint. Through this sampling technique, very few Latino households were captured. Thus, until now, insufficient data existed regarding how the Latino community has been impacted by the FWC.

CASPER-Latinx is a cross-sectional study that consisted of a 58-item survey. Data was collected between November of 2019 and January of 2020. In order to meet the cultural and linguistic needs of the community, the survey was translated using the forward (English to Spanish) and backward (Spanish to English) translation techniques with two different translators from the local Latino community. Data was collected by bilingual (Spanish/English speakers) community members who were trained by the principal investigator in survey administration techniques.

The content of the CASPER-Latinx survey is similar to the 2019 Flint CASPER survey employed, but there are a few differences between the two surveys. The CASPER-Latinx survey includes a more detailed set of questions assessing language barriers. While the general CASPER survey only asks respondents whether someone in their household has difficulty understanding English, the CASPER-Latinx survey asks respondents whether someone in their household has difficulty (1) understanding English, (2) speaking English, and (3) reading English. In addition, the CASPER-Latinx survey asks respondents about which Latino subgroup they identify with (i.e., Mexican/Mexican American/Chicano, Puerto Rican, Cuban, or Other Hispanic/Latino),

whereas the general Flint CASPER survey only asks about the respondent's race/ethnicity (i.e., American Indian or Native Alaskan, African American/Black, Asian, Caucasian/White, or Native Hawaiian/Pacific Islander). The final difference includes the CASPER-Latinx survey addressing household health history (household members who have ever been told by a healthcare professional that they have; Asthma/COPD/emphysema, diabetes, developmental disability, hypertension/heart disease, physical disability, or psychosocial/mental illness). Some commonalities of the CASPER surveys include questions regarding household demographics, household health and behavioral health, individual behavioral health, health communication, stress levels, and resilience.

Study Population

Participants of CASPER-Latinx were recruited using a snowball sampling method using community contacts and referrals. Eligibility for the study included respondents 18 years of age or older, self-identify as Hispanic/Latino, and reside in the City of Flint, Michigan. A total of n = 105 surveys were completed. However, after removing duplicated households, households with zip codes located outside of the City of Flint, and incomplete surveys, the sample size was reduced to n = 98 unique Latino households. Before initiation of the survey, written informed consent was obtained from all participants in either English or Spanish. All participants were given a $20 prepaid Mastercard for completing the 58-item survey, which ranged on average 30 to 40 minutes to complete. This study was approved by the Institutional Review Board of the University of Michigan-Flint.

Measures

All data was collected using self-reported techniques. The demographic variables that were measured for this study include age, gender, and acculturation. Sex was measured for only the survey respondent and coded as either male or female. Age was also only reported for the respondent. Acculturation was measured for the entire household.

To measure acculturation, question 8, "does anyone in your household have difficulty understanding English?" 8a, "does anyone in your household have difficulty speaking English?" and 8b, "does anyone in your household have difficulty reading English?" were each transformed into new variables where 1=yes and 0=no. Any "yes" response to difficulty understanding, writing, or reading English was considered 1 household language barrier. Using the recoded variables that were made from questions 8, 8a, and 8b, a new composite variable was created making a 3-item scale to measure acculturation. Cronbach's Alpha test of reliability showed more than satisfactory results of the scale at $\alpha = .941$. Scores for the 3-item acculturation scale ranges from zero to three where 1 = the presence of any 1 language barrier, 2 = the presence of any 2 language barriers, or 3 = the presence of all 3 language barriers.

Water crisis related stressors are addressed by question 16. The question asks about water crisis related stressors in five different areas: compromised health, financial worries, added stressors to daily routine, feeling overlooked by decision makers, and feeling that crisis will never be fixed. The questions states, "Since July 2018, have you or a member of your household experienced stress due to the Flint water crisis regarding…" Responses include, "None," "Some," "A lot," "Don't know," and "Refused." Each item

was recoded to remove missing responses, "don't know," and "refused." After recoding, a 5-item composite variable was created for water crisis related stressors where scores ranged from zero (no stress) to ten (significant stress). Cronbach's alpha for the scale in this current study population was good at $\alpha = .804$.

To measure chronic financial stress, a composite variable was created using questions 29 and 30. Question 29 asks, "How often in the past 12 months would you say you were worried or stressed about having enough money to pay your rent/mortgage?" Question 30 asks, "How often in the past 12 months would you say you were worried or stressed about having enough money to buy nutritious meals?" Responses to both questions included "Always," "Usually," "Sometimes," "Rarely," "Never," "Don't know," or "Refused." Both questions were recoded into new variables to omit "Don't know" or "Refused" responses and transform "Always" and "Usually" into a "2," "Sometimes" into a "1" and "Rarely" and "Never" into a "0." The two new variables were then used for the creation of the composite variable that consisted of a 4-item scale to measure chronic financial stress. The 4-item chronic financial stress scale was reliable in the current study population with Cronbach's alpha $\alpha = .791$.

Physical functioning was assessed using items taken from the 12-item Short Form Survey (SF-12) which is a widely used tool to assess self-reported physical health (Larson, 2002). Responses are recoded using a reverse coding method which generates indicator values and allows for reliable comparisons in regression due to standardization (Ware, Kosinski, Keller, 1995). The four survey questions used to create the composite scale variable are "Does your health now limit you in these activities? If so, how much?" "moderate activities such as moving a table, pushing a vacuum cleaner, bowling, or

playing golf" (question 39) and "Climbing several flights of stairs" (question 40). Available responses to both questions were, "Yes, limited a lot," "Yes, limited a little," No, not limited at all," "Don't know," or "Refused." Question 39 and 40 were recoded into new variables where "Yes, limited a lot" was recoded to "2," "Yes, limited a little" was recoded to "1," and, "No, not limited at all" was recoded to "0." Any "Don't know" or 'Refused" responses were omitted. The other two questions that physical functioning was composed of are "During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?" "Accomplished less than you would like" (question 41) and "Were limited in the kind of work or other activities" (question 42). Responses to both questions included "Yes," "No," "Don't know," or "refused." Question 41 and 42 were recoded into new variables where "Yes" was recoded to "1" and "No" was recoded to "0." Again, any "Don't know" or 'Refused" responses were omitted. The four recoded variables were then used to create a 4-item scale with scores ranging from zero to six where higher scores indicate greater physical functioning limitations. Cronbach's alpha for the scale in the current population was $\alpha = .869$.

Analysis

Using *IBM SPSS Statistics* software, version 26, all available descriptive statistics from the entire survey were used to create a demographic profile of the Flint CASPER-Latinx population. Frequencies are reported for dichotomous and categorical variables which include sex, race, Latinx subgroup, language preference, diagnoses, households with at least one pregnant member, acculturation, type of housing structure, homeownership, and age distribution of household members. Mean and Standard

Deviation (SD) are reported for continuous variables which include age, length of residence in Flint, water crisis stressors, chronic financial stress, physical functioning scale, acculturation, and household size. Bivariate analyses were conducted to examine the relationships between water crisis stressors and physical functioning, chronic financial stress and physical functioning, age and physical functioning, gender and physical functioning, and acculturation and physical functioning. A Pearson correlation coefficient was used to analyze the relationship between age and physical functioning, water crisis related stressors and physical functioning, and chronic financial stress and physical functioning. A paired samples t-test analyzed the relationship between gender and physical functioning and acculturation and physical functioning. Once significant variables were identified from bivariate analyses, a stepwise linear regression analysis was used to determine the most predictive variables for physical functioning. The first model of the multivariate stepwise regression examined basic demographics (i.e., age, gender, and acculturation) and the second model analyzed the stress variables (i.e., water crisis related stressors and chronic financial stress).

Results

Table 1

Flint CASPER-Latinx Individual Characteristics and Household Characteristics

	Mean	**Standard Deviation (SD)**
Age (years)	49.98	16.3
Sex		**%**
Male		29.93
Female		70.4
Race/Ethnicity		
American Indian/Alaskan Native		2

Asian	0	
African American or Black	0	
White	62.2	
Native Hawaiian of Pacific Islander	0	

Latinx subgroup

Mexican/Mexican American/Chicano	92.9
Puerto Rican	2
Cuban	1
Other	4.1

Language preference

English	43.9
Spanish	56.1

	Mean	**Standard Deviation (SD)**
Length of residence in Flint (years)	31.83	19.91
Water crisis related stressors	5.8	2.3
Chronic financial stress	3.7	2.2
Physical functioning scale	1.6	2.02

Have you or a member of your household ever been told by a healthcare professional that they have	**%**
Asthma	14.6
Diabetes	23.2
Developmental disability	4.3
Hypertension/heart disease	26.1
Physical disability	13
Psychosocial mental illness	8.7
Pregnant household members	4.1

Acculturation

1 barrier	7.1
2 barriers	4.1
3 barriers	56.1

	Mean	**Standard Deviation (SD)**
Acculturation	1.87	1.37

Type of housing structure	**%**

Single family home	96.9	
Mobile home	1	
Multiple unit	1	
Other	1	
Home ownership		
Own	73.5	
Rent	24.5	
Other	2	
	Mean	**Standard Deviation (SD)**
Household size	3.28	1.87
Household age distribution	**%**	
<5	11.3	
6-17	40.7	
18-20	24.7	
21-64	88.8	
65+	17.4	

Results shown in Table 1 are the individual and household demographic findings

of the Flint CASPER-Latinx study population. The mean age was nearly 50 years old

with a large SD of 16.3 years. The study sample was made up of more females (70.4%)

than males (29.3%). Majority of the population identified as white (62%), while more

than 10% reported "don't know" when asked about their race. Latinx subgroup

frequencies indicated 93% of participants identified as Mexican/Mexican

American/Chicano. In regard to language preference, a greater proportion of the sample

completed the survey in Spanish (56.1%) compared to English (43.9%). The average

length of residency in Flint was 31.83 years (SD 19.91). Next, the average for water crisis

related stressors was 5.8 (SD 2.6). Results for the average of chronic financial stress were

at 3.7 (SD 2.2) and the average for the scale for physical functioning was low at 1.6.

More than a quarter (26%) of respondents reported that a member of their household was

told they have hypertension or heart disease. In addition, 23% reported someone in their

household who had diabetes and 14.6% reported that a member of their household had

been diagnosed with Asthma, COPD, and/or emphysema. Only 4.1% of participants

reported having at least one pregnant person within their household. More than half of

respondents (56%) reported having at least one member of their household who had

difficulty reading, writing, and understanding English and average at 1.87 (SD 1.37).

Nearly all participants reported living in a single-family home (96.9%). A large portion

of the population owned their home (73.5%) and a quarter of the population rented

(24.5%). The average household size was 3.28 people (SD 1.87). Finally, a vast majority

(89%) of the sample reported household members between the ages of 21 and 64.

Table 2

Bivariate Analyses for Physical Functioning

	r	n	df	p-value
Age	.26	69		.033*
Gender	.049	70	69	.773
Acculturation	-.429	69	68	.808
Water Crisis Related Stressors	.13	56		.342
Chronic Financial Stress	.134	66		.283

*Significant value

Findings of the bivariate analyses are included in Table 2. A Pearson correlation

assessed the relationship between age and physical functioning and found a significant

relationship between the two variables (r= .26, n=69, p=.033). A paired samples t-test

conducted to assess the relationship between gender and physical functioning did not find

a significant difference between gender and physical functioning (t(69) =.35, p=.773). A paired samples t-test was conducted to examine acculturation and physical functioning. A significant relationship was not found (t(68) =.24, p=.808). A Pearson correlation analyzed the relationship between water crisis related stressors and physical functioning and again, did not find a significant relationship (r= .13, n=56, p=.342). The final bivariate analysis conducted was a Pearson correlation to determine if a relationship exists between chronic financial stress and physical functioning. No relationship was detected (r=.134, n=66, p=.283).

Following bivariate analyses, a stepwise, linear regression analysis was conducted where two models were tested. Model 1 included three demographic variables: age, gender, and acculturation. Model 2 added water crisis related stressors and chronic financial stress to the analysis. In the first model, age was found to be a significant (p=.014., β=.184) predictor of physical functioning. In the second model, only age remained as a significant predictor of physical functioning (p=.013, β=.185).

Discussion

It is reasonable that the results of the current research study provide additional support to the well-documented relationship between age and physical functioning. A wealth of research exists regarding natural aspects of aging and increased age-related physical functioning limitations as humans age (Burrows, et al., 2021). The population of respondents over 65 years old only included 17.4% of the sample. Although the dataset for Flint CASPER-Latinx was not intended to be specific to older adults, this relationship was still evident.

Results of stress levels did not appear as anticipated. On a scale of zero to ten, the average level of water crisis related stressors was 5.8 and on a scale of zero to eight, chronic financial stress was 3.7. Existing research indicates that those who hold lower SES are prone to issues such as financial hardships, accessing healthcare, poor work conditions, poor housing/neighborhood, etc. (Larson et al., 2015). It was anticipated that the FWC would further exacerbate stress levels for Latino residents, but the results of this study were not consistent with that theory. This can be explained by research that shows when Latinos face higher levels of stress, they have better coping techniques compared to non-Latino whites (American Psychological Association, 2006 & Farley et al., 2005). Similarly, Chavez-Korell, et al. (2014) notes that having strong familialism ties assists with chronic stress management. It is estimated that the study sample has a strong sense of familialism as they do not appear very acculturated.

Over half of the population reported having someone in their household who has difficulty reading, writing, and understanding English. While this might create communication barriers, research shows Latinos who are more acculturated, are at higher risk of developing health complications compared to Latinos who are less acculturated (Chavez-Korell, et al., 2014). Being more acculturated can lead to feelings of distress after prolonged periods of being surrounded by a majority culture (Fox, Thayer & Wadhwa, (2017) & Alcántara et al. (2017)). Given that Spanish was the preferred language for the study sample, acculturation appears less prevalent which may create fewer health complications that would limit physical functioning for Flint Latinos.

Limitations

One limitation of this research was the low levels of physical functioning limitations reported. Almost 37% reported no physical functioning limitations and only 5% reported the highest limitation level. Although age ranged from 19-90 years old, the average age was about 50 years old and SD was large at 16.2. Since age and poor physical functioning are related, results are likely due to the low prevalence of elderly respondents. Another possible limiting factor to low levels of physical functioning is that the survey was based on household data rather than individual data. It is likely that those with higher limitations were not the ones filling out the survey.

Another limitation was the sample size of only 98 participants. A downfall to a small sample size limits extrapolation of results to other Latino populations (Faber & Fonseca, 2014). The method for data collection also created limitations. Surveys were administered by local members of the Latino community which could have caused participants not to feel comfortable disclosing information because they were too proud or too embarrassed to admit their true stress, financial, or health situations.

The next limitation was the technique of gathering participants for the study. A snowball sampling method was necessary to rapidly obtain the study sample because the research was inclusive of only Latino residents in the city of Flint. This sampling method limits validity because participants were not selected at random. Sampling bias can arise in snowball sampling methods because of the possibility of participants who help find others to partake in the study, may share similar traits and be of a similar mindset (Explorable, 2021).
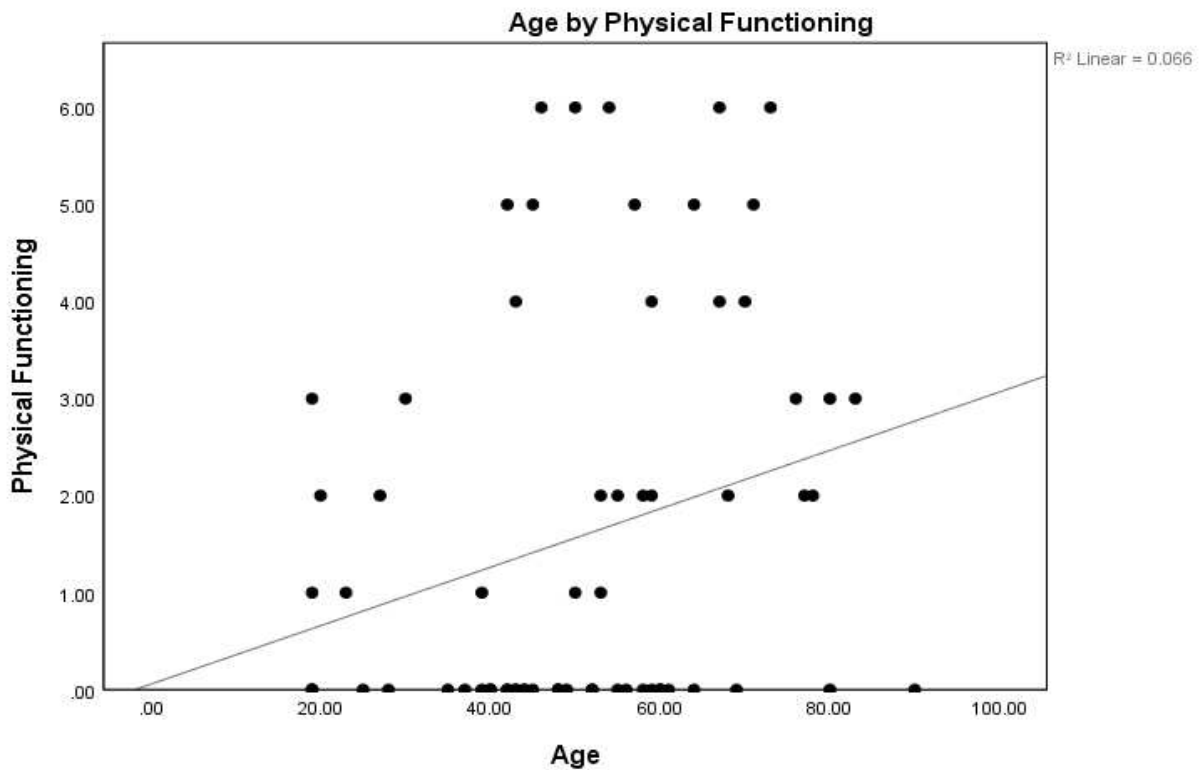
Finally, the study was based on self-reported data which can raise speculation of reliability and recall bias (Setia, 2016). As access to healthcare has been documented as being more difficult for Latinos compared to non-Latino whites, another limiting factor about self-reported data is that Latinos might not have the same perception of health and well-being as non-Latino whites would. They may not understand the severity of symptoms or health concerns they have due to lack of involvement with the healthcare system and lack of regular monitoring and awareness of their health status.

Implications

Existing research indicates how minority groups can differ from the general populations and why it is important to address their needs separately. Future studies should address minority populations on smaller scales as did Flint CASPER-Latinx (i.e., city or county vs statewide data). Data should be collected annually to provide longitudinal surveillance with higher accuracy levels. Future studies that are specific to racial/ethnic minority groups should use community based participatory research (CBPR) techniques to promote trusting relationships within the community. Obtaining stronger relationships with the community might allow for obtaining more accurate data.

Furthermore, drawing conclusions about physical functioning and stress among the Latinos population cannot be obtained from this research as no significant relationship was detected. Future research that analyzes this relationship should look at age specific populations (i.e., elderly or middle age). The ability to detect the relationship between age and physical functioning among this data puts further emphasis on the importance of available physical activity programs and resources (affordable/accessible gyms, tracks, exercise courts) to Latinos residing in Flint. As language barriers were

found to be prevalent for more than half of the population, it is vital that such programs

and resources are appropriately communicated. Using communication channels such as

Latino churches, local news or TV commercials, social media platforms, or flyers in

higher populated areas, would be great techniques to reach Latinos in Flint.

Applied public health competencies

Analyze quantitative data using biostatistics, informatics, computer-based programming

and software, as appropriate*

o Using skills and techniques learned in Biostatics for Health Professionals and

Epidemiology, I was able to analyze quantitative data from the CASPER-Latinx

study. Understanding how to use computer-based programming software (SPSS

26) provided me with the ability to run statistical tests with this dataset. Theories

and techniques learned in Epidemiology gave me the capacity to understand how

to analyze, draw conclusions, and the ability to answer my public health research

question: How do different types of stress impact physical functioning among

Latinx Adults residing in Flint, Michigan?

Interpret results of data analysis for public health research, policy or practice

- o I interpreted the results of my SPSS descriptive, bivariate, and multivariate analyses to

    answer my public health research question: How do different types of stress impact

    physical functioning among Latinx Adults residing in Flint, Michigan? Again, this ability

    is credited primarily to Biostatics for Health Professionals and Epidemiology but also

    Public Health Administration and Policy where I gained a better understanding of

    establishing policies.

Assess population needs, assets and capacities that affect communities' health*

- o Based upon the findings of my research, I assessed the health status of the Latino

    population in Flint to better understand their physical and behavioral health needs by

    examining a dataset, specific to their population. Specifically, I assessed physical

    functioning and chronic stress levels after experiencing the FWC which allowed me to

    better understand barriers to achieving optimal health. Barriers found to achieving such

    health were related to common health disparities that minority populations encounter due

    to characteristics of individuals with lower SES. The Social Determinants of Health class

    as well as cultural competence assisted my understanding of health disparities and lack of

    health equity for the Latino population in flint.

Advocate for political, social or economic policies and programs that will improve health in

diverse populations*

- Based upon my findings of CASPER-Latinx research and community asset and capacity assessments, in the conclusion of my paper, I advocate for strategies, programs, and resources that address current needs for local Latino members in the Flint community. These programs and service recommendations are aimed at improving the health of the Latinx population impacted by the Flint Water Crisis. Understanding how to initiate and apply strategies or policy procedures to advocate for a minority population was learned in Health Education Theory and Strategies and Public Health Administration and Policy.

Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes*

- As part of my program and service recommendations, I proposed strategies to identify stakeholders and build partnerships to address local program and service gaps revealed in my research project. I proposed different community engagement strategies to employ in the development of effective, evidence-based programming to improve physical functioning outcomes among Latinx adults such as working with churches or the local news stations to promote physical activity programs or resources.

Apply ethical decision making in a health care context.**

- To complete this project, I applied ethical decision-making in several different healthcare contexts. First, I employed ethical decision-making when conducting my statistical analyses. I did not falsify data to change the outcomes of my research. I exercised professional ethics by conducting my study analyses myself. I did not have someone else conduct my study analysis on my behalf. Additionally, I applied ethical decision-making when reporting and interpreting my research findings. I limited my discussion of findings to the statistical analyses conducted. Finally, I exercised professional ethics by properly

citing sources used to write my research paper. I did not present someone else's work or

ideas as my own by incorporating them into my research without proper

acknowledgement (i.e., quotes and/or citation).

References

Alcántara, C, Patel, S. J., Carnethon, M., Castañeda, S. F., Isasi, C. R., Davis, S., Ramos, A. R., Arredondo, E., Redline, S., Zee, P.C., Gallo, L. C. (2017). Stress and sleep: Results from the Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study. *Elsevier,* 3, 713-221. doi: 10.1016/2017.08.004

Arredondo, E. M., Sotres-Alvarez, D., Stoutenberg, M., Davis, S. M., Crespo, N.C., Carnethon, M. R., Castañeda, S. F., Isasi, C. R., Espinoza, R. A., Daviglus, M. L., Perez, L. G., Evenson, K. R. (2016). Physical activity levels in U.S. Latino/Hispanic adults: results from the Hispanic community health study/study of Latinos. *American Journal of Preventive Medicine,* 50(4), 500-508. doi:101016201508029.

Atdjian, S., Vega, W. (2005). Disparities in mental health treatment in U.S. racial and ethnic minority groups: implications for psychiatrists. *Journal of the American Psychiatric Association, 56(12)*, 1600-1602.

Adler, N. E., & Newman, K. (2002). Socioeconomic disparities in health: Pathways and policies. *Health Affairs, 21*(2), 60-76. doi:10.1377/.21.2.60

American Public Health Association. (2020) *Health Equity.* Retrieved from https://www.apha.org/topics-and-issues/health-equity

American Psychological Association. (2013). *How stress affects your health*. Retrieved from https://www.apa.org/topics/stress/health

American Psychological Association. (2006). *National survey reveals Hispanics engage in healthy behaviors to manage stress more than general population*. Retrieved from http://www.apa.org/news/press/releases/2006/10/hispanic-health

Burrows, B., Andrade, F., Piedra, L., Xu, S., Aguiñaga, S., Steinberg, N., Sarkisian, C., &

    Hernandez, R. (2021). The Influence of Evidence-Based Exercise and Age Reattribution

    on Physical Function in Hispanic Older Adults: Results From

    the *¡Caminemos!* Randomized Controlled Trial. *Journal of applied gerontology: the*

    official journal of the Southern Gerontological Society, *40*(3), 278–288. doi:

    10.1177/0733464820927171

Centers for Disease Control and Prevention. (2012) Community assessment for public health

    emergency response (CASPER) toolkit (Second edition). Atlanta, GA: CDC.

Centers for Disease Control and Prevention. (2020). Health disparities among youth. Retrieved

    from https://www.cdc.gov/healthyyouth/disparities/index.htm

Centers for Disease Control and Prevention. (2020). *Health of Hispanic or Latino population*.

    Retrieved from https://www.cdc.gov/nchs/fastats/hispanic-health.htm.

Centers for Disease Control and Prevention. (2018). HRQOL concepts. Retrieved from

    https://www.cdc.gov/hrqol/concept.htm

Chavez-Korell, S., Benson-Flórez, G., Rendón, A. D., & Farías, R. (2014). Examining the

    Relationships Between Physical Functioning, Ethnic Identity, Acculturation, Familismo,

    and Depressive Symptoms for Latino Older Adults. *The Counseling Psychologist*, *42*(2),

    255–277. doi:10.1177/0011000013477906

Cohen, G. H., Ross, C. S., Cozier, Y. C., & Galea, S. (2019). Census 2020-A Preventable Public

    Health Catastrophe. *American journal of public health*, *109*(8), 1077–1078.

    doi:10.2105/.305074

County Health Rankings. (2020). *Michigan*. Retrieved from

    https://www.countyhealthrankings.org/app/michigan/2020/rankings/genesee/county/outc

    omes/overall/snapshot

Explorable. (2021) *Snowball sampling.* Retrieved from https://explorable.com/snowball-

    sampling

de Moissac, D., & Bowen, S. (2019). Impact of language barriers on quality of care and patient

    safety for official language minority francophones in Canada. *Journal of Patient

    Experience,* 24–32. Doi:10.1177/2374373518769008

Faber, J., & Fonseca, L. M. (2014). How sample size influences research outcomes. *Dental press

    journal of orthodontics*, *19*(4), 27–29. doi:10.15902176

Farley, T., Galves, A., Dickinson, L. M., & Maria de Jesus, D. P. (2005). Stress, coping, and

    health: A comparison of mexican immigrants, mexican-americans, and non-hispanic

    whites. *Journal of Immigrant Health, 7*(3), 213-20. doi:10.100710903

Faugier, J. & Sargeant, M. (1997). Sampling hard to reach populations. *Journal of Advanced

    Nursing, 26(4)*, 790–797. doi:10.10461365

Fox, M., Thayer, Z., & Wadhwa, P. D. (2017). Acculturation and health: the moderating role of

    socio-cultural context. *American anthropologist*, *119*(3), 405–421. doi:10.111112867

Garber, C. E., Greaney, M. L., Riebe, D., Nigg, C. R., Burbank, P. A., Clark, P. G. (2010).

    Physical and mental health-related correlates of physical function in community dwelling

    older adults: a cross sectional study. *BMC Geriatrics, 10*(6). doi:10.11861471.

Garcia, M. A. & Reyes, A. M. (2018). Physical functioning and disability trajectories by age of

    migration among Mexican elders in the United States, *The Journals of Gerontology:

    Series B*, 73(7), 1292–1302.

Graham, J.E., Stoebner-May, D.G., Ostir, G.V., Al Snih, S., Peek, M. K., Markides, K.,

    Ottenbacher, K. J. (2007) Health related quality of life in older Mexican Americans with

    diabetes: A cross-sectional study. *Health Qual Life Outcomes,* 39. doi:10.1186/1477-

    7525-5-39

Healthy People 2020. (2020). Disparities. Retrieved from

    https://www.healthypeople.gov/2020/about/foundation-health-measures/Disparities

Hekman, K., Weir, S., Fussman, C., Lyon-Callo, S. (2014). Health risk behaviors among Latino

    adults within the state of Michigan: 2012 Latino behavioral risk factor survey. Lansing,

    MI: Michigan Department of Community Health, Lifecourse Epidemiology and

    Genomics Division and Health Disparities Reduction and Minority Health Section.

Hummer, R. A., & Hayward, M. D. (2015). Hispanic older adult health & longevity in the United

    States: current patterns & concerns for the future. *Daedalus*, *144*(2), 20–30.

    doi:10.116200327

Jackson, C. S., & Gracia, J. N. (2014). Addressing health and health-care disparities: the role of a

    diverse workforce and the social determinants of health. *Public health reports*

    (Washington, D.C.: 1974), *129*(2), 57–61. doi.org/10.1177/00333549141291S211

Joint Economic Committee. (2019). *The Economic State of the Latino Community in America.*

    Retrieved from https://www.jec.senate.gov/public/_cache/files/f16b51b0-5f61-43a6-

    9428-8835d0ad6a7c/economic-state-of-the-latino-community-in-america-final-errata-10-

    15-2019.pdf

Kayitsinga, J. (2015). *A Socioeconomic Profile of Latino/Hispanic Population.* JSRI

    Demography Report DR.07. East Lansing, MI: The Julian Samora Research Institute,

    Michigan State University.

Larsen, B.A., Noble, M. L., Murray, K. E., & Marcus, B. H. (2014). Physical activity in Latino

   men and women: Facilitators, barriers, and interventions. *American Journal of Lifestyle*

   Medicine, 9(1), 4–30. doi:10.1177/1559827614521758

Larson C. O. (2002). Use of the SF-12 instrument for measuring the health of homeless

   persons. *Health services research*, *37*(3), 733–750. doi:10.1111/00046

McCurley, J. L., Mills, P. J., Roesch, S. C., Carnethon, M., Giacinto, R. E. Isasi, C. R., Teng, Y.,

   Sotres-Alvarez, D., Llabre, M. M., Penedo, F. J., Schneiderman, N., Gallo, L. C. (2015).

   Chronic stress, inflammation, and glucose regulation in U.S. hispanics from the

   HCHS/SOL sociocultural ancillary study. *Society for Psychophysiological Research,*

   52(8), 1071-1079. doi: 10.1111/.12430

Morales, L. S., Lara, M., Kington, R. S., Valdez, R. O., & Escarce, J. J. (2002). Socioeconomic,

   cultural, and behavioral factors affecting Hispanic health outcomes. *Journal of health*

   care for the poor and underserved, *13*(4), 477–503. doi.10.1177/104920802237532

MiCalhoun. (2020). *Ethnicity data for state: Michigan*. Retrieved from

   http://www.micalhoun.org/demographicdata?id=25&sectionId=941

National Research Council. (2010). How does where people live effect their health?,

   Understanding the Changing Planet: Strategic Directions for the Geographical Sciences,

   67-74. Washington, DC: The National Academies Press. doi:10.17226/12860

Painter, P., Stewart, A. L., & Carey, S. (1999). Physical functioning: definitions, measurement,

   and expectations. *Advances in renal replacement therapy*, *6*(2), 110–123.

   doi.org/10.1016/s1073-4449(99)70028-2

Pebley, A. R., Goldman, N., Andrasfay, T., & Pratt, B. (2021). Trajectories of physical

>   functioning among older adults in the US by race, ethnicity and nativity: Examining the

>   role of working conditions. *PLoS One, 16*(3) doi:10.13710247804

Pew Research Center. (2020). *U.S. Hispanic population surpassed 60 million in 2019, but

>   growth has slowed.* Retrieved from https://www.pewresearch.org/fact-tank/2020/07/07/u-

>   s-hispanic-population-surpassed-60-million-in-2019-but-growth-has-slowed/

Pew Research Center. (2007). 2007 National survey of Latinos: as illegal immigration issue

>   heats up, Hispanics feel a chill. Retrieved from

>   https://www.pewresearch.org/hispanic/2007/12/13/iii-quality-of-life-for-

>   latinos/#:~:text=Eighty%2Dsix%20percent%20of%20Latinos,than%20a%20high%20sch

>   ool%20diploma.&text=Some%2080%25%20of%20native%2Dborn,64%25%20of%20th

>   e%20foreign%20born.

Setia M. S. (2016). Methodology Series Module 3: Cross-sectional Studies. *Indian journal of

>   dermatology*, *61*(3), 261–264. doi:10.4103/0019-5154.182410

Sneed, R.S., Dotson, K., Brewer, A., Pugh, P., Johnson-Lawrence, V. (2020). Behavioral health

>   concerns during the flint water crisis, 2016-2018. *Community Mental health Journal, 56*,

>   793-803. doi:10.1007/s10597-019-00520-7

Tomey, K. M., & Sowers, M. R. (2009). Assessment of physical functioning: A conceptual

>   model encompassing environmental factors and individual compensation

>   strategies. *Physical Therapy, 89*(7), 705-14. doi:10.2522/ptj.20080213

Tremblay, M., Martin, D.H., McComber, A.M., McGregor, A., Macaulay, A.C.

>   (2018). Understanding community-based participatory research through a social

movement framework: a case study of the Kahnawake Schools Diabetes Prevention

Project. *BMC Public Health,* 18(487). doi.org/10.1186/s12889-018-5412

United States Census Bureau. (2019). *Quick facts; Flint city, Michigan; United States*. Retrieved

from https://www.census.gov/quickfacts/fact/table/flintcitymichigan,US/PST045219

U.S. Department of Health and Human Services. (2008). 2008 physical activity guidelines for

Americans. Retrieved from https://health.gov/sites/default/files/2019-09/paguide.pdf

U.S. Department of Health and Human Services Office of Minority Health. (2020). *Cancer and*

Latino Americans. Retrieved from

https://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlid=61

U.S. Department of Health and Human Services Office of Minority Health. (2019). *Profile:*

Hispanic/Latino Americans. Retrieved from

https://minorityhealth.hhs.gov/omh/browse.aspx?lvl=3&lvlid=64

U.S. Department of Health and Human Services Office of Minority Health (2019) *Diabetes and*

Hispanic Americans. Retrieved from

https://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlid=63

Vásquez, E., Strizich, G., Gallo, L., Marshall, S. J., Merchant, G. C., Murillo, R., Penedo, F. J.,

Salazar, C., Sotres-Alvarez, D., Shaw, B. A., & Isasi, C. R. (2016). The Role of stress in

understanding differences in sedentary behavior in Hispanic/Latino adults: Results from

the Hispanic community health study/study of Latinos sociocultural ancillary

study. *Journal of physical activity & health*, *13*(3), 310–317. doi:10.1123/0608

Ware, J. E., Kosinski, M., Keller, S. D. (1995). *SF-12: How to score the SF-12 physical and*

mental health summary scales (Second Ed.). Boston:MA The Health Institute, New

England Medical Center.

Warnecke, R. B., Oh, A., Breen, N., Gehlert, S., Paskett, E., Tucker, K. L., Lurie, N., Rebbeck,

    T., Goodwin, J., Flack, J., Srinivasan, S., Kerner, J., Heurtin-Roberts, S., Abeles, R.,

    Tyson, F. L., Patmios, G., & Hiatt, R. A. (2008). Approaching health disparities from a

    population perspective: the national institutes of health centers for population health and

    health disparities. *American journal of public health*, *98*(9), 1608–1615.

    doi:10.2105102525

The WHOQOL Group. (1998). The world health organization quality of life assessment

    (WHOQOL): development and general psychometric properties. *Social Sciences*

    Medicine, 46(12), 1569-1585. doi:10.10160277