

Future Directions in Health Disparities Research: A Compilation from the 2017 Health Disparities Internship Program

Nisaa F. Aleem, Alexandra Lopez, Ashley N. Lopez, and Emily Romero

Working Paper No. 12 | February 2018

healthequitychicago.org

CENTER FOR COMMUNITY HEALTH EQUITY

 DEPAUL UNIVERSITY  RUSH UNIVERSITY

Center for Community Health Equity

Our Working Papers Series aims to stimulate a wide-ranging conversation about community health. Papers will be posted periodically - sometimes preceding a seminar at the Center or at times following a presentation. We also commission working papers from colleagues in Chicago, the United States, and other countries. At the heart of the series are contributions from community-based organizations. The series encourages the exchange of ideas between different individuals and organizations. Inclusion of a paper in the series should not limit subsequent publication in any other venue.

Editorial Board:

Rush University Medical Center

Lisa Barnes
Sharon Gates
Tricia Johnson
Chien-Ching Li
Beth Lynch
Raj Shah

DePaul University

Jessica Bishop-Royse
Douglas Bruce
Fernando De Maio
Maria Ferrera
Marty Martin
John Mazzeo

Suggested Citation

Aleem, N.F., Lopez, A., Lopez, A.N., and Romero, E. (2018). Future Directions in Health Disparities Research: A Compilation from the 2017 Health Disparities Internship Program. *Working Paper* No. 12. Center for Community Health Equity. Chicago, IL.

Copyright remains with the author(s). Reproduction for other purposes than personal research, whether in hard copy or electronically, requires the consent of the author(s).

For information on the Center for Community Health Equity and our *Working Papers Series*, Contact:

Fernando De Maio, PhD
DePaul University
990 W. Fullerton Ave., Suite 1100
Chicago, IL
60614

fdemaio@depaul.edu

Tel: 773-325-4431

Raj C. Shah, MD
Rush University Medical Center
600 South Paulina, Suite 1022
Chicago, IL
60612

Raj_C_Shah@rush.edu

Tel: 312-563-2902

Foreword

Crystal M. Glover, Ph.D.
Rush Alzheimer's Disease Center
Faculty Research Mentor – Health Disparities Internship Program

During the past five years, the Health Disparities Internship Program has been administered by the Education/Training Core of the Center of Excellence on Disparities in HIV and Aging (CEDHA) at Rush University Medical Center in Chicago, Illinois. Sponsored by the Rush Alzheimer's Disease Center, this novel program engages a select group of motivated high school and undergraduate students interested in health science careers to appreciate health disparities research. The program provides small group seminars on health disparities research; self-directed learning on important skills such as health literacy, health communication, and behavioral change; weekly journaling regarding personal experiences relevant to these important skills; and engagement with community leaders and persons from underrepresented, underserved, and vulnerable communities. Most notably, students gain research skills through the development of research questions related to health disparities issues. Students conduct literature reviews guided by their research questions and perform subsequent statistical analyses. The Internship Program culminates in students drafting research papers and delivering presentations highlighting their research questions, analyses, results, and implications.

At 40 hours per week for 8 weeks, the Internship Program is designed to be challenging and provide students with a realistic apprenticeship regarding conducting health disparities research in an academic medical center. Post-internship, students from the 2017 cohort exhibited continued commitment to their own research journeys through the refinement of their research papers. Through intern research papers, represented as a collection of working papers here, readers are able to see the curiosities of young minds and explore emergent areas of interest in health disparities research. With a focus on diverse populations including Asian Americans, Latin Americans, and United States veterans, students emerged from the Internship Program as experts in their areas of interest and exhibited dedication to critical inquiry and understanding of health disparities in the United States.

With pride, the Rush community invites you to read, be inspired and be intrigued, and comment on the papers from students who completed the 2017 Health Disparities Internship Program.

Biographies: 2017 Health Disparities Interns

Nisaa Aleem completes her senior year of high school at Neuqua Valley in 2018. During her internship, Nisaa focused on the impact of educational attainment on cholesterol awareness in Asian Americans. Nisaa plans to pursue a double major in political science and chemistry during her undergraduate studies. She hopes to attend medical school to become a cardiologist. Nisaa enjoys helping others and works within her local community through organizations such as Kids Matter.

Emily Romero is a Latina from the Back of the Yards neighborhood in Chicago. During her internship, Emily focused on the role of employment status in receiving mental health treatment among Latinos. While a recent high school graduate during the internship, Emily currently attends the University of Illinois at Chicago with the goal of a career in medicine. She loves music and enjoys attending concerts.

Alexandra Lopez is a recent graduate of Northeastern Illinois University where she majored in biology. During her internship, Alexandra focused on the impact of educational attainment on diabetes management class attendance among Latinos with diabetes. Alexandra is currently studying for the GRE and applying to Master's programs in public health. Alexandra also looks forward to her wedding in the fall.

Ashley Lopez is a recent graduate of Rush University where she obtained her Bachelor's degree in Health Sciences. Previously, she attended Wilbur Wright City College of Chicago where she earned a Practical Nursing degree. During her internship, Ashley focused on the role of income level on alcohol consumption among United States veterans. As a native Chicagoan, Ashley understands community needs and aims to work toward addressing those needs as a Nurse Practitioner in an underserved community. In her spare time, Ashley enjoys visiting museums, exploring new restaurants, and spending time with her nephews.

THE IMPACT OF EDUCATION LEVEL ON CHOLESTEROL TESTING WITHIN ASIAN
AMERICANS

Nisaa F. Aleem, Crystal M. Glover, PhD, Ana W. Capuano, PhD, & Raj C. Shah, MD

Rush University Medical Center

Research in context

Evidence before this study

The Asian American population is expected to rise rapidly and it is important to understand their health needs. Many Asian Americans experience cardiovascular disease risk factors such as high cholesterol.

Added value of this study

In this study, we found that those with lower education are more likely to have tested their cholesterol within the past year.

Implications of all the available evidence

Future studies may need to verify whether higher education leads to lower cholesterol level checks in Asian Americans and what factors may explain the association.

Abstract

Background: Asian Americans are the fastest growing minority group in the United States. Previous research has shown that risk factors such as high cholesterol are prevalent in Asian Americans. In this study, we will examine the relationship between education level and cholesterol testing in Asian Americans.

Method: Data were taken from the 2015 Behavioral Risk Factor Surveillance Survey (BRFSS). All participants were age 18 years and older and identified as Asian American. All participants reported their education level. We calculated odds ratios to determine the likelihood of participants having their cholesterol levels tested in the past year by participant education levels. We also obtained chi-square tests to compare cholesterol testing with each level of education.

Results: The odds of testing cholesterol levels within one year for Asian Americans that did not graduate high school were 3.95 compared to 3.19 for college graduates.

Discussion: Our findings conflict with those from previous research. Discrepant findings may be due to the current study not considering various ethnic groups comprising the Asian American population as each ethnic group may have differing health characteristics.

Keywords: Cholesterol Testing; Education Level; Asian Americans

The Asian American population is one of the most under-researched groups in the United States. Currently, Asian Americans comprise 21 million of the total United States population. From 2000 to 2010, the United States experienced a 46% increase in the Asian American population. Of Asian Americans, 12% live at or under the poverty line and 7.5% do not have health insurance (1). Hence, it is essential to understand the health needs of this population.

Education in Asian Americans

Oftentimes, Asian Americans are referred to as the "model minority" due to academic achievements and other positive attributes, but this is not necessarily true. In terms of education, 87.1% of Asian Americans graduated from high school, 50% have a bachelor's degree, and 20% have a graduate degree (1). Differences in quality of education exist depending on where the education was acquired, in the United States or respective native countries. Previous research has indicated that Asian Americans with higher levels of education are more likely to report good health. However, Asian Americans educated in their native countries are less likely to report good health (2).

Cardiovascular Disease Risk Factors and Cholesterol in Asian Americans

Heart disease is a leading cause of death in certain Asian American ethnic subgroups. Researchers have found heart disease is the most common cause of death in male Filipinos, Asian Indians, and Japanese Americans (4). Heart disease is only second to cancer in Chinese Americans. A medical issue that can lead to cardiovascular disease (CVD) is known as a CVD risk factor. CVD risk factors include: high cholesterol, high blood pressure, poor diet, a sedentary lifestyle, diabetes, and obesity. However, clinical intervention is most effective with high blood pressure, high cholesterol, and diabetes. Researchers have argued that CVD risk factors are more prevalent in Asian Americans. In one study, foreign-born Asian Americans were 2.4 to 3.6 times more likely to develop diabetes than non-Latino Whites. Additionally, foreign-born status and low levels of education increase the chance of developing diabetes (5). A recent study examining CVD risk factors in Korean American adults has indicated over 53% of participants had high cholesterol (7). Another study comparing cholesterol levels of Japanese Americans to both native Japanese individuals and urban Japanese workers has found Japanese Americans to have the highest total cholesterol levels. Although previous literature has shown high cholesterol levels in certain Asian American subgroups, previous literature has not, to our knowledge, compared cholesterol levels between ethnic Asian American subgroups. For example, previous research has not examined varying levels of cholesterol between Japanese Americans and Asian Indians.

Cholesterol Screening

A reduction in CVD includes being aware of clinically controllable risk factors such as cholesterol levels. Cholesterol is a substance carried in the blood comprised of low-density lipoproteins (LDL), high-density lipoproteins (HDL), and triglycerides. LDL can become harmful due to high levels potentially leading to a heart attack or stroke. However, HDL is healthy cholesterol and facilitates the prevention of cardiovascular-related issues. Triglycerides are fat used by the body for energy. The buildup of

triglycerides and LDL on artery walls is dangerous as it can cause a blockage that can lead to a heart attack. Approximately 73.5 million adults in the United States have high cholesterol and only 48.1% receive treatment (3).

The Centers for Disease Control and Prevention (CDC) recommends checking cholesterol levels every five years and more frequently if diagnosed with heart disease (3). One study (9) has assessed "the proportion of U.S. adults who reported having their cholesterol checked." Results indicated 71% of adults in the United States have had their cholesterol tested before and 66% had it tested in the past 5 years (9). However, another study has examined cholesterol testing by racial and ethnic group (10). Study results indicated 9.1% of respondents reported never having their cholesterol tested (10). Of the 9.1 %, almost 7% consisted of Whites compared to 13% of Asian Americans and Pacific Islanders (10). Indeed, disparities exist in cholesterol screening between racial and ethnic groups.

Cholesterol and Education in Asian Americans

Level of education has been postulated as an indicator for awareness or knowledge of various health-related issues. For example, people with less than 12 years of education are less likely to know the symptoms of a heart attack (12). These studies link lower levels of education with less knowledge of CVD risk factors; however, research linking cholesterol testing with education level presents a gap in the literature.

Purpose of This Study

To our knowledge, previous studies have not examined patterns of cholesterol testing in Asian Americans. Additionally, few studies have assessed the association between cholesterol testing and levels of education level in Asian Americans or otherwise. To address this research gap, this study will examine how education level impacts cholesterol testing in Asian Americans.

Methods

Participants

Data was obtained from the Behavioral Risk Factor Surveillance Survey (BRFSS), a public database and the largest health survey system in the world with over 400,000 participants. The BRFSS is an annual survey conducted throughout the year in all 50 states (13). Data was collected through phone interviews with participants per BRFSS protocol. The study sample consisted of 7,670 participants. Inclusion criteria included being 18 years of age and older and self-identification as Asian American. Participants were selected if they responded to questions pertaining to education level. All participants must have answered, "yes" to previously having their cholesterol checked and indicated the most recent check. All missing data were excluded.

Measures

Using the BRFSS, we compared two variables: education level and cholesterol testing. For education level, we examined responses to the question, "What is the highest grade or year of schooling you have completed?" Education level was divided into four levels: did

not graduate high school, graduated high school, attended college or technical school, and graduated from college or technical school. Cholesterol testing was measured by asking participants, "About how long has it been since you last had your cholesterol checked?" with response options: within the past year, within the past two years, within the past 5 years, and 5 or more years. Other covariates included gender, race, and age. Gender was defined as either male or female. Race was reported in seven categories: White only, Black or African American only, American Indian or Alaskan Native only, Asian only, Native Hawaiian or other Pacific Islander only, Other race only, and Multiracial. Age was reported in 5-year age groups ranging from 18 through 80.

Ethics

This work was determined to be non-human subjects research and approved by Rush University Institutional Review Board.

Analysis

First, we checked the distribution of key variables including education level, cholesterol testing, gender, and race to determine missing data and created frequency tables. Second, to examine the continuous variable of age, we calculated the mean, standard deviation, and 95% confidence interval. Third, to understand the relationship between cholesterol testing and education level, we computed odds and odds ratios for cholesterol testing within one year.

Results

Participants

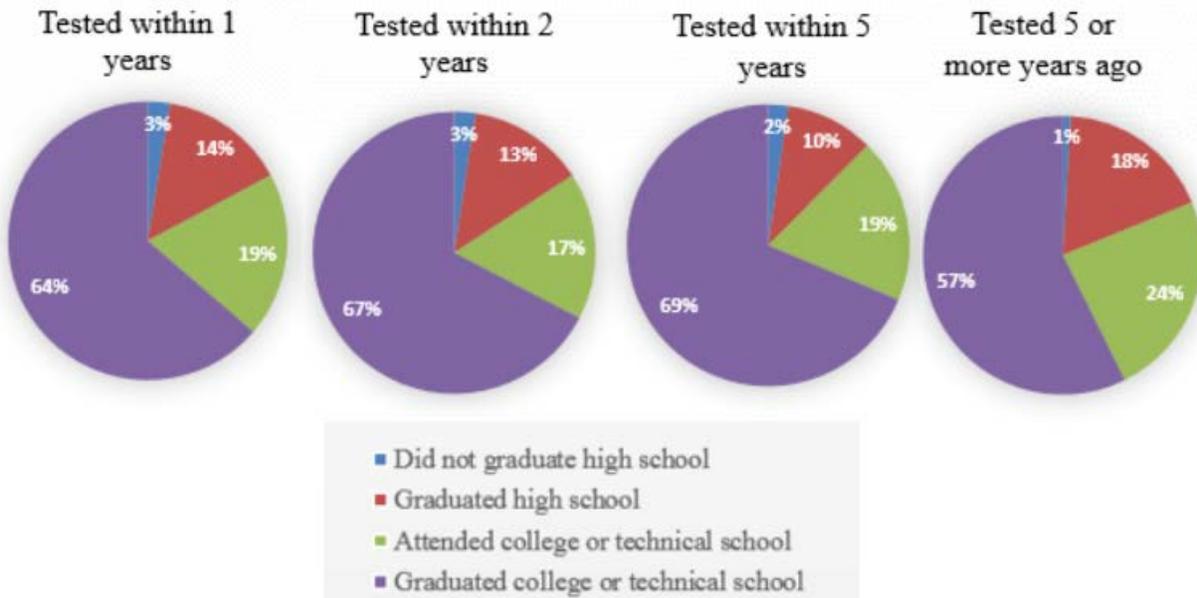
Participants were 7,670 Asian American adults. The average age was 49.0 and 49% of participants were male. The majority of participants graduated from college or technical school. Approximately 77% of participants had their cholesterol tested in the past year. Only 2.8% of participants had their cholesterol tested more than five years ago.

Table 1: Participant Demographics

Demographics		
Age		
Mean	49.0	
Median	48.0	
Upper 95% Confidence Interval	49.3	
Lower 95% Confidence Interval	48.6	
Sex	Absolute Number	Percentage
Male	3801,	49.6%
Female	3869	50.44%
Education Level		
Did not graduate high school	193 (2.5%)	
Graduated High school	1089 (14.2%)	
Attended college or technical school	1454 (17.0%)	
Graduated from college or technical school	4934 (64.3%)	

Of all participants, 76.94% had their cholesterol checked within the past year. Only 2.84% reported having checked more than 5 years ago. College graduates comprised 63.67% of all participants who checked their cholesterol within one year and 57.34% of those who checked their cholesterol 5 or more years ago. Of those who had their cholesterol tested within 2 years, 16.89% attended college. The percentage increased to 23.85% in the last category. High school graduates comprised 10.14% of all participants who tested their cholesterol within the past 5 years and 17.89% of those who tested their cholesterol 5 or more years ago. Participants with the lowest level of education tested their cholesterol more than participants with higher levels of education. The odds of testing cholesterol in one year for participants that did not graduate high school were 3.95 compared to 3.19 for college graduates. The chi-square value for education level by cholesterol testing was 22.94 with a p-value of $< .01$. (See Figure 1).

Figure 1: Cholesterol Testing by Education Level for Asian Americans



Chi-Square (df= 9) =22.49, p-value= <.01

Discussion

In this study, we hypothesized that Asian Americans with lower levels of education would be less likely to test their cholesterol within one year. However, our findings did not support our hypothesis. We found that the percentage of participants with a college degree increased from tested within one year to five years. The percentage decreased for the last category; hence, participants with a college education are tested within the recommended time. One factor to consider is a majority of Asian Americans graduated college. For high school graduates and college graduates, the percentage increases in the "tested 5 or more years ago" category, which is beyond CDC recommendations. Overall, the odds of cholesterol testing decreased as education levels increased.

Cardiovascular disease is the leading cause of death in ethnic Asian subgroups such as Indian Asians, Japanese Americans, and male Filipinos. Previous research has established that CVD risk factors such as high cholesterol are prevalent in Asian American populations. One study found people with low levels of education knew less about CVD. Another study found South Asians who did not speak English well and had a low education level knew less about CVD. That study also concluded that South Asians knew the least than any other United States population.

Our study conflicts with previous literature, which may be due to limitations and biases in the study. Limitations include data were cross-sectional; therefore, we could not examine the patterns over a long period of time. The BRFSS only surveys those with a residential phone, which prevents us from examining all groups of people including people who are homeless. The BRFSS combines all Asian Americans into one group; thus, disabling us

from understanding cholesterol testing among specific Asian ethnic subgroups. In a recent study, participants across four different Asian ethnic subgroups were surveyed with Chinese and Filipino Americans at higher risk for high cholesterol and hypertension (6). The BRFSS was conducted in English for Asian Americans; thus, potentially preventing people who do not speak English from participation. Lastly, a bias may have been present as participants must have answered, "yes" to the question, "Have you ever had your cholesterol checked?" This may explain why there were such a small number of people that did not graduate high school. Although young people can develop high cholesterol, older adults are at a higher risk. Those still in college or those with just a high school degree are typically younger and do not make it a priority to check their cholesterol. Further studies may include examining other variables such as language or country of origin, which may affect awareness of CVD risk factors.

References

1. Center for Disease Control and Prevention. (2017). *Health of Asian or Pacific Islander Population*. Retrieved from <https://www.cdc.gov/nchs/fastats/asian-health.htm>
2. Walton, E., Takeuchi, D. T., Herting, J. R., & Alegría, M. (2009). Does place of education matter? contextualizing the education and health status association among asian americans. *Biodemography and Social Biology*, 55(1), 30-51. doi:10.1080/19485560903054648
3. Center for Disease Control and Prevention. (2015). *High Cholesterol Facts*. Retrieved from <https://www.cdc.gov/cholesterol/facts.htm>
4. Hastings, K. G., Jose, P. O., Kapphahn, K. I., Frank, Goldstein, B. A., Thompson, C.A.,... Chaturvedi, V. (2015). Leading Causes of Death among Asian American Subgroups (2003–2011). *PLoS One*, 10(4), e0124341.
5. Echeverria, S. (2016). Social and clinically-relevant cardiovascular risk factors in Asian Americans adults: NHANES 2011-2014. *Preventive medicine*, 99, 222-227.
6. Wu, TY., Hsieh, HF., Wang, J. et al. *J Community Health* (2011) 36: 811. doi:10.1007/s10900-011-9379-1
7. Kim, M. T., Juon, H. S., Hill, M. N., Post, W., & Kim, K. B. (2001). Cardiovascular Disease Risk Factors in Korean American Elderly. *Western journal of nursing research*, 23(3), 269-282.
8. Namekata, T. (1996). Cholesterol levels among Japanese Americans and other populations: Seattle Nikkei Health Study. *Journal of Atherosclerosis and Thrombosis*, 3(2), 105-113.
9. Christian, J. B., Bourgeois, N. E., Lowe, K. A. (2015). Cholesterol Screening in U.S. Adults and Awareness of High Cholesterol among Individuals with Severe Hypertriglyceridemia. *Journal of cardiovascular nursing*, 30(1), 26-34.
10. Kenik, J., Jean Jacques, M., Feinglass, J. (2014). Explaining racial and ethnic disparities in cholesterol screening. *Preventive medicine*, 65, 65-69.
11. Kandula, N. (2009). Knowledge Gaps and Misconceptions about Coronary Heart Disease among U.S. South Asians. *American journal of preventive medicine*, 38(4), 439-442.
12. Giardina, E. V., Mull, L., Sciacca, R., Akabas, S., Flink, L. E., Moise, N., Mattina, D. (2012). Relationship between Cardiovascular Disease Knowledge and Race/Ethnicity, Education, and Weight Status. *Clinical cardiology*, 35(1), 43-48.
13. Center for Disease Control and Prevention. (2017). *Behavioral Risk Factor Surveillance System*. Retrieved from <https://www.cdc.gov/brfss/index.html>

Does Employment Status Impact Mental Health Treatment in Latinos Compared to Non-Latinos?

Emily Romero, Crystal M. Glover, PhD, Ana W. Capuano, PhD, Raj C. Shah, MD

Rush University Medical Center

Research in context**Evidence before this study**

This study aimed to understand the relationship between employment status and the receipt of mental health treatment within Latinos. A dearth of literature has focused on the association between Latino's mental health and their employment status.

Additionally, a small body of literature has focused on mental health within different Latin subgroups. Hence, more research is needed to understand whether or not employment status impacts mental health treatment in Latinos.

Added value of this study

With a small number of participants who were Latinos, our study results indicated employment status did not impact whether or not Latinos received treatment for mental health.

Implications of all the available evidence

Current study results indicated that few Latinos have engaged in research regarding mental health and employment status as measured by the Behavioral Risk Factor Surveillance System Survey. More research needs to be conducted in order to understand mental health treatment and its relationship to employment status within Latinos.

Abstract**Background:**

Latinos comprise a large percentage of blue-collar workers. Unfortunately, blue-collar jobs oftentimes do not offer mental health services to their employees. The current study aims to examine the relationship between employment status and mental health treatment among Latinos compared to non-Latinos.

Methods:

We examined the relationship between employment status and mental health treatment in Latinos compared to non-Latinos. We also examined the role of age and gender in the relationship between employment status and mental health treatment. We used frequency distributions and chi-square analyses to assess relationships between race/ethnicity, employment status, and mental health treatment.

Results:

We did not find a relationship between employment status and mental health treatment primarily due to a low number of Latino participants.

Conclusion:

Future research should explore the relationship between employment status and mental health treatment, especially within Latinos.

Keywords:

Mental Health; Employment; Hispanics/Latinos

Approximately 58 million Latinos reside within the United States. The Latino population is very diverse with anyone of Latin American origin considered as Latino including people from Puerto Rico, Cuba, Colombia, Honduras, and Brazil. Of Latinos in the United States, nine million have mental health issues such as anxiety and depression - the two most common mental health issues within the Latino community (1).

Various psychosocial determinants of health, such as employment status, gender, and culture may facilitate higher rates of mental health issues among Latinos. First, employment may be related to mental health. According to the Bureau of Labor Statistics, Hispanics comprised 16.1% of 146.3 million people employed in the United States (3). More than one-quarter of Latinos are employed in blue-collar jobs, which can be both mentally and physically draining. Many blue-collar jobs do not offer resources for mental health treatment and blue-collar employees are oftentimes unable to leave work or take time off if they are in need of help. Second, Hispanic women may face, "the cumulative psychosocial effects of these stressors may place them in need of mental health support." (1). However, due to constraints such as unemployment and familial obligations, many Hispanic women are likely to have limited or no time to seek out and utilize mental health services in their community (1). Third, mental health stigma exists within the Latino community. Stigma may lead many Latinos to not receive mental health treatment since it can be frowned upon (5). Many Latinos may also face "symptoms of depression or anxiety may develop as a result of immigration and culture shock" according to Comas-Diaz and Griffith (1988).

A small body of literature has focused on the effect of employment status on mental health treatment in Latinos. One piece of research indicated, "people of ethnic and racial minority groups have reported delays in seeking services because of inability to leave work or take time off from work because of lack of benefits" (12). Additionally, Latinos may not receive mental health treatment if they are unemployed, do not have health insurance, or are unaware of available resources. However, previous studies consisted of small sample sizes of Latinos with conflicting results regarding Latinos and mental health treatment. Hence, more research must examine the relationship between employment status and seeking treatment for mental health issues.

Purpose

The purpose of this study is to understand the impact of employment status on mental health treatment in Latinos compared to non-Latinos. While there is a vast amount of research regarding different barriers affecting mental health treatment on different racial/ethnic minorities such as Hispanics, more research is needed regarding the impact of employment status on mental health treatment within the Latino community. It is important to understand the relationship between employment status and mental health treatment in Latinos as they are a growing population impacting the economy and healthcare system. Understanding the barriers they face, which affect their mental health treatment, can help us create policies that are able to knock down those barriers.

Methods

Participants

We used the 2015 Behavioral Risk Factor Surveillance System (BRFSS) - a large, national, public database. All participants indicated seeking mental health treatment.

Materials and Measures

BRFSS survey questions operationalized the following variables: employment status, Hispanic ethnicity, gender, age, and receipt of mental health treatment. The BRFSS used a series of telephone interviews with people in the United States in collaboration with the Centers for Disease Control and Prevention (CDC). Participants who identified as "Hispanic, Latino/a, or Spanish origin" were included in this study. Employment status was determined by the question, "Are you currently employed for wages, self-employed, out of work for 1 year or more, out of work for less than 1 year, a homemaker, a student, retired, or unable to work." Mental health treatment was determined by "yes," "no," or not sure responses to the question, "Are you now taking medicine or receiving treatment from a doctor or other health professional for any type of mental health condition or emotional problem?" Eligible participants were 18 years of age and older. Participants identified their gender as either male or female. This study was approved by the Institutional Review Board at Rush University Medical Center.

Analyses

Mental health treatment served as the outcome variable and employment status as the predictor. Age and gender served as covariates. Initially, we examined frequency distributions for the following variables: Hispanic status, race, employment status, and mental health treatment. Afterward, we obtained chi-square statistics for mental health treatment by race/ethnicity. We also examined the mean, median, minimum, maximum and 95% confidence interval of the continuous variable age.

Results

Our total sample size consisted of 20,106 participants who were 18 years of age and older. Of the total sample, 169 participants identified as Hispanic, Latino/a, or of Spanish origin; while 19,937 identified as non-Latino. For Latino participants, 41% identified as male compared to 40% of non-Latino participants (see Table 1). The mean age for Latino participants was 40 years while the mean age for non-Latino participants was 57 years.

Results indicated no significant difference between Latino (15%) and non-Latino (15%) participants regarding receipt of mental health treatment. We found similar probabilities for receiving mental health treatment for Latino participants (0.1736) and for non-Latino participants (0.1734). We then calculated odds ratios to show the probability of receiving mental health treatment. We found similar probabilities between the two groups: for Latinos, the probability was 0.1736 and for Non-Latinos, it was 0.1734.

Discussion

According to the CDC, the largest minority group in the United States are Hispanics, at currently 58 million. Sixteen percent of the 146.3 million employed people in the United States are Hispanics. Their mental health is extremely important to take into consideration, especially because mental health is oftentimes not talked about within the Latino community and seeking mental health treatment is typically frowned upon. Research shows that barriers such as employment status, education level, and income may lead Hispanics to not receive mental health treatment.

In our study, Latinos received similar amounts of mental health treatment as non-Latinos. The results also indicated that unemployment rate is not higher among Latinos in comparison to non-Latinos. However, with such a small sample of Latinos, we caution against generalizing our results. Hence, there should be more data collected to show if employment status has an impact on mental health treatment. One limitation of the current study included the small sample size of Latinos. This was due in part to the BRFSS only asking participants in certain states to answer the mental health questionnaire. These states have small populations of Latinos, which is why more studies are needed in order to determine the impact of employment status on mental health and its treatment in Latinos.

Table 1: Participant Gender by Participant Ethnicity

SEX	Hispanic, Latino/a, Spanish origin (% within gender)	Non-Hispanic, Latino/a, or Spanish origin (% within gender)
Male	41.42% (n= 70)	(40.28%) (n= 8030)
Female	(58.58%) (n= 99)	(59.72%) (n= 11907)

Table 2: Receipt of Mental Health Treatment by Participant Ethnicity

Receiving medicine for mental health treatment	Hispanic, Latino/a, Spanish origin (% within mental health treatment)	Non-Hispanic, Latino/a, or Spanish origin (% within mental health treatment)
Yes	14.79% (n= 25)	14.76% (n= 2946)
No	85.21% (n= 144)	85.22% (n= 16991)

Table 3: Participant Employment Status by Mental Health Treatment Status

Employment Status	Not receiving treatment for mental health (% within employment status)	Receiving treatment for mental health (% within employment status)
Employed for wages	56.00% (n= 14)	73 (50.69%)
self-employed	0.00% (n= 0)	13 (9.03%)
Out of work for 1 year or more	0.00% (n= 0)	4 (2.78%)
Out of work for less than 1 year	4.00% (n=1)	5 (11.81%)
A homemaker	4.00% (n= 1)	17 (11.81%)
A student	8.00% (n= 2)	13 (9.03%)
Retired	0.00% (n= 0)	11 (7.64%)
Unable to work	28.00% (n=7)	8 (5.56%)

Figure 1: Age

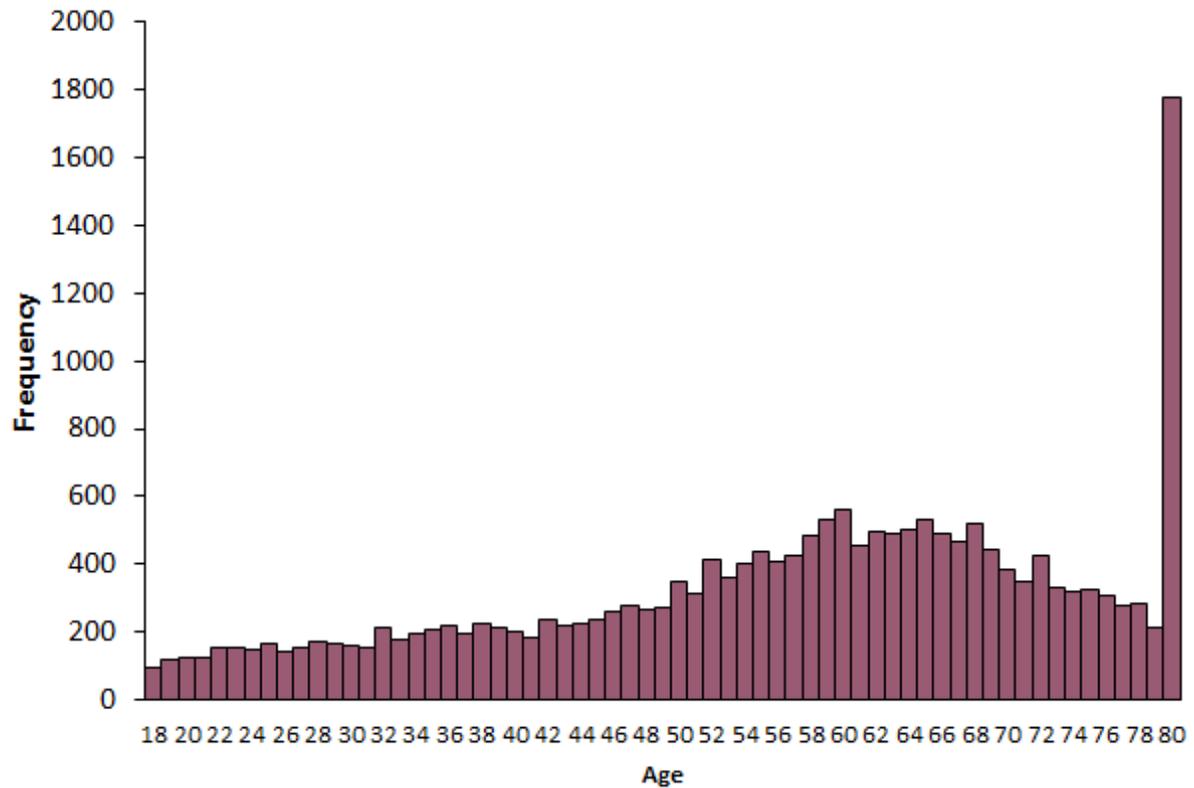
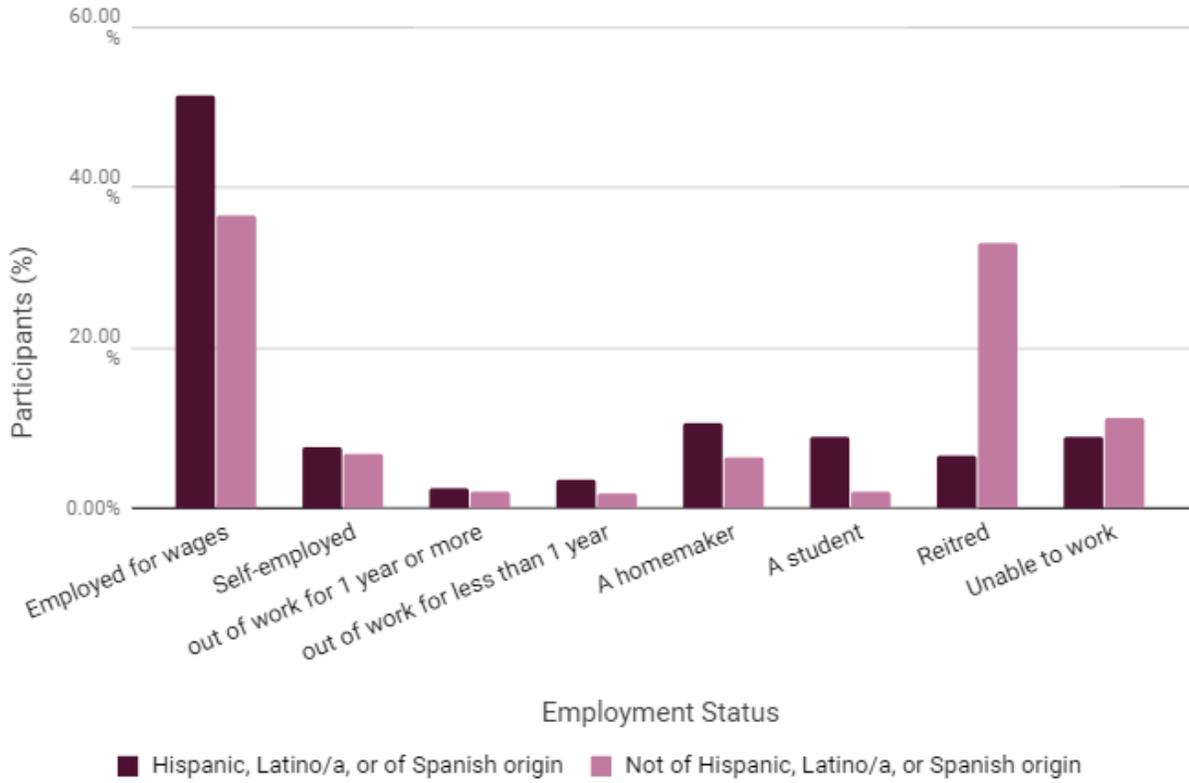


Figure 2: Employment Status by Mental Health Treatment



References

1. Kouyoumdjian, H., Zamboanga, B. L., Hansen, D. J. (2003). Barriers to Community Mental Health Services for Latinos: Treatment Considerations. *Clinical Psychology: Science and Practice*, 10(4), 394-422.
2. Alegria, M., Drake, R. E., Kang, H., Metcalfe, J., Liu, J., DiMarzio, K., & Ali, N. (2017). Simulations Test Impact Of Education, Employment, And Income Improvements On Minority Patients With Mental Illness. *Health Affairs*, 36(6), 1024-1031. Bureau of Labor
3. Statistics, U.S. Department of Labor, *The Economics Daily*, Hispanics and Latinos in industries and occupations on the Internet at <https://www.bls.gov/opub/ted/2015/hispanics-and-latinos-in-industries-and-occupations.htm> (visited July 21, 2017).
4. Mueser, K. T., Bond, G. R., Essock, S. M., Clark, R. E., Carpenter Song, E., Drake, R. E., & Wolfe, R. (2014). The effects of supported employment in Latino consumers with severe mental illness. *Psychiatric Rehabilitation Journal*, 37(2), 113-122.
5. Wells, K. B., Hough, R. L., Golding, J. M., Burnam, M. A., & Karno, M. (1987). Which Mexican-Americans underutilize health services?. *The American Journal of Psychiatry*, 144(7), 918-922.
6. Lagomasino, I. T., Dwight Johnson, M., Miranda, J., Zhang, L., Liao, D., Duan, N., & Wells, K. B. (2005). Disparities in Depression Treatment for Latinos and Site of Care. *Psychiatric Services*, 56(12), 1517-1523.
7. Andersen, R. M., Giachello, A. L., & Aday, L. A. (1986). Access of Hispanics to health care and cuts in services: a state-of-the-art overview. *Public Health Reports*, 101(3), 238-252.
8. Doornbos, M. M., Zandee, G. L., DeGroot, J., & Warpinski, M. (2013). Desired Mental Health Resources for Urban, Ethnically Diverse, Impoverished Women Struggling With Anxiety and Depression. *Qualitative health research*, 23(1), 78-92.
9. Mays, V. M., Jones, A. L., Delany Brumsey, A., Coles, C., & Cochran, S. D. (2017). Perceived Discrimination in Health Care and Mental Health/Substance Abuse Treatment Among Blacks, Latinos, and Whites. *Medical care*, 55(2), 173-181.
10. Kahn, M. W., Heiman, E. (1978). Factors Associated With Length of Treatment in a Barrio-Neighbourhood Mental Health Service. *International journal of social psychiatry*, 24(4), 259-262.
11. Babitsch, B., Gohl, D., von Lengerke, T. (2012). Re-revisiting Andersen. *Psycho-social medicine*, 9, Doc11-Doc11.
12. Alegría, M., Chatterji, P., Wells, K., Cao, Z., Chen, C., Takeuchi, D., ... Meng, X. (2008). Disparity in Depression Treatment Among Racial and Ethnic Minority Populations in the United States. *Psychiatric Services*, 59(11), 1264-1272.

The Impact of Educational Attainment on Diabetes Management Class Attendance in
Latinos with Diabetes

Alexandra Lopez, B.S.¹, Crystal M. Glover, Ph.D.², Ana W. Capuano, Ph.D.²,
Raj C. Shah, MD²

Northeastern Illinois University, Chicago, Illinois 60641¹
Rush University Medical Center, Chicago, Illinois 60612²

Research in Context

Latinos with diabetes have higher complications when unable to attend diabetes management classes due to many factors. Educational attainment represents a potential factor that may affect the attendance to diabetes management classes among Latinos in comparison to non-Latinos. Current study findings suggest that educational attainment impacts diabetes management class attendance with higher education associated with higher likelihood of class attendance.

Abstract

Background: Of the 39 million Latino adults in the United States, over 12% have diabetes. that requires interventions such as diabetes management classes to prevent complications. Previous studies in Latino cohorts found that being unable to attend a diabetes management class was associated with higher rates of complications and mortality due to diabetes and that educational attainment could have an impact on class attendance. Given that over a quarter of Latino adults have indicated they had attained an education of ninth-grade or less, we examined whether or not there was an association between educational attainment and diabetes management class attendance among Latinos with diabetes.

Methods: Diabetes management class attendance and education level for adults self-identifying as Latino/Hispanic and having diabetes were obtained from the 2015 Behavioral Risk Factor Surveillance Survey (BRFSS). We constructed frequency tables for diabetes management class attendance as a function of education level and utilized a chi-square test to determine statistical significance.

Results: Of the 1,836 adult Latino participants with diabetes, 940 (51%) attended a diabetes management class. Compared to Latinos with a low education level (high school diploma or less), Latinos with a higher education level (some college/technical schooling or above) had 1.64 greater odds of attending a diabetes management class (chi-square = 55.83, p-value = <0.01).

Conclusion: While the analysis is cross-sectional and causality cannot be determined, novel interventions to support Latinos with lower education levels to attend diabetes management classes may be needed to improve diabetes outcomes.

Keywords: Diabetes Management; Latinos/Hispanics; Education Level

Diabetes affects approximately 30 million people in the United States (1). When a person cannot produce insulin or use insulin efficiently, high blood glucose levels occur as the primary sign of diabetes (1). Diabetes requires consistent management including proper diet, physical activity, and diabetes education over a lifetime (2). Individuals of all ages, sexes, and racial/ethnic groups have been diagnosed with diabetes. However, minorities in the United States are more likely to be diagnosed with this chronic disease, and it is commonly seen among Latinos (1, 3). Evidence-based intervention programs such as diabetes management classes are being used to combat the diabetes epidemic. Although education programs can improve diabetes management, gaps in educational delivery remain (4). Despite the variety of diabetes management programs, some evaluated programs have shown improvement in participants with diabetes (4). However, the Latino community faces many barriers when trying to maintain balance for a healthy life with diabetes. For example, diabetes education requires some educational background to read and comprehend the information. Therefore, lower education levels may affect whether or not Latinos attend a diabetes management class. Additionally, language may be a barrier for the Latino community as the majority of educational materials and classes for diabetes are in English (5).

Diabetes among Adults

In the United States, the prevalence of diabetes diagnoses has drastically increased over the past decade among all ages, sexes, and racial/ethnic groups for which there were data available (6). Diabetes continues to be a growing concern, particularly for minorities such as the Latino community. The Centers for Disease Control and Prevention (CDC) noted mortality due to diabetes was 50% more likely in Hispanics than in non-Hispanic Whites (7). In 2010, more than 13% (approximately 3 million) of all Hispanics in the United States were living with diabetes, and numbers continue to rise (8). As a result of this epidemic, adults with diabetes are burdened with higher healthcare costs (9). Additionally, individuals with diabetes are at higher risk for other health concerns such as stroke, blindness, kidney disease, and heart disease (9). These comorbidities accompanying diabetes double the healthcare costs for individuals with diabetes compared to individuals without diabetes (9).

Diabetes Management Class Attendance

Since lack of diabetes education is detrimental, interventions are used in healthcare to facilitate healthy behaviors in an effort to decrease health risks in all racial/ethnic groups (8). Diabetes self-management education entails developing goals and healthy habits to improve diet and increase physical activity while reducing risk factors through preventative care (10). Diabetes knowledge alone will not produce adequate diabetes management; even so, patients with diabetes education are more likely to engage in self-management activities which have been shown to significantly delay or reduce symptoms such as cardiovascular and kidney disease (10, 11). The American Diabetes Association (ADA) states that in addition to enhancing the patient's quality of life, diabetes self-management education could decrease and improve clinical outcomes and healthcare

costs (10). Diabetes management classes are also necessary when healthcare providers do not have sufficient time to provide all required information for diabetes self-care (10). However, researchers believe intervention programs need to be evaluated for their efficacy (6).

The Latino community also experiences health inequities regarding diabetes management class attendance. Latinos continue to face obstacles that can impede attendance to diabetes management classes, such as low socioeconomic status or lack of access (12). As such, diabetes management classes need to be educationally and economically tailored to Latino communities due to large Latino populations in the United States, the prevalence of diabetes among Latinos, and increasing healthcare costs. Evaluating diabetes education programs and addressing barriers for minorities to attend such programs can improve the efficacy of diabetes management classes, aiding healthcare leaders and policymakers to conserve healthcare dollars and time (13).

Educational Attainment and Individuals with Diabetes

Previous research suggests psychosocial determinants, namely educational attainment, can affect the likelihood of diabetes and its severity. In 2011, Ayyagari observed that individuals with greater years of educational attainment showed a decreased risk of being diagnosed with diabetes as well as reduced risk of diabetes complications (14). Goldman and Smith also found educational attainment improved diabetes management (15). Additional studies found adherence to a treatment regimen for diabetes requires many attributes that may be strongly associated with education. For instance, education could improve interpretation of medical instructions, nutritional intake, and signs of worsening conditions (14). However, in 2016, Hispanic populations (16.4%) were less likely to hold a bachelor's degree or higher compared to Asian-American (55.9%) and non-Hispanic Whites (37.3%) (16). The ADA also highlighted a correlation between greater diabetes prevalence and lower educational attainment in Hispanics/Latinos (17).

Current literature has predominantly focused on health literacy and literacy skills. However, literacy skills are not synonymous with educational attainment. Literacy skills are defined as someone's ability to read and write, whereas educational attainment describes the highest level of schooling achieved. As a result, literacy skills may not sufficiently infer the impact of educational attainment on a person's diabetes management. Approximately 90 million Americans do not have sufficient literacy skills "to function in today's economy and healthcare settings" (18). Previous studies discovered patients who have low literacy skills also have poor knowledge of their disease, and this lack of knowledge can lead to increased risk of hospitalization or worse clinical outcomes (19). This is especially true for Hispanics since over a quarter of those ages 25 years and older have indicated an education level of ninth-grade or less (20). Addressing possible barriers of educational attainment may provide the Latino community with an effective means of understanding diabetes in management classes.

Purpose of This Study

There is limited research on the relationship between educational attainment and diabetes management class attendance, particularly among Latinos. The objective of this study is to examine the impact educational attainment has on diabetes management class participation in Latinos with diabetes compared to non-Latinos with diabetes. Additionally, we examine the relationship between preferred language and diabetes management class attendance among Latinos with diabetes.

Methods

Participants

We used data from the 2015 Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS consists of responses from a series of telephone surveys. The BRFSS includes questions that assess health risk behaviors, chronic health conditions, and preventative measures such as the diagnosis of diabetes and attendance to a diabetes management class (21). Participants are 18 years and older from the United States, the District of Columbia, Puerto Rico, and the Virgin Islands. The inclusion criteria for this study were males and females that were respondents of the BRFSS and indicated that they were told they had diabetes. Participants were excluded if they had missing responses including "do not know" or "not sure" or refused to answer questions assessing the following variables: education level; diabetes management class; Hispanic, Latino/a, or Spanish origin; diabetes; and language.

Materials & Methods

Questions selected from the 2015 BRFSS operationalized the following variables: education level, Latino status, diabetes diagnosis, and attendance to a diabetes management class. Education level served as our predictor variable and was a four-category variable ranging from no high school education to having a college or technical degree. We categorized education level as low education and high education. Low education included a high school diploma or less and high education included some college/technical schooling and above. For the identification of Latino status, we used "Hispanic, Latino/a, or of Spanish origin calculated variable" with response options "yes" or "no." Participants also included those who answered yes to the question "have you ever been told you have diabetes?" We then determined if respondents had taken a diabetes management class using the question, "Have you ever taken a course or class in how to manage your diabetes yourself?" to which they responded "yes" or "no." Language served as a covariate. The BRFSS questionnaire is available in English and Spanish so "language" is the preferred language of the respondent. We received a non-human subjects approval from the Institutional Review Board at Rush University Medical Center.

Analysis

Initial analyses included the examination of frequency tables of categorical variables: education level, diabetes management class, and language. We then looked for a possible correlation between educational attainment and diabetes management class attendance among Latinos and non-Latinos. We also performed chi-square tests. All analyses were conducted using SAS software, version 9.3, of the SAS system for Linux.

Results

Participant Characteristics

The 2015 BRFSS had a total of 441,456 respondents. This study had a sample size of 28,839 respondents with diabetes including Latinos (n=1,836) and non-Latinos (n=27,003). The average age of an adult with diabetes was 65 years old \pm 11.60 for both Latinos and non-Latinos. Latinas and non-Latinas had higher rates of diabetes diagnoses compared to Latinos and non-Latinos (see Table 1). The education level of Latinos and non-Latinos with diabetes was analyzed independently from diabetes management class attendance. Non-Latino participants had higher attendance and graduation rates than Latinos (see Table 2).

Table 1. Frequency of Gender of Latinos with Diabetes and Non-Latinos with Diabetes

Gender	Latinos with diabetes (n=1,836)	Non-Latinos with diabetes (n=27,003)
Male	39.92% (n=733)	45.06% (n=12,168)
Female	60.08% (n=1,103)	54.94% (n=14,835)

Table 2. Education Level by Latinos and Non-Latinos with Diabetes

Education level	Latinos with diabetes (n=1,836)	Non-Latinos with diabetes (n=27,003)
Did not graduate high school	35.08%	10.32%
Graduated high school	30.50%	33.30%
Attended college or technical school	19.99%	28.69%
Graduated college or technical school	14.43%	27.70%

Educational Attainment and Diabetes Management Classes for Latinos and Non-Latinos

We assessed the likelihood of attendance to a diabetes management class by education level for Latinos and non-Latinos with diabetes. The odds ratio of low education versus high education for Latinos was 0.5059 with a p-value of <0.01 (degrees of freedom = 3). The odds ratio of low education versus high education for non-Latinos was 0.5871 with a p-value of <0.01 (degrees of freedom = 3). The parameters that defined low education in this study were “did not graduate high school” or “graduated high school.” High education was defined as “attended college or technical school” or “graduated from college or

technical school.” Within both Latino and non-Latino participants, high education was associated with a higher likelihood of attending diabetes management classes (Table 3).

Table 3. Educational Attainment of Latinos and non-Latinos with Diabetes according to Diabetes Management Class Attendance

Education level	Latinos who attended a class (n=940)	Non-Latinos who attended a class (n=15,188)
Did not graduate high school	28.51% (n=268)	7.22% (n=1,097)
Graduated high school	29.57% (n=278)	30.68% (n=4,659)
Attended college or technical school	24.04% (n=226)	32.12% (n=4,878)
Graduated college or technical school	17.87% (n=168)	29.98% (n=4,554)

Language and Diabetes Management Class Attendance among Latinos

Secondary analyses compared attendance to a diabetes management class between English and Spanish speaking Latinos with diabetes. Results indicated 73.83% of Latinos with diabetes who spoke English attended a diabetes management class compared to 26.17% of Spanish speakers. See Table 4.

Table 4. Language Spoken by Latinos with Diabetes according to Diabetes Management Class Attendance

Language	Attended a class (n=940)	Did not attend a class (n=896)
English	73.83% (n=694)	58.93% (n=528)
Spanish	26.17% (n=246)	41.07% (n=368)

Discussion

Diabetes is a heightened concern that affects millions of individuals in the United States (1). Previous literature has found diabetes is highly prevalent among Hispanics/Latinos, one of the largest minority groups in the United States that is expected to triple in size by 2050 (11). The prevalence of diabetes among Latinos emphasizes the importance of successful diabetes self-care through intervention methods such as diabetes management classes as well as barriers that may hinder Latinos from attending diabetes management classes (e.g. language or socioeconomic status).

We hypothesized that higher education in Latinos with diabetes would lead to greater diabetes management class attendance. Our results indicated there was an association between education level and diabetes management class attendance in Latinos. Latinos with only a high school diploma were less likely to attend a diabetes management class than non-Latinos with a high school diploma. On the contrary, non-Latinos showed an

increase in diabetes management class attendance as they increased in educational attainment.

Previous studies suggested other barriers such as language, cultural differences, and socioeconomic status could impact diabetes management class attendance (10, 12). Our results also showed Latinos with a preference for English had higher attendance to a diabetes management class than those with a preference for Spanish. This is important since studies mention the majority of Latinos and Hispanics in the United States are more likely to be fluent in Spanish than English, and the number of Hispanics speaking Spanish is expected to increase exponentially (22). These studies and our results raise the question, why then are Latinos with a Spanish preference having less attendance rates to a diabetes management class? There could be other underlying barriers to attending diabetes management classes.

Our study had several limitations. First, the data obtained from the BRFSS included responses that were self-reported, such as the account of having been told the diagnosis of diabetes and whether or not the respondent attended a diabetes management class. As a result, we had to rely on the accuracy of the respondents' recollection and affirmations. The response rate was very high as well, being approximately 48% for landline surveys and 47% for cell phone surveys. Second, data were cross-sectional, so we are unable to make any cause and effect inferences. Lastly, the BRFSS included one question to identify if a respondent was Hispanic, Latino/a, or someone of Spanish origin. This question did not distinguish between several Hispanic or Latino/a subgroups. When respondents answered yes, they were presented with four options: Mexican, Mexican American, Chicano/a; Puerto Rican; Cuban; and another Hispanic, Latino/a, or Spanish origin. The lack of differentiation among Latin ethnic subgroups indicates a common gap in the literature. Studies tend to focus on one subgroup and generalize the results to the whole Latino and Hispanic population. This can lead to many discrepancies and distort the way the Latino community is served. Our study also possessed strengths. The BRFSS codebook provided a large sample size, and cross-sectional data gave us the opportunity to find a correlation between our variables.

Future studies can further explore the correlation between language preference and diabetes management class attendance, as well as educational attainment and diabetes management class attendance. Our study results could provide areas where diabetes education and management programs could be improved, especially for individuals who do not prefer or speak English, and have lower educational attainment. The design of diabetes management classes and deliverance of diabetes education may need be re-evaluation to accommodate a diverse group of attendees.

References

1. Basics About Diabetes. (2015, March 31). Retrieved July 16, 2017, from <https://www.cdc.gov/diabetes/basics/diabetes.html>
2. Funnell, M. M., Brown, T. L., Childs, B. P., Haas, L. B., Hosey, G. M., Jensen, B., ... Weiss, M. A. (2010). National Standards for Diabetes Self-Management Education. *Diabetes Care*, 33 (Suppl 1), S89–S96. <http://doi.org/10.2337/dc10-S089>
3. American Diabetes Association. (2015, May 18). Statistics About Diabetes. Retrieved July 13, 2017, from <http://www.diabetes.org/diabetes-basics/statistics/>
4. Dorland, K., & Liddy, C. (2014). A pragmatic comparison of two diabetes education programs in improving type 2 diabetes mellitus outcomes. *BMC Research Notes*, 7, 186. <http://doi.org/10.1186/1756-0500-7-186>
5. Osborn, C. Y., Amico, K. R., Cruz, N., Perez-Escamilla, R., Kalichman, S. C., O'Connell, A. A., ... Fisher, J. D. (2011). Development and implementation of a culturally tailored diabetes intervention in primary care. *Translational Behavioral Medicine*, 1(3), 468–479. <http://doi.org/10.1007/s13142-011-0064-9>
6. Beckles, G. L., & Chou, C. (2017, August 14). Morbidity and Mortality Weekly Report (MMWR). Retrieved January 20, 2018, from <https://www.cdc.gov/mmwr/volumes/65/wr/mm6545a4.htm>
7. CDC Vital Signs. (2015, May 05). Retrieved July 13, 2017, from <https://www.cdc.gov/vitalsigns/hispanic-health/index.html>
8. Aponte, J., Campos Dominguez, G., Jaramillo, D. (2015). Understanding Diabetes Self-Management Behaviors Among Hispanics in New York City.
9. American Diabetes Association. (2015, June 22). The Cost of Diabetes. Retrieved August 7, 2017, from <http://www.diabetes.org/advocacy/news-events/cost-of-diabetes.html>
10. Gonzalez, L. S., Berry, D. C., Davison, J. A. (2013). Diabetes Self-Management Education Interventions and Glycemic Control Among Hispanics: A Literature Review. *Hispanic Health Care International*, 11(4), 157-166.
11. Peña Purcell, N. C., Boggess, M. (2014). An Application of a Diabetes Knowledge Scale for Low-Literate Hispanic/Latinos. *Health promotion practice*, 15(2), 252-262.
12. Schneiderman, N., Llabre, M., Cowie, C. C., Barnhart, J., Carnethon, M., Gallo, L. C., ... Avilés-Santa, M. L. (2014). Prevalence of Diabetes Among Hispanics/Latinos From Diverse Backgrounds: The Hispanic Community Health Study/Study of Latinos (HCHS/SOL). *Diabetes Care*, 37(8), 2233–2239. <http://doi.org/10.2337/dc13-2939>
13. Peek, M. E., Cargill, A., & Huang, E. S. (2007). Diabetes Health Disparities: A Systematic Review of Health Care Interventions. *Medical Care Research and Review: MCRR*, 64(5 Suppl), 101S–156S. <http://doi.org/10.1177/1077558707305409>
14. Ayyagari, P., Grossman, D., & Sloan, F. (2011). Education and Health: Evidence on Adults with Diabetes. *International Journal of Health Care Finance and Economics*, 11(1), 35–54. <http://doi.org/10.1007/s10754-010-9087-x>
- American Diabetes Association. (2014, July 24).

15. Goldman, D. P., & Smith, J. P. (2002). Can patient self-management help explain the SES health gradient? *Proceedings of the National Academy of Sciences of the United States of America*, 99(16), 10929–10934. <http://doi.org/10.1073/pnas.162086599>
16. U.S. Census Bureau. (2017, March 30). Highest Educational Levels Reached by Adults in the U.S. Since 1940. Retrieved August 09, 2017, from <https://www.census.gov/newsroom/press-releases/2017/cb17-51.html>
17. American Diabetes Association. (2014, July 24). Diabetes Among Hispanics: All Are Not Equal. Retrieved July 15, 2017, from <http://www.diabetes.org/newsroom/pressreleases/2014/dabetes-among-hispanics-all-are-not-equal.html>
18. Rothman, R. L. (2004). Influence of Patient Literacy on the Effectiveness of a Primary Care–Based Diabetes Disease Management Program. *JAMA: the Journal of the American Medical Association*, 292(14), 1711-1716.
19. Rothman, R., Malone, R., Bryant, B., Horlen, C., DeWalt, D., & Pignone, M. (2004). The Relationship Between Literacy and Glycemic Control in a Diabetes Disease-Management Program. *The Diabetes educator*, 30(2), 263-273.
20. Rosal, M. C., Goins, K. V., Carbone, E. T., & Cortes, D. E. (2004). Views and Preferences of Low-Literate Hispanics Regarding Diabetes Education: Results of Formative Research. *Health education & behavior*, 31(3), 388-405.
21. Behavioral Risk Factor Surveillance System. (2014, May 16). Retrieved July 25, 2017, from <https://www.cdc.gov/brfss/about/index.htm>
22. Lopez, M. H., & Gonzalez-Barrera, A. (2013, September 05). What is the future of Spanish in the United States? Retrieved August 9, 2017, from <http://www.pewresearch.org/fact-tank/2013/09/05/what-is-the-future-of-spanish-in-the-united-states/>

1. Much of the research cited here uses the terms Latinos and Hispanics interchangeably even though they are defined differently, but for the current study we use the term Latino. ↑

The Role of Income Level on Alcohol Consumption among Veterans

Ashley Nicole López, BS, Crystal M. Glover, PhD, Ana W. Capuano, PhD, Raj C Shah, MD

Center for Excellence on Disparities in HIV and Aging

Rush Alzheimer's Disease Center

Research in Context

Evidence before this study

Previous research has found high alcohol consumption within the veteran population. While low income levels can be a risk factor for high alcohol consumption in veterans, there is little research on the influence of high income levels on alcohol consumption.

Added Value of this study

This study demonstrates higher reports of binge drinking in veteran populations with higher income levels.

Implications of all the available evidence

Further research to determine the reasons why veterans of higher income levels have higher reports of binge drinking is necessary. Additionally, programs aimed to reduce binge drinking specifically targeted to this group would be beneficial to ensure their understanding of the effects of binge drinking.

Abstract

Background: High alcohol consumption is known to be prevalent in the veteran population. While some studies have focused research of risk factors such as injuries, mental illnesses, and combat exposure, seldom have focused directly on income. Our study aimed to address this gap in the literature.

Methods: Using a sample of 47,487 self-identified veterans from the 2015 Behavioral Risk Factor Surveillance System, this study examined if income level, age, and gender play a role in alcohol consumption, measured by reported binge drinking. We hypothesized that veterans in higher income brackets will have lower reports of binge drinking.

Results: When focusing on income level divided into low, medium, and higher income level, we found that between the three levels, the highest reports of binge drinking were found in veterans among the higher income bracket. Additionally, we discovered that veterans who reported binge drinking were younger. Lastly, we found that reports of binge drinking were higher in males in comparison to females.

Discussion: Contrary to our hypothesis, higher income levels negatively affected binge drinking in our veteran population. Younger, male veterans of a higher income level reported binge drinking more frequently. There exists a need for further studies to determine why persons of higher income levels are reporting more binge drinking and how to address this problem through interventional programs.

Keywords: Veterans; Alcohol Consumption; Substance Abuse; Income

Of the 326.4 million people in the United States, there are 21.8 million veterans, half of which served in World War II, the Vietnam War, and/or the Korean War (1). As veterans of war, many have returned home with physical and mental disturbances. The American Psychological Association (APA) has reported that 20% of soldiers returning from Iraq and Afghanistan have mental illnesses (2). The Veteran's Affairs (VA) has indicated that common mental illnesses in veterans are post-traumatic stress disorder (PTSD), anxiety, depression, and traumatic brain injuries (3). Further reports by the VA have shown a prevalence of mental illnesses and alcohol misuse among veterans (4).

In addition to issues regarding mental health, veterans experience challenges as they transition into civilian life. Researchers have learned that understanding military life is essential to ensuring a successful re-integration for veterans (5). The "Homecoming Theory" explains a soldier is separated by space and time from civilian life. Due to this separation, different expectations exist for the veteran and the family about his/her return home; thus, making the transition overwhelming. Further veteran challenges highlighted by the VA are searching for, applying to, and adjusting to employment (6).

As veterans try to overcome challenges, they can develop either positive or negative coping mechanisms. Some positive coping mechanisms outlined by the VA are exercise, engaging in relaxing activities, or adopting a pet (7). However, negative coping skills are widespread in the veteran population. Substance Use Disorders (SUD), mainly Alcohol Use Disorder (AUD), are common among incoming veterans (8).

Veterans and Alcohol Consumption

While some military personnel drink socially or as a pastime, others drink as a coping mechanism. Studies have found combat exposure as a predictor for high alcohol consumption in the military. Research findings have discovered soldiers with high combat exposure and deployment have the highest percentage of binge drinking, heavy alcohol use, and harmful alcohol use. Alcohol use can lead to negative behaviors in the military and binge drinkers have more than twice the percentage of negative consequences related to alcohol use than those who did not binge drink (9). Similar studies found veterans between the ages of 61 and 70 were 73% more likely to report heavy drinking compared to non-veterans of the same ages after accounting for demographic differences (10). Studies defined heavy drinking as having two or more drinks a day on average (10).

Veterans and Income

While in service, the military determines income by rank and years served. The basic pay upon entrance is \$1,479.30 monthly as an Enlisted Level 1 (E-1) with the military rank of a Private First Class. After four months, military personnel earn \$1,599.00. Privates in the military have a pay grade of E-1 to E-3. Sergeants, officers, lieutenants, and captains receive higher paychecks, usually due to higher education or longer service. The highest pay grade attainable, \$15,000 monthly, is the position of a General with over 40 years of experience (11). The wages soldiers make may not seem like a lot of money, but they spend little to no costs for housing, healthcare, and food, not including allowances.

Once a soldier becomes a veteran, pay is calculated differently. Income is contingent on years served, dependents, and needs. On average, veterans make more than their nonveteran counterparts do. However, female veterans have a lower average household income than male veterans and the overall United States. The reported average income for male veterans in 2015 was \$58,995 and \$54,962 for female veterans (12). The United States federal median household income for 2015 was \$56,516 (13). Furthermore, the Department of Labor (2017) reports, although male veterans have lower unemployment rates, veterans affected most by unemployment are those who served in the Gulf War – Era I. Disparities exist between veterans based on factors such as era served in the military, gender, and age.

Income and Alcohol Consumption

Previous studies have found a correlation between alcohol use and social disadvantage. Factors such as racism, discrimination, stress, and poverty create an increased risk for alcohol abuse in individuals exposed to these factors (14). Other researchers discovered a positive association between severe economic loss and negative drinking behaviors. Another study reviewed the effects of the recession on drinking behaviors. Mulia et al.'s research observed "women reporting retirement loss, reduced hours/wages, and job loss consumed 41 to 70% more alcohol than women unaffected by the recession, and men who experienced job loss and housing problems had increased risk for drunkenness, drinking consequences, and dependence." When looking at older adults who lost their retirement, they drank 42% more than their counterparts who were not affected (15). Studies have outlined a trend in drinking behaviors: poverty or income loss is associated with higher probability of increased alcohol consumption. Similar trends exist when analyzing gender (women from the Mulia et al, study) and older age (from Clapp's study of older adults).

Although there is abundant evidence supporting low income being associated with higher alcohol consumption, other studies have reported the opposite. Keyes and Hasin (16) found higher income was associated with higher alcohol consumption. In a study that measured alcohol consumption through surveys and a pseudo-recycling program, researchers observed higher quantities of alcohol containers around the same time social security checks arrived at a senior living facility (17). As determined, income level is a factor for alcohol use in the general population, with effects in low and higher income levels. Little information exists regarding income level and alcohol consumption in veterans. Our research plans to address this gap in literature.

Purpose of This Study

While there is a wealth of information with low income and alcohol use, there is little information found regarding alcohol consumption in populations with higher income. Scarce information exists regarding alcohol use in minority veterans. Gaps from lack of information in these populations can give a false representation of the health of veterans. Additionally, many of the studies that assessed alcohol consumption relied on self-reported drinking behaviors and are arguably unreliable due to the potential of under-reporting from the individual. Studies have demonstrated that a relationship between

income level and alcohol consumption in veterans does not exist, while other studies (9) have found military personnel from lower pay grades reported a higher use of alcohol.

The Centers for Disease Control and Prevention (CDC) reports, "The cost of excessive alcohol use in the United States reached \$249 billion in 2010" (18). The purpose of this paper is to ascertain if income level is a positive or negative predictor of alcohol consumption in veterans. Our research aims to address the gaps found in the literature pertaining to veterans of a higher income level. We hypothesize that veterans in higher income brackets will have lower reports of binge drinking. While there exists an association between lower income and drinking, very little literature has addressed higher income levels with drinking and much less in the veteran population.

Methods

Participants

Our study consisted of self-identified veterans who took part in the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is a telephone survey conducted nationwide through the Computer-Assisted Telephone (CATI) system which uses random digit dialing. The BRFSS interviews occupants of private or college housing and is conducted in a span of 1-3 months in all 50 states and US territories. Within the BRFSS, participants who self-identified as a veteran implied that respondents were 18 years old and/or older and served actively in the United States Armed Forces, including the National Guard. We used data from respondents who provided information regarding their income level and binge drinking with answers other than "don't know/not sure," refused, or blank. For our secondary analyses, we ensured our sample answered age with an answer other than "don't know/not sure," refused, or blank; and gender as either male or female.

Materials and Measures

Measures used in our analyses were questions from the BRFSS. Information collected from participants pertained to health, health behaviors, and utilization of services for health. In the BRFSS, income level is reported in eight categories: less than \$10,000; less than \$15,000; less than \$20,000; less than \$25,000; less than \$35,000; less than \$50,000; less than \$75,000; and more than \$75,000 annual total household income. We further categorized income level as low, medium, and high. Responses of less than \$35,000 categorized as low income; responses of less than \$50,000 were medium income; and responses "less than \$75,000" and "\$75,000 and more" were high income. Within the BRFSS, the variable "binge drinking calculated" operationalized alcohol consumption for veterans. The variable "binge drinking calculated" selected all participants' answers to the variable Binge Drinking and separated them into two categories: those who reported binge drinking and those who did not. The BRFSS separated age into thirteen groups: starting with 18 and ending with 80. Respondents who entered higher than 80 for age were still considered as 80. The BRFSS defined gender as either male or female.

We received a non-human subjects research approval from the Institutional Review Board at Rush University Medical Center.

Analysis

Our initial analysis included the examination of frequency tables of categorical variables: income level and gender. We also created two-by-two tables of these variables (e.g. income level by gender) and obtained chi-square tests. We checked the mean, median minimum, maximum, and 95% confidence intervals of the continuous variables age and alcohol consumption.

Results

Participant Characteristics

The BRFSS 2015 database has 441,456 participants with 57,545 veterans. Excluding veterans who did not respond or had missing data on questions regarding binge drinking and income level, our sample size decreased to 47,487 respondents. The frequency analysis on income indicated 32% (n=15,235) of veterans had income below \$35,000; 17.5% (n=8,292) had income between \$35,000 and \$50,000; and 50.5% (n=23,960) had income above \$50,000. The average age of veterans was 63 years old. Approximately 91% (n=43,121) were males. See Table 1.

Table 1 – Characteristics of Veterans by Income Level and Gender

Income	Male (n, %*)	Female (n, %*)	Total Population by Income (n, %*)
Below \$35,000	13,726 (90.1)	1,509 (9.9)	15,235 (32.1)
\$35,000-\$50,000	7,583 (91.4)	709 (8.6)	8,292 (17.5)
Above \$50,000	21,812 (91.0)	2,148 (9.0)	23,960 (50.5)
Total Population by Gender	43,121	4,366	47,487
* Percent within income bracket			

Association between income level and alcohol consumption in veterans

The BRFSS measured annual household income in eight levels. For our analysis, we re-categorized income into three larger income categories: low, medium, and high (please refer to “Methods”). Our frequency analysis indicated that 10% of veterans in the lower income bracket reported binge drinking. Within the medium income level, 11% of veterans reported binge drinking. In the higher income bracket, 13% of veterans reported binge drinking. Data from our statistical analyses observed half of the veterans sampled were located in the higher income (above \$50,000) bracket. Calculating probability, odds, and odds ratio by hand, we found the probability of low income veterans reporting binge drinking was 0.1043; veterans of medium income had a 0.1084 probability; and higher income veterans had a 0.13 probability. The odds of each income category were 0.1164 for low income veterans, 0.1216 for medium income veterans, and 0.1482 for higher income veterans. Finally, in calculating odds ratio for high income versus low income

veterans, we found the ratio to be 1.273. Chi-square analyses for each individual income level (1-8) returned a p -value of <0.001 , highlighting the significance of the difference between groups.

Association of age and gender with alcohol consumption in veterans

Our study measured the covariates age and gender against responses of binge drinking. Our results illustrated 11.9% ($n=5,139$) of males and 10.1% ($n=442$) of females reported binge drinking. Calculating probabilities, odds, and odds ratio, we found males had a 0.1286 probability of reporting binge drinking while females had a 0.0953 probability. Additionally, males had an odd of 0.1476 and females had an odd of 0.1053 for reporting binge drinking. In calculating odds ratios for males versus females, we found a ratio of 1.4013. Overall, males were more likely to report binge drinking in comparison to females.

We also analyzed the mean, median, and standard deviation of veteran ages who reported binge drinking and those who did not report binge drinking. Results indicated the mean age of veterans who reported drinking was 54 years, the median age was 56 years, with a standard deviation of 16.14 years. For veterans who did not report drinking, the mean age was 64 years, the median age was 68 years, and the standard deviation was 14.13 years. Overall, the entire veteran study sample had a mean age of 63 years, with a median age of 67 years and a standard deviation of 14.76 years.

Discussion

Contrary to our hypothesis, our results showed veterans with higher income levels had the highest reports of binge drinking compared to veterans in lower and medium income levels. In our study sample, veterans of higher income level were 27% more likely to report binge drinking when compared to veterans of lower income. When compared to findings in the literature, a previous study indicated that respondents with higher income levels reported excessive levels of alcohol consumption (16), which is consistent with our findings. Furthermore, research studies focused on binge drinking in the general population showed those with higher income levels are more likely to binge drink (19, 20). However, other studies have shown poverty as a risk factor for high alcohol consumption (14).

When analyzing gender, previous literature has suggested males are more likely than females to report higher levels of binge drinking (15), which is consistent with our result that men were 40% more likely to report binge drinking than women. In previous studies, however, younger age may or may not be a predictor of reported binge drinking. In a similar study using a previous BRFSS survey year, binge drinking was reported higher in the older population of veterans, aged 61-70 years (10). In our study, we found veterans who reported binge drinking were younger in age than veterans who did not report binge drinking.

Study findings indicate that higher income levels can be an influence for alcohol consumption. Previous studies have also found that environmental factors and genetic

factors can affect alcohol consumption. College culture and peer pressure can contribute to higher alcohol consumption in younger adults in these environments (21). Additionally, persons who come from a culture of leisurely drinking can find it easy to entertain guests with alcoholic beverages and become unaware of the number of drinks consumed. Furthermore, the ability to finance their alcoholic tendencies with ease can foster an environment where the effects of alcohol can be overlooked.

The primary strength of our study lies in observing which veterans have higher reports of binge drinking by studying demographic characteristics of income level, gender, and age. Our study is innovative because we used a national public database, representative of all 50 states. The BRFSS has a large study sample of 441,456, allowing our study to have a sample size of 47,487 veterans.

Our study also had several limitations. First, data were cross-sectional. Our analyses were constricted to veterans who responded to this survey for the year 2015. Secondly, the dataset could not represent veteran subgroups, such as homeless veterans. Hence, drinking habits of veteran subgroups are not included in this study. Similarly, this survey was conducted via landline or cell phone line; veterans must have had either in order to participate and research participation may have been limited to such veterans. Lastly, data collected was based on self-reported binge drinking. The validity of self-reports can be questioned, specifically because any respondent can under- or over-report binge drinking.

Future research, as proposed by other studies (17), can be conducted to observe behaviors of alcohol consumption on a biweekly basis or when persons receive their paycheck. Future studies may also conduct a survey to ask veterans, or the general population, how much of their paycheck they would estimate goes to alcohol consumption. If income is associated with higher alcohol consumption, as shown by data, research regarding why persons with higher income are reporting binge drinking would provide useful to help focus preventative measures in this population.

References

1. Bureau, U. C. Veterans statistics. Retrieved from <https://www.census.gov/library/visualizations/2015/comm/veterans-statistics.html>
2. The critical need for professionals trained for war-related issues. Retrieved from <http://www.apa.org/about/gr/issues/military/critical-need.aspx>
3. VA. (2016). Office of Research & Development. Retrieved from https://www.research.va.gov/topics/mental_health.cfm
4. VA. (2015). PTSD and Substance Abuse in Veterans. Retrieved from https://www.ptsd.va.gov/public/problems/ptsd_substance_abuse_veterans.asp.
5. Ahern, J., Worthen, M., Masters, J., Lippman, S. A., Ozer, E. J., & Moos, R. (2015). The challenges of afghanistan and iraq veterans' transition from military to civilian life and approaches to reconnection. *PloS One*, 10(7), e0128599.
6. Common Challenges During Re-Adjustment. Retrieved from <https://www.mentalhealth.va.gov/communityproviders/docs/readjustment.pdf>
7. Self-help and coping - PTSD: National center for PTSD. Retrieved from <https://www.ptsd.va.gov/public/treatment/cope/>
8. Vazan, P., Golub, A., & Bennett, A. S. (2013). Substance use and other mental health disorders among veterans returning to the inner city: Prevalence, correlates, and rates of unmet treatment need. *Substance use & Misuse*, 48(10), 880-893. doi:10.3109/10826084.2013.796989
9. Bray, R. M., Brown, J. M., & Williams, J. (2013). Trends in binge and heavy drinking, alcohol-related problems, and combat exposure in the U.S. military. *Substance use & Misuse*, 48(10), 799-810.
10. Bohnert, A. S. B., Ilgen, M. A., Bossarte, R. M., Britton, P. C., Chermack, S. T., & Blow, F. C. (2012). Veteran status and alcohol use in men in the united states. *Military Medicine*, 177(2), 198-203. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/22360067>
11. Defense Finance and Accounting Service. Military Pay Charts. Retrieved from <https://www.dfas.mil/militarymembers/payentitlements/military-pay-charts.html>.
12. VA. Profile of Veterans: 2015. Retrieved from https://www.va.gov/vetdata/docs/SpecialReports/Profile_of_Veterans_2015.pdf
13. Bureau, U. C. Income and poverty in the united states: 2015. Retrieved from <https://www.census.gov/library/publications/2016/demo/p60-256.html>
14. Nina Mulia, Yu Ye, Sarah E Zemore, & Thomas K Greenfield. (2008). Social disadvantage, stress, and alcohol use among black, hispanic, and white americans: Findings from the 2005 U.S. national alcohol survey. *Journal of Studies on Alcohol and Drugs*, 69(6), 824-833. doi:10.15288/jsad.2008.69.824
15. Mulia, N., Zemore, S. E., Murphy, R., Liu, H., & Catalano, R. (2014). Economic loss and alcohol consumption and problems during the 2008 to 2009 U.S. recession. *Alcoholism, Clinical and Experimental Research*, 38(4), 1026-1034. doi:10.1111/acer.12301
16. Keyes, K. M., & Hasin, D. S. (2008). Socio-economic status and problem alcohol use: The positive relationship between income and the DSM-IV alcohol abuse diagnosis. *Addiction*, 103(7), 1120-1130.
17. Clapp, J. D., Reed, M. B., Martel, B., Gonzalez, M. C., & Ruderman, D. (2014). Drinking behavior among low-income older adults: A multimethod approach to estimating alcohol use. *Alcoholism, Clinical and Experimental Research*, 38(11), 2862-2868.

18. Alcohol use costs increase. (2016). Retrieved from <http://www.cdc.gov/features/costsofdrinking/index.html>
19. CDC. (2017). Facts Sheet - Binge Drinking. Retrieved from <https://www.cdc.gov/alcohol/fact-sheets/binge-drinking.htm>
20. Vital signs: Binge drinking prevalence, frequency, and intensity among adults - united states, 2010. (2012). MMWR. Morbidity and Mortality Weekly Report, 61(1), 14-19.
21. NIAAA (2002). Changing the Culture of Campus Drinking. Retrieved from <https://pubs.niaaa.nih.gov/publications/aa58.htm>