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Knowledge, Perceived Barriers, and Preventive Behaviors Associated with Cardiovascular Disease Among Gallaudet University Employees

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Abstract

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MS, University of Maryland, 2005

BS, Rochester Institute of Technology, 2000

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

When the Minority Health Improvement and Health Disparity Elimination Act of 2007 went into effect, there was a corresponding increase in research focused on cardiovascular disease (CVD) in underrepresented groups, except for 1: culturally Deaf Americans. Guided by the health belief model, the purpose of this study was to determine if there were significant differences in the level of knowledge, perceived barriers, and preventive behaviors associated with CVD among Deaf and hearing employees at Gallaudet University, Washington D.C. This cross-sectional quantitative research study used a survey with questions derived from 2 existing national surveys. One hundred eighty-six subjects were recruited on the campus of Gallaudet University. Chi-square analysis was conducted to seek any association between respondents and cardiovascular knowledge. A *t* test assessed for association between respondent characteristics and knowledge of CVD. A multivariate linear regression model was used to discover if differences in CVD knowledge score were predicted by socioeconomic factors. Deaf (28%) and hearing (43%) participants differed significantly in identifying all 6 correct signs/symptoms of heart attack ($p = 0.04$). Hearing females (80%) managed their blood pressure at healthy levels which is twice more than their Deaf female counterparts (61%, $p = 0.01$). Hearing Blacks (78%) had a discussion of their high blood pressure with their doctor more than Deaf Black counterparts (28%, $p = 0.05$). Gaining a better understanding of the Deaf health trends on CVD could inspire positive social change that ultimately could improve health for Deaf individuals in the United States.

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Chapter 1: Introduction to the Study

Introduction

Cardiovascular disease (CVD) claims about 600,000 people per year in the United States (Kochanek, Xu, Murphy, Miniño, & Kung, 2011) and poses a significant public health issue. The CVD mortality rate per year is actually higher than cancer, chronic lower respiratory disease, and accidents combined, which makes it the leading cause of death in the United States (American Heart Association [AHA], 2015; Centers for Disease Control and Prevention [CDC], 2008). CVD is also among the 15 leading factors that caused at least 45 million people to have functional disabilities (CDC, 2009). In addition, heart disease causes an economic strain of approximately $108.9 billion each year in the United States (Heidenreich et al., 2011).

CVD is well documented for the racial minority population and traditionally underrepresented groups. . The risk of African Americans developing CVD is three times greater than that of Whites (Fincher et al., 2004). African-American men have the highest death rates from CVD (369.2 deaths per 100,000 population) compared to White men (283.4), White women (192.2) and Black women (260.05; Go et al., 2014). In 2010, the CDC documented that the rate of preventable heart-related deaths for non-Hispanic Black individuals was nearly twice the rate as that of non-Hispanic Whites (Schieb, Greer, Ritchey, George, & Casper, 2013). Many studies found risk factors such as smoking, obesity, high blood hypertension, no leisure-time physical activity, hypercholesterolemia, and diabetes to be strongly correlated to CVD (AHA, 2015; CDC, 2015; Go et al., 2014; Kurian & Cardarelli, 2007; Myers, 2003; Schieb et al., 2013). Data from the 2003 CDC

Behavioral Risk Factor Surveillance Survey (BRFSS) survey revealed that the prevalence of more than two risk factors for CVD is highest among Blacks (48.7%) and American Indian/Alaska Natives (AI/AN; 46.7%) with Asians being the lowest (25.9%; Go et al., 2014).

In response to overwhelming data on racial minority health, Congress responded with the passage of the Minority Health Improvement and Health Disparity Elimination Act of 2007 and the Health Equity and Accountability Act (Thomas, James, & Lillie-Blanton, 2007). In turn, these acts require the Secretary of Health and Human Services to make an effort to reduce health disparities in racial minorities (Thomas et al., 2007). Native Americans and Alaska Natives even received their own statute, the Indian Health Care Improvement Act, with respect to their historical and cultural differences with the federal government (Indian Health Service, 2017). Additionally, former First Lady, Michelle Obama, took the initiative to fight childhood obesity across America with the Let's Move campaign (Office of the First Lady, 2010). As a result of these initiatives, several achievements have been reached in the battle with CVD in racial minority health.

However, the culturally Deaf and hard of hearing is one minority group that has not received much attention in efforts to reduce and eliminate CVD. Therefore, this study was necessary to understand the current trends of Deaf and hard of hearing Americans in terms of CVD. The results of this study may cause lasting social changes in health knowledge, attitudes, and behavior among Deaf people in reducing CVDs. In this chapter, I will explain the background, the purpose, the theoretical framework, assumptions, limitations, and the significance of this study.

Background

Knowledge of CVD is vital in getting people to begin certain behaviors such as quitting smoking, increasing physical activity, and improving diet. Prochaska and DiClement's transtheoretical model described knowledge as an essential step in developing a healthier lifestyle (Velicer et al., 1998). For example, only 54% of women recognize heart disease as the leading cause of death for women (Mosca, Mochari-Greenberger, Dolor, Newby, & Robb, 2010). However, based on a published national study on women, the awareness of CVD as a leading cause of death has doubled since 1997 and was correlated with increased physical activity and weight loss (Roger et al., 2012). This correlation shows how vital the knowledge gained plays a role in leading a healthier lifestyle.

Many researchers have studied the knowledge of CVD among racial minority groups with disturbing results. From the 2003–2005 BRFSS, Black women were reported to have lower levels of CVD knowledge than White and Hispanic women (Lutifyya, Cumba, McCullough, Barlow, & Lipsky, 2008). The trend continued into 2012 as CVD awareness among Black and Hispanic women remained below that of White women (Go et al., 2014). In fact, CVD awareness in Black women in 2012 was similar to that of White women in 1997 (Go et al., 2014). In a survey with total of 875 students in four Michigan high schools, 42% of men correctly recognized CVD as the greatest cause of death versus 14% of women (Vanhecke, Miller, Franklin, Weber, & McCullough, 2006). Studies have shown higher knowledge of CVD is associated with higher education (Lynch, Liu, Kiefe, & Greenland, 2006; Potvin, Richard, & Edwards, 2000; Winham &

Jones, 2011). However, AI/ANs were revealed to have significantly lower heart attack knowledge than the national average (13%–20% vs. 31%) regardless of having at least college/vocational to college degree (Brega et al., 2013). While there exists evidence that some populations (i.e. women, Blacks, Hispanic, Asians, Native Americans) have been the targets of efforts to increase awareness of CVD and its consequences, not all groups have benefited from such efforts. One such group is that of the culturally Deaf.

The population of the Deaf is a group that is confusing for people who lack the knowledge of the label. When used as cultural label, the word *deaf* is often written with a capital *D* as in *Deaf*. When the word *deaf* is written with a lower case *d*, it refers as a label for the audiological condition (Padden & Humphries, 2005). The Deaf does not include late-deafened, nor elderly hearing loss (Padden & Humphries, 2005). In addition, it does not include military veterans who became deaf due to combat (Padden & Humphries, 2005). Persons who self-identify as culturally Deaf tend to experience hearing loss before the age of 3 and use American Sign Language (ASL) as their primary form of communication (Margello-Anast, Estarziau, & Kaufman., 2006). ASL is not a representation of the English language as it is a unique language with its own grammar and syntax (Valli & Lucas, 1995). The Deaf community is a well-recognized ethnic minority with its own language, culture, and beliefs (Barnett, 1999). People who are deaf that do not know ASL are considered not to be culturally Deaf (Glickman, 1996). In this group of deaf individuals, they tend to socialize in the *hearing world* where they develop spoken language skills and all of their social contacts are in the hearing world (Glickman, 1996)). Often these deaf individuals lost their hearing as result of injury, genetics, or

disease later after acquiring spoken language skills (Glickman, 1996). In a few cases, these deaf individuals can move between these two worlds of the deaf and hearing. In recognition of the differences in the two labels, I will capitalize the word deaf in this study.

Previous studies have shown that Deaf persons tend to have lower health status, lack health knowledge, and decreased health care utilization when compared to the general population in the United States (Barnett & Franks, 1999, Ebert & Heckerling, 1995; Pollard, 1994). This is also true in the United Kingdom, as Emond et al. (2015) found when they completed the U.K.'s first comprehensive survey of the health of Deaf adults in the United Kingdom. Another study indicated that prelingually deafened adults have less physician visits compared to general (hearing) population (Barnett & Franks, 2002). Other studies have shown that the Deaf person is not very knowledgeable in health-related topics as compared to hearing counterparts (Margello-Anast et al., 2006; Steinberg, Barnett, Meador, Wiggins, & Zazove, 2006). One study revealed that the cancer prevention awareness among Deaf people is low with an average of only 22.9% correct answers on their knowledge of cancer prevention (Zazove, Meador, Reed, Sen, & Gorenflo, 2009).

The special communication and cultural needs of Deaf individuals may lead to significant gaps in their knowledge of health, and health care systems (Barnett & Franks, 2002; Margello-Anast et al., 2006). Most Deaf people consider ASLtheir first language and English as a second language, and therefore, are not fluent in English (Friess, 1998; Roberts, 2006). However, there are Deaf people who grew up in an English-speaking

family (hearing) and do mainstream at public hearing schools. They may write English well but may not speak English at all as they prefer to use an ASL interpreter to voice for them in English. While mainstreaming at public schools, Deaf students have often misunderstood several things in classrooms due to inadequate interpreter skills or no interpreters (Friess, 1998; Gannon, 1998; Roberts, 2006).

Lack of appropriate services and resources for the Deaf at public schools often lead them to fall behind with reading and written levels of English compared to their peers (Philips, 1996). The average reading level for an adult who is Deaf at birth is of fourth grade (Margello-Anast et al., 2006). Their low reading level may not allow them to fully understand the written health information they receive at their doctor's office or on the Internet, nor the captioning of a televised health-related program. In a national representative study, Deaf adults were found to have had fewer doctor visits than those in hearing population (Barnett & Franks, 2002). The explanation for this phenomenon is probably due to difficulty in communication with their health providers. Many doctors do not realize the severe limitations of lip reading as "The most skilled lip readers… correctly interpret only 25-30% of the movements they detect on a hearing person's lips" (Sinai Health System and Advocate Health Care, 2004, p. 2). Therefore, mistrust of health educators, service providers, and the lack of interpreters means that Deaf people are more reluctant to visit their doctors as often as they should (Barnett & Franks, 2002; Friess, 1998). Lack of access and exposure to general information about CVD from media and public health campaigns is also a possible contributing factor to their lower

health status. As a consequence, Deaf adults miss out on vital health information, leading to a greater risk for CVD.

Researchers have noted the importance of CVD education in terms of reducing the prevalence of CVDs. The literature on CVD is replete with evidence on how massive the CVD burden is on the U.S. health care system (Heidenreich et al., 2011; Trogdon, Finkelstein, Nwaise, Tangka, & Orenstein, 2007; Wang, McPherson, Marsh, Gortmaker, & Brown, 2011). Additionally, the literature is abundant on the knowledge of CVD among the various high-risk groups (Brega et al., 2011; Flink, Sciacca, Bier, Rodriguez, & Giardina, 2013; Winham & Jones, 2011); however, a gap in the literature exists due to the limited research on the culturally Deaf population and their knowledge of CVD. This suggests that there is a need for a study to devote attention to the extent to which Deaf individuals are knowledgeable about CVD and its risk factors (see Barnett, McKee, Smith, & Pearson, 2011; Margello-Anast et al., 2006) consequently, I designed this study to address this gap in the literature.

Problem Statement

There is no clear picture of the risk of CVD among the culturally Deaf community in the United States. Literature based on the trends of CVD among the culturally Deaf and hard of hearing population is scarce. Previous researchers indicated that Deaf persons tend to lack general health knowledge when compared to the general population (Barnett et al., 2011; Emond et al., 2015; Gaskins, 1999; Margello-Anast et al., 2006; Roberts, 2006). Therefore, it is likely that the Deaf population is also lacking in their knowledge of CVD. It was important to assess the knowledge, perceived barriers, and preventive

behaviors of the Deaf in order to gain a better understanding of the current knowledge of CVD in this population.

David, Tuttle, Barnett, and Kitzman (2012) conducted a focus group study on the perception of CVD among the Deaf population in Rochester, New York. However, their study focused on language and literacy as potential barriers to CVD-related assessment and not on how much the Deaf knew about CVD.

Another study by Patel et al. (2011) found 20 out of 42 Deaf subjects from the United Kingdom in their CVD intervention study to be at high risk for CVD. Patel et al. found it to be difficult to communicate with Deaf individuals about CVD and said that their sign language "appears" to be underdeveloped. Patel et al. also stated that their Deaf participants could not read their CVD promotional materials properly due to lower reading level and lack of knowledge in CVD related vocabulary. Patel et al. did not seem to understand the norms of Deaf people, did not know ASL, and relied heavily on sign language interpreters, which may be similar to other researchers and health professionals; this may be a reflection that many are not culturally sensitive to this minority group. Patel et al. stated that the reason for the failure in their CVD intervention in reducing estimates of cardiovascular risk among their Deaf participants was likely related to the design and delivery of health promotion to the Deaf.

Another study, conducted by Margello-Anast et al. (2006) from Sinai Health System in Chicago, revealed the potential that the prevalence of CVD among the Deaf and hard of hearing population in Chicago is higher compared to the general population. The prevalence for at least one risk factor of CVD is approximately 84% among Deaf

respondents (Margello-Anast et al., 2006) compared to the estimated 64% of U.S. (hearing) adults (CDC, 2004). In addition, the knowledge of CVD among those in the Deaf and hard of hearing community is lower compared to their hearing counterparts (Margello-Anast et al., 2006). For instance, 90% of respondents in a U.S. population-based survey (hearing population) listed chest pain/pressure as a heart attack symptom (Geoff et al., 1998) compared to 49% of Margello-Anast et al.'s respondents. What was striking about Margello-Anast et al.'s study was that there are no significant differences in knowledge of CVD across most of the socioeconomic status (SES) characteristics for their Deaf participants.

However, Margello-Anast et al.'s (2006) study lacked credibility for generalization of the Deaf and hard of hearing population. About 28 million people in the United States have hearing loss (Lucas, Schiller, & Benson, 2004). About 0.5% of the population is profoundly Deaf and may be an approximate number of those who are culturally Deaf (Ries, 1994). A sample of only 203 Deaf patients from Chicago's health care systems was included in Margello-Anast et al.'s study, which is still too small of a sample size to generalize to the Deaf population in the United States. Even Margello-Anast et al. (p. 238) admitted that the results of their study could not be generalized to all Deaf and hard of hearing persons.

Further study of knowledge of CVD among the Deaf and hard of hearing is needed to address a meaningful gap in the literature and increase the validity of generalization of research findings. Additional research is also needed to investigate

indications of perceived barriers and preventive behaviors that may be preventing the Deaf and hard of hearing from maximizing their health.

Purpose of the Study

The purpose of this quantitative study was to compare the knowledge, perceived barriers, and preventive behaviors associated with CVDs among a diverse, random sample of Deaf and hearing employees at Gallaudet University. First, I determined the overall level of CVD knowledge between Deaf and hearing employees at Gallaudet University. Second, I determined whether SES played a factor in the examination of CVD knowledge between Deaf and hearing employees. Third, I compared the preventive behaviors in relation to CVD between the hearing and Deaf employees. Lastly, I evaluated whether there was any significant difference in perceived barriers to leading a healthy lifestyle between the hearing and Deaf employees. The dependent variables were CVD knowledge, CVD prevention, and health lifestyle. The independent variables were hearing status, preventive behavior to CVD, perceived barriers to a healthy lifestyle, age, gender, race, and family history of CVD. The results of this study did provide empirical data on the trends of health knowledge, barriers, and preventive behavior in CVD among Deaf population.

Research Questions and Hypotheses

The following research questions and hypotheses guided this study:

Research Question #1: Is there a significant difference in the level of knowledge about CVDs between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD?

$H_0$1: There is no significant difference in the level of knowledge about CVDs between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

$H_1$1: There is a significant difference in the level of knowledge about CVDs between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

Research Question #2: Is SES a factor when other socio-demographic variables (age, gender, family history, and race) are taken into account in the examination of the difference in CVD knowledge among Gallaudet employees who are culturally Deaf and those who are hearing?

$H_0$2: SES is not a factor when accounting in the examination of the difference in CVD knowledge among Gallaudet University employees who are culturally Deaf and hearing employees when considering socio-demographic variables (age, gender, family history, and race).

$H_1$2: SES is a factor when accounting in the examination of the difference in CVD knowledge among Gallaudet University employees who are

culturally Deaf and hearing employees when considering socio-demographic variables (age, gender, family history, and race).

Research Question #3: Is there a significant difference in preventive behavior in relation to CVD between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD?

$H_0$3: There is no significant difference in preventive behavior in relations to CVDs between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD

$H_1$3: There is a significant difference in preventive behavior in relations to CVDs between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD

Research Question #4: Is there a significant difference in perceived barriers to leading a healthy lifestyle between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD?

$H_0$4: There is no significant difference in perceived barriers to leading healthy lifestyle between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

$H_1$4: There is a significant difference in perceived barriers to leading healthy lifestyle between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

Theoretical Framework for the Study

The health belief model (HBM) was the theoretical framework I selected for this quantitative study. This framework is based on the fact that a person must first understand the beliefs of an individual or certain population about health before they can explain their health behavior (Glanz, Rimer, & Viswanath, 2008; Nutbeam & Harris, 2004). Hochbaum, Kegels, and Rosenstock were social psychologists who developed the HBM to understand why people were not participating in free tuberculosis screening program offered by the U.S. Public Health Service (Sharma & Romas, 2008).

The Constructs of HBM

Perceived susceptibility refers to the beliefs of getting a disease (Champion & Skinner, 2008). For example, an individual will understand the possibility of getting lung cancer if they do not stop smoking. Perception varies among individuals in any condition as some people believe that they are invincible and will not get sick, while some might admit the possibility of getting sick but believe that it is not likely to happen to them (Sharma & Romas, 2008). Others may learn the possibilities that they are vulnerable to get sick due to certain unhealthy behaviors and feel the urge to take preventive measures (Sharma & Romas, 2008).

Perceived seriousness refers to the beliefs of a disease as serious (Champion & Skinner, 2008). For example, a person may see smoking to be a serious condition and in turn has an increasing desire to quit smoking. This construct of HMB also has a strong cognitive component, which depends on knowledge (Rosenstock, 1974). Health educators need to explain the severity of the disease and personalize the message to the participants in order to stress the perceived seriousness (Sharma & Romas, 2008).

Perceived benefits refers to the beliefs of a positive outcomes associated with the new behavior change (Champion & Skinner, 2008). For example, smokers will see how much they save in medical bills and personal budget if they quit smoking. Another example would be that people still go for a colonoscopy, an uncomfortable procedure, because they see the benefit of reducing colon cancer (Yim, Butterly, Goodrich, Weiss, & Onega, 2012).

Perceived barrier refers to a belief of obstacles preventing them from adopting new behavior (Champion & Skinner, 2008). An individual may consider a new behavior to be expensive, inconvenient, or upsetting (Champion & Skinner, 2008; Rosenstock, 1974). If a person believes the benefits of changing to a new behavior regardless of obstacles, they will adopt the new behavior. Among all the four constructs, perceived barrier is the most vital one in determining behavior change (Champion & Skinner, 2008).

According to HBM, for the successful implementation of a health promotion program, the identification of baseline knowledge among the targeted group members is essential before investing in development of a new program (Winham & Jones, 2011).

For example, baseline information may reveal differences in knowledge and beliefs in certain regions. In that case, it is vital that programs are to be tailored for the target audience in a given region in order to be effective (Winham & Jones, 2011). Further, the application of HBM offered me guidance on ways to determine the knowledge, preventive behaviors, and perceived barriers by Gallaudet employees about CVD.

Nature of the Study

In this study, I employed a quantitative cross-sectional approach using self-reported data from the Deaf and hard of hearing staff and faculty at Gallaudet University. I used one survey with questions derived from Margello-Anast et al.'s (2006) survey (an existing instrument with questions from validated health surveys such as SF-12 and BRFSS) and the AHA Women and Heart Disease 2012 survey. The survey questions were intended to test CVD knowledge, determine preventive behaviors in relation to CVD, and determine perceived barriers to leading a healthy lifestyle. Demographic information about Gallaudet employees was also collected. The dependent variables were CVD knowledge, CVD prevention, and healthy lifestyle. The independent variables were hearing status, preventive behavior to CVD, perceived barriers to a healthy lifestyle, age, gender, race, SES, and family history of CVD.

Quantitative methodology was the appropriate choice for this study mainly because the data I collected was numerical. The aim of this study was to collect, count, measure, and assess the meaning behind the variables included in the research questions. Ultimately, a quantitative method provided statistical explanations of the results.

The analytical strategies I used with the resulting data from the self-reported survey were as follows:

- Basic percentages in assessing demographic characteristics of the study population.
- Basic frequency tables of each question.
- Bivariate and multiple regressions analysis.
- Simple frequencies (chi-square) were compared for statistical significance across respondents' perceived barriers differing on some other characteristics (e.g., hearing, deaf, age, gender, SES, race, and family history of CVD).
- A *t* test was used to assess continuous variables for association between respondent characteristics and knowledge of CVD.
- Chi-square/Fisher was used to assess categorical variables for association between respondent characteristics and knowledge of CVD.

Definition of Terms

A clear understanding of the terms and acronyms is essential for the complete understanding of this study. In the following list, I will provide definitions of the fundamental terms and acronyms used throughout this research:

American Sign Language (ASL): The primary language of Deaf communities in the United States where the Deaf employ signs made by moving the hands combined with facial expressions and postures of the body (National Institute on Deafness and Other Communication Disorders) 2014).

Atherosclerosis: A process when a plaque builds up in the walls of the arteries, making it hard or stops the blood to flow through (AHA, 2015).

Cardiovascular disease (CVD): A heart and blood vessel disease. Many of the problems are related to atherosclerosis that can result in a heart attack or stroke (AHA, 2015).

Culturally Deaf: A person who tends to experience hearing loss before the age of 3 and use ASL as their primary form of communication (Margello-Anast et al., 2006).

Perceived barriers: A person's estimation of the level of challenge of social, personal, environmental, and economic obstacles to a desired goal status (Glasgow, 2008).

Socioeconomic status (SES): A measurement in social standing of an individual or group with combination of education, income, and occupation (Winkleby, Jatulis, Frank, & Fortmann, 1992).

Assumptions

The Washington D.C. metropolitan area (DC Metro) is the home to one of the largest culturally Deaf population in the United States (Humphries, 2014). DC Metro includes Washington D.C., and certain areas of southern Maryland and northern Virginia (Reuters, 2006). The significant contribution of this population is Gallaudet University, the world's only university with programs and services specifically designed to accommodate Deaf and hard of hearing students (Gallaudet University, 2016)). Gallaudet University employed 888 faculty and staff, 457 of who are Deaf (Gallaudet University, 2016). The federal government employs 4,745 Deaf as of 2006 (U.S. Equal Employment

Opportunity Commission (EEOC), 2006). Another significant contributor to the Deaf population size in DC Metro is the Maryland School for the Deaf and Model Secondary School for the Deaf. According to U.S. Census (2012) when the District of Columbia (4,412 deaf), Maryland (55,235) and Virginia (79,940) are combined, the total population with a hearing disability from ages 18 to 64 is 139,587. However, it is problematic to quantify culturally Deaf people due to lack of distinction between types, onsets, and severity levels of hearing loss in surveys (Harrington, 2014).

One assumption I held in my study was that the respondents would be truthful about their responses to the survey tool I used. I also assumed that all participants understood CVD-related information because they are at a university. In turn, I assumed that the instruments of this study provided accurate measurements of the respondents' knowledge, perceived barriers, and preventive behaviors.

Scope and Delimitations

In this study, I focused on the knowledge, perceived barriers, and preventive behaviors of Deaf and hearing employees at Gallaudet University in Washington D.C. The study involved the perceptions of 186 respondents through the use of a survey tool. Participants were selected by convenience sampling with half of participants being Deaf and the other half hearing. Students at Gallaudet University were excluded from this study mainly because they were not employed by Gallaudet University as full-time employee status with benefits and they had not yet received a college degree. Also, students are influenced by the social and academic stresses of colleges setting. College

students often engage in health risk behaviors as they experiment with their new freedom and environment (Rozmus, Evans, Wysochansky, & Mixon, 2005).

Certain boundaries of this research included a limited time frame of 3 months to complete data collection before the summer break. The results of my study may be generalized to Margello-Anast et al.'s (2006) study in Chicago because I used a similar measurement instrument. It can also be generalized to other locations where there are large Deaf populations such as Austin, Texas; Columbus, Ohio; and Seattle, Washington to name a few (U.S. Census Bureau, 2010a). Since I conducted my study in a university setting, the results could also be generalized to the National Technical Institute for the Deaf (NTID), the other college with a larger number of Deaf and hearing employees, in Rochester, New York.

Limitations

Since I collected the data in this study from a self-reported survey, the major limitation was the potential for recall bias, related differential misclassification, and low response rates. The data collected in this study may not have included data on confounding factors such as personal medical history or family history. There was also a potential for ecological fallacy where aggregated data weakened the inferences about individuals.

Using employees at Gallaudet University as the main participants in this research could have resulted in selection bias. However, I addressed this limitation by using convenience sampling. Some participants were not able to understand CVD information, and some participants did not complete my survey instrument. The survey I used in this

study contained questions derived from two surveys that were published in CVD studies. The creators confirmed that their instruments had not been tested for reliability and validity.

Significance

The results of this study of CVD at Gallaudet University, the only university for Deaf individuals in the world, may empirically support the result of Margello-Anast et al.'s (2006) study by extending its generalizability. The new information that was gathered to address my research questions may lead to a better understanding of Deaf people's knowledge, attitude, and perceived barriers related to CVD without regard to the type, onset, and severity of hearing loss in the population being studied. With the inclusion of the hearing employees from Gallaudet University in the study, I was able to compare the difference(s) in knowledge, attitude, and perceived barriers related to CVD, if any, to that of the Deaf people. The potential of understanding and improving the health care needs related to CVD of Deaf people is now higher because of this approach.

The CDC ranked Washington D.C. as the highest area in the country in terms of heart disease-related, preventable deaths in 2010 at 99.6 per 100,000 of the population (Schieb, Greer, Ritchey, George, & Casper, 2013). The D.C. Metro area includes all the federal district and parts of Maryland and northern Virginia. Maryland had a rate of 65.1 preventable deaths and Virginia experienced a rate of 54.6 preventable deaths per 100,000 individuals (Schieb et al., 2013). However, both Maryland and Virginia are among the top four states that saw a greater variance in preventable death from county to county (Schieb et al., 2013).

Ironically, there is no known study of CVD in the culturally Deaf and hard of hearing population in the Washington D.C. Metro, which hosts perhaps the largest culturally Deaf and hard of hearing population in the United States. A search using Google Scholar showed no CVD-related studies of the Deaf in DC Metro. The health and wellness coordinator at Gallaudet University confirmed that there was no CVD-related study previously carried out at Gallaudet University. The two studies conducted at the university that the coordinator was aware of were focused on sexual misconduct and HIV/AIDS among students (Roberts, 2006). It is highly likely that this study may be the first one its kind in the DC Metro. My use of a survey that has questions from validated health surveys commonly used in the hearing population in this survey allowed for the testing of the validity and reliability with Deaf persons, so as to enable comparison studies between the Deaf and general populations (Margello-Anast et al., 2006). Further comparisons can be made with other cities with large population of culturally deaf residents such as Rochester, Los Angeles, and Chicago to name a few. The findings from this study have the potential to make an original contribution and support practical application by encouraging development of appropriate CVD educational interventions for Deaf individuals at Gallaudet University as well as other universities with deaf programs (i.e., Rochester Institute of Technology and California State University of Northridge) as part of an effort to help reduce CVD among the Deaf and hard of hearing population.

Not only does this study have the potential to contribute to Margello-Anast et al.'s (2006) findings, it has the potential to promote positive social changes in terms of health

trends among Deaf and hard of hearing people in the United States. It has been 24 years since the Americans with Disabilities Act of 1990 was passed; yet, the current trends of public health-related organizations still limit the Deaf and hard of hearing population's ability to lead a healthier lifestyle. The results of this study could also inspire more research on other serious health-related issues, aside from CVD, such as obesity, smoking, and AIDS for this underrepresented group.

As of 2015, there were no known Deaf health research or Deaf health promotion campaigns, Deaf health intervention programs, or Deaf health organizations at Gallaudet University and in Washington D.C. metropolitan area, which is home to the largest concentrations of Deaf and hard of hearing people in the United States. There is more work needed for the development of materials and programs that best meets the unique communication and cultural needs of the Deaf population. More research into the development of effective, standardized screening tools for use with a Deaf population is also warranted. Then, in turn, these tools could be disseminated to healthcare providers for use with their Deaf patients, thereby helping to reduce or eliminate the health knowledge deficit among the Deaf and hard of hearing population.

Summary

It is still not understood why the Deaf population seems to be at higher risk of CVD compared to their hearing counterparts. The lack of available data limits the understanding of CVD health among the culturally Deaf in the United States. The purpose of this quantitative study was to compare the knowledge, perceived barriers, and preventive behaviors associated with CVDs between hearing and deaf employees at

Gallaudet University. According to the HBM, a person must have an awareness of negative consequences of their current actions or health status and a perception of self-risk in order to have some willingness to alter behaviors (Jones, Weaver, Grimley, Appel, & Ard, 2006). In turn, the HBM served as the framework for this quantitative study to assess the knowledge and beliefs of this Deaf population at Gallaudet University about CVD. In Chapter 2, I will review the current literature on what is known about CVD, the trends of CVD in racial minority health, and health trends of the Deaf community in the United States.

Chapter 2: Literature Review

Introduction

The purpose of this quantitative study was to compare the knowledge, perceived barriers, and preventive behaviors associated with CVDs among a diverse, random sample of Deaf and hearing employees at Gallaudet University. Deaf people have been shown to have lower CVD knowledge than their hearing counterparts (Geoff et al., 1998; Greenlund et al., 2004; Lundelin et al., 2012; Margello-Anast et al., 2006; Mata, Frank, & Gigerenzer, 2014; McKee et al., 2011; Smith et al., 2015). Therefore, Deaf people are at higher risk of CVD incidence than hearing people (Barnett et al., 2011; Emond et al., 2015). There was a need for further study on the CVD knowledge of the Deaf population in order to address a gap in the literature and increase the validity of generalization in accordance with previous studies.

I have divided this chapter into three parts. In the first part of the chapter, I will provide the literature search strategy and a summary of the review of the literature related to CVD, its risk factors, and its incidence. The next part will include a discussion of the HBM as the theoretical framework for this study. In the final part of this chapter, I will summarize what is known about CVD among the Deaf population.

Literature Search Strategy

Limited research in CVD knowledge among Deaf Americans indicates that a disparity does exist when compared to their hearing counterparts (Margello-Anast et al., 2006; McKee et al., 2011; Smith et al., 2015). I used the following virtual library databases and Internet search engines to collect published material about Deaf health and

cardiovascular disease: SAGE, Thoreau, MEDLINE, ProQuest, PubMed, and Google Scholar.

Keywords used to search the databases and search engines included the following terms: *Deaf, minority health, cardiovascular disease, knowledge,* and *barriers*. The search was then narrowed down to material published between 2010 and 2017. My search yielded two articles on Thoreau, 32 articles on PubMed, and 9,900 articles on Google Scholar. All of these articles were peer reviewed and full text. I also collected vital information through professional organizations such as the CDC, AHA, National Institutes of Health, and the World Health Organization. Dr. Margellos-Anast, one of the designers of a survey that I derived this study's survey from, also personally provided valuable literature and references.

Cardiovascular Diseases (CVDs)

CVD is a class of conditions that involve the heart or blood vessels or both (AHA, 2014). Numerous problems associated with CVD are often related to a process called atherosclerosis (AHA, 2014). Atherosclerosis is where plaque builds up in the arteries and making it narrow to a point that it will interrupt the blood flow and can lead to a blood clot where the arteries is completely closed up (AHA, 2014). Atherosclerosis, if not treated, commonly leads to heart attack, stroke, or even death (AHA, 2014).

A heart attack, also called myocardial infarction, occurs when the blood clot is formed in coronary artery a blood vessel that feeds blood to part of the heart muscle (AHA, 2014). If that part of heart muscle is not getting the oxygen it needs from the blood, the section of the heart muscle begins to die, and the result may be death or

weakening of the heart where heart failure and arrhythmia may occur (AHA, 2014). According to the AHA (2014), the five symptoms of heart attack are chest pain; shortness of breath; fatigue; nausea; and pain that spreads to the neck, shoulders, or arms.

A stroke occurs when the blood clot is formed that blocks blood flow to the brain (AHA, 2014). The most common type of stroke is an ischemic stroke where the blood supply to a part of the brain is shut off or deprived of oxygen (AHA, 2014). As a result, the brain cells die and the consequences may be death or a temporary or permanent disability such as paralysis, memory loss, or difficulty in talking or walking (AHA, 2014). A hemorrhagic stroke is second most common type of stroke where blood vessels within the brain burst, known as aneurysm or arteriovenous malformations (AHA, 2014). Hemorrhagic stroke accounts for 13% of stroke cases (AHA, 2014). According to AHA (2014), the five warning signs and symptoms of stroke are: sudden numbness or weakness of the leg, arm, or face; sudden confusion or trouble understanding; sudden trouble seeing in one or both eyes; sudden trouble walking, dizziness, or loss of balance or coordination; and sudden severe headache.

According to the CDC (2013), CVD is the leading cause of death in the United States. The incidence and prevalence of CVD is well documented. About 600,000 Americans die of heart disease every year (CDC, 2013). Every year, about 720,000 Americans have a heart attack, and out of these, 205,000 happen in people who are not suffering their first heart attack (Go et al., 2014). More than 795,000 people suffer a stroke each year (CDC, 2014). Almost 130,000 Americans die from stroke every year (Kochanek et al., 2011). About 87% of all strokes are ischemic strokes (Go et al., 2014).

Table 1

Leading Causes of Death in 2013 (CDC, 2015)

Cause of death	Per 100,000
Heart disease	611,105
Cancer	584,881
Chronic lower respiratory diseases	149,205
Accidents (unintentional injuries)	130,557

Heart disease and stroke can result in death; however, they can also result in decreased quality of life such as serious illness or disability. After a heart attack, individuals suffer fatigue and depression and may find it difficult to be active (AHA, 2014). A stroke may lead to paralysis, speech difficulties, and emotional problems (AHA, 2014). Stroke is the leading cause of long-term disability (AHA, 2014; Go et al., 2014). From a financial perspective, families who experience a heart attack or stroke have to deal with medical bills and lost wages along with the potential of decreasing their standard of living. Heart disease and stroke account for more than $312.6 billion in health care expenditures and lost productivity annually (AHA, 2014).

However, CVD is one of the most preventable causes of death. According to the AHA (2014), the best prevention measures an individual can take to improve their health from CVD is changing their lifestyle. Strategies to change their lifestyle for the better

include: exercise, weight loss, the reduction of stress, quitting smoking, and eating a healthy diet (AHA, 2014).

CVD Major Risk Factors and Incidence

Clinical and statistical researchers have pointed out several factors that increase the risk of CVD (AHA, 2015). The following are a list of the major risk factors for CVDs:

Tobacco Smoke

The risk of developing heart disease is much higher in smokers than that of nonsmokers (AHA, 2015; Roger et al., 2012). The CDC (2014) stated that in 2013, 1 in 5 adults smoked, and 20 of every 100 men smoked compared to 15 of every 100 women. Smokers were 19.4% White, 18.3% Black, and 12.1% Hispanic (CDC, 2014). Smokers were highest among persons with a GED certificate and lowest among those with a graduate degree (CDC, 2014). Smokers were higher among persons with a disability than those with no disability (Jamal et al., 2014).

Hypertension: High Blood Cholesterol and Pressure

As the level of blood cholesterol rises, the risk of heart disease rises too (AHA, 2015; Roger et al., 2012). The higher the blood pressure is, the stiffer the heart muscle becomes which makes it harder for the heart to work properly, and this increases the risk of heart attack or stroke (AHA, 2015; Roger et al., 2012). According to the CDC (2011), 1 in 3 adults has high cholesterol and 1 in 3 adults has high blood pressure. Blacks (38.6%) have the highest prevalence of hypertension compared to Whites (32.3%) and Hispanics (17.3%; CDC, 2011)). Men (30%) and women (31.7%) are similar in the

prevalence of hypertension with those who possess less than a high school education with the highest prevalence among adults and college graduate the lowest (CDC, 2011).

Physical Inactivity

An inactive lifestyle is a risk factor for heart disease. Studies have shown that regular physical activity helps reduce the risk of heart and blood vessel disease (AHA, 2015; Roger et al., 2012). Myers (2003) found that if a person were to meet the government recommendations for physical activity, there would be an estimated 30% to 40% reduction in cardiovascular events. According to the CDC, Whites are the highest among racial groups to meet the 2008 Physical Activity Guidelines compared to Blacks (17.3%) and Hispanics (14.4%; CDC, 2014). Men are more likely to meet the 2008 Physical Activity Guidelines than women (42.6%), and adults with more education are more likely to meet the 2008 Physical Activity Guideline than adults with less education (CDC, 2014).

Obesity

The more a person has excess body fat, the more likely they will develop hypertension, diabetes, and atherosclerosis (AHA, 2015; Myers, 2003). These conditions will put a person at high risk for a heart disease and stroke (AHA, 2015; Roger et al., 2012). According to the CDC, more than one-third (78.6 million) of U.S. adults are obese. Blacks (47.8%) have the highest rate of obesity followed by Hispanics (42.5%), Whites (32.6%), and Asians (10.8%; CDC, 2015). Women have shown a correlation between obesity and education with women who have college degrees less likely to be obese when compared with less educated women (CDC, 2015).

Diabetes Mellitus

Diabetes increases a person's risk of developing CVD (AHA, 2015). At least 68% of people above age 65 with diabetes die of some form of heart disease and 16% die of stroke (AHA, 2015; Roger et al., 2012). CVD death rates were about 1.7 times higher in those diagnosed with diabetes than those who were not (CDC, 2014). According to the CDC (2014), 29.1 million people in the U.S. have diabetes with Blacks (15.9%) having a higher percentage of diabetes than Hispanics (13.2%) and White (7.6%).

Several studies have shown the more risk factors a person has, the greater risk of having a heart attack or stroke (AHA, 2015; Grundy et al., 1999; Roger et al., 2012). The risk for heart disease doubles for each risk factor (National Institute of Health (NIH), 2015). Following a healthy lifestyle can help prevent or control many risk factors and in turn reduce risk of having heart attack or stroke (NIH, 2015).

CVD Prevention

Health behavior models propose that without knowledge there is no motivation to change behavior; therefore, knowledge of risk factors of CVD is important. If individuals are aware of the risk factors for CVD, they may change their behaviors to prevent the development of CVD or eliminate risk factors for CVD. Information about heart disease has evolved over the years. In the 1950s–1960s, information was provided for women on how they could take care of their husband's heart (Miller & Kollauf, 2002). From the 1960s to 1970s, information on heart disease was primarily focused on men (Miller & Kollauf, 2002). Now in the present day, more information is focused on all genders and

other racial minority groups as compared to the past (Mosca, Feris, Fabunmi, & Robertson, 2003).

Much research has revealed that many groups still lack the sufficient knowledge of CVD risk factors and still practice unhealthy behaviors that may lead to a CVD event. Lynch, Liu, Kiefe, and Greenland (2006) studied CVD risk factor knowledge in 4,193 young adults, focusing on the risk factors of hypertension, hyperlipidemia, smoking, overweight status, sedentary lifestyle, and unhealthy diet. Sixty-five percent of study participants were not able to recognize any of the risk factors (Lynch et al., 2006). Hispanic women (27%) were less likely to correctly identify CVD as the leading cause of death compared to non-Hispanic, White women (88%; Giardina et al., 2013). Only 5% of 4,254 Vietnamese participants in Santa Clara County, California correctly identify all five symptoms of a heart attack and 22% for symptoms of stroke (Nguyen et al., 2009). About 20%–38% of AI/ANs were able to recognize of all symptoms of stroke compared with 44% nationally (Fang et al., 2008).

There is substantial evidence showing that people have at least one of the risk factors of CVD. Rigotti, Lee, and Wechsler (2000) discovered that more than 60% of college students in his study sampled a tobacco product. Freedman, Dietz, Srinivasan, and Berenson (1999) found 60% of children between age of 5 and 10 years in the United States to be in overweight category who have at least one condition related to obesity such as hypertension, diabetes, osteoarthritis, asthma, heart disease, high cholesterol, or sleep apnea. According to Emanuel (2008), a meta-analysis found that 63 of 73 studies

showed an increased rate of childhood obesity with increased media exposure with rates increasing proportionally to time spent watching television.

Comprehensive lifestyle interventions are effective strategies for CVD prevention. Smoking cessation is one of them. Two-thirds of cardiac deaths occur in cigarette smokers (National Heart, Lung, and Blood Institute (NHLBI), 2015). Non-smokers have more years free of CVD than smokers: 6.22 years for males and 4.93 for females (Gaita & Sperling, 2015). One year after quitting smoking, the risk of heart disease is reduced to about half; after 5 years, the stroke risk is reduced to that of a nonsmoker (Mahmud & Feely, 2003). Exercising (increased physical activity) is also one of the effective strategies for CVD prevention. Research shows that those who are sedentary in terms of physical activity have a mortality risk that is 4.5 times that of those who are active (Myers et al., 2002). Cutting down screen media time for children has been shown to increase physical activity and/or improve diet (Hancox et al., 2004).

Theoretical Framework

Health Belief Model (HMB) Related to CVD

The HBM has been used to determine relationship between health beliefs and health behaviors. Knowledge and sociodemographics are the modifying factors that may influence health perceptions/beliefs. Health beliefs, in turn, include the key concepts of HBM: perceived susceptibility, benefits, barriers, and self-efficacy as shown in Figure 1 (Glanz, Rimer, & Viswanath, 2008).

Figure 1. Diagram of HMB Constructs

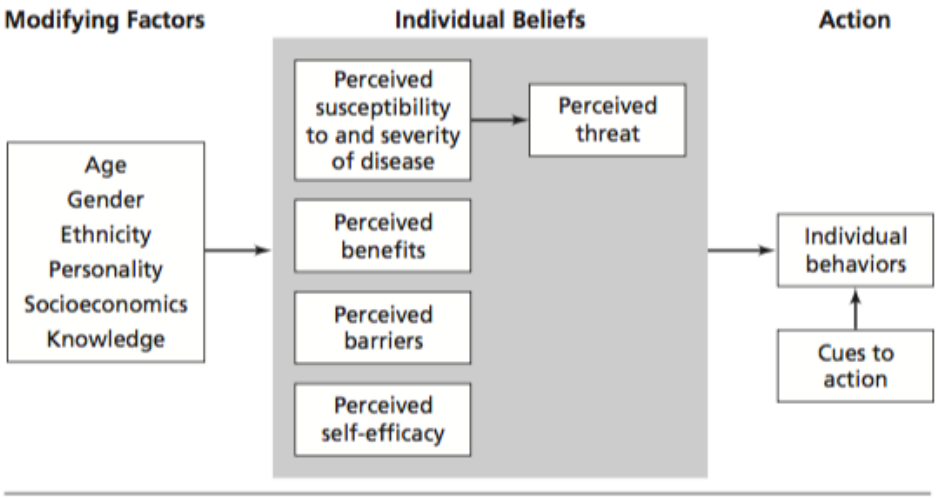

Figure 1. Diagram of HMB constructs. Reprinted from "Health Behavior and Health Education: Theory, Research, and Practice," by V. L. Champion and C. S. Skinner, 2008, p. 49. Reprinted with permission.

Self-efficacy was not part of the original model of HMB. Bandura defined *self-efficacy* as the conviction that one can adopt the behavior required to produce the (healthy) results (Bandura, 1997). It is when a person feels competent to initiates and maintains the behavioral change. Rosenstock, Strecher, and Becker pushed for self-efficacy to bed added to the HBM as one of the construct (Glanz et al., 2008).

There are several research studies that use the HBM as related to cardiovascular disease. Green, Grant, Hill, Brizzolara, and Belmont (2003) found that their participants underestimated their risk of heart disease. With 470 undergraduate college students participating in a heart disease risk perception survey, it was found that 68% of the respondents rated their risks as lower, or much lower, than those of their peers (Green et al., 2003). The benefit of denial and lack of awareness may explain why individuals underestimate their personal susceptibility of experiencing a CVD event (Gramling et al.,

2008). Another study of Stanford University female students showed similar results as 59% of these students fear breast cancer as compared to 29% for heart disease (Pilote & Hlatky, 1995). In 1997, an AHA national survey showed that women perceived that their risk of developing CVD is 9% compared to 61% for breast cancer (Mosca et al., 2000). Males and females have been shown to perceive the risk of cardiovascular disease differently. According to a study by Homko and colleagues, women perceived their risk significantly higher than men (0.61 vs. 0.15; $p < .01$) (Homko et al., 2008). The study also showed women to be more knowledgeable about CVD than men (Homko et al., 2008). Ali (2002) conducted an investigation on heart disease prevention behavior of women. Ali found that perceived susceptibility was the strongest predictor for participating in prevention activities. Participants in CVD knowledge workshop showed more than 50% increase in knowledge and susceptibility (Ali, 2002).

The HBM is the framework for my study of Gallaudet University employees. Within this theoretical framework, it is my intention is to examine the current CVD knowledge, perceived barriers and preventive behavior between Deaf and hearing employees at Gallaudet University. Intervention is not a part of this study.

Table 2

Key Concepts of Health Belief Model

Concept	Definition	Application
Perceived Susceptibility and Severity	One's belief of the chances of getting a condition and how serious a condition and its consequences are.	Research Question #1,3
Perceived Benefits	One's belief in the efficacy of advised action to reduce risk.	Research Question #3
Perceived Barriers	One's belief in the tangible and psychological costs of the advised behavior.	Research Question #4
Perceived Self-efficacy	One's belief in the ability to overcome perceived barriers to take action.	Research Question #4
Knowledge and Socioeconomics	Modifying factors that influence individual's	Research Question #2

beliefs.

Social Cognitive Theory Related to CVD

Another theory developed by Albert Bandura was in consideration as the framework for this study: social cognitive theory (SCT). The SCT assumes that the explanation of human behavior is due to continuous reciprocal interaction between cognitive, behavioral, and environmental determinants as shown in Figure 2 (Bandura, 1977).

Figure 2. Diagram of Social Cognitive Theory

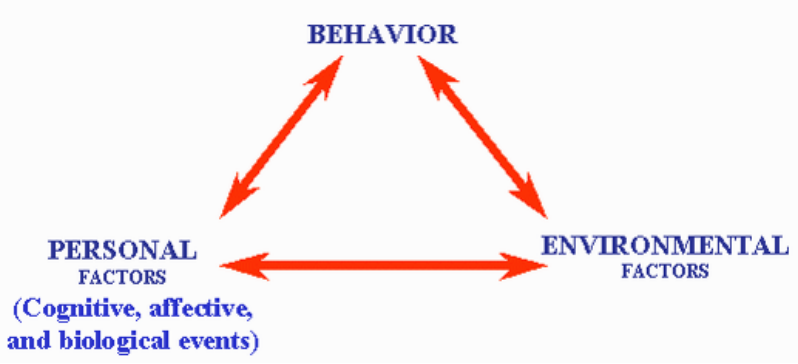

Figure 2. From "Self-efficacy Beliefs of Adolescents*"* by F. Pajares, T.C. Urdan. 2006. Reprinted with permission

The Child and Adolescent Trial on Cardiovascular Health (CATCH) used SCT to reveal their lack of knowledge and prevention of CVD (Edmundson et al., 1996; Luepker et al., 1996; Stone et al., 1996). They used SCT to help them design an appropriate intervention to improve children's dietary patterns and physical activity. As a result, subjects in CATCH showed improved knowledge, healthier behavior, and higher self-efficacy (Edmundson et al., 1996; Luepker et al., 1996; Stone et al., 1996). Another SCT

model study by Krummel, Humphries, and Tessaro (2002) revealed that rural women with no more than 13 years of education were unaware of their personal CVD risks. They noticed that younger women in that group have very low self-efficacy and lack the skills for food selection and preparation for healthy meals (Krummel et al., 2002).

Table 3 will explain how the concepts are applied to the research questions of this study:

Table 3

Key Concepts of Social Cognitive Theory

Concept	Definition	Application
Cognitive	Knowledge, expectations and attitude of a condition.	Research Question #1
Environmental	Social norms or influence on others about a condition	Research Question #2
Behavioral	Skills, practice, self-efficacy to reduce risk of a condition.	Research Question #3, 4

Even though this theory could fit well with the research question, it does not really directly address Research Question #2, the socioeconomic question. HMB clearly identified socioeconomics as one of the modifying factors for their behavior more than

SCT. In fact, Bandura developed this theory that eventually led indirectly to the creation a new construct for HMB: *perceived self-efficacy* (Glanz et al., 2008). Therefore, the argument stands for HMB as the official framework for this study.

Literature on Knowledge of CVD among Deaf Population

Over the years, many health institutes have developed effective strategies on improving CVD knowledge in order to reduce CVD events and mortality (Roger et al, 2011; Vaccarino et al., 2009; Wenger, 2010). As a result, the CVD mortality in the past 30 years showed a sharp decline but has not been impacted equally across all populations (Mackenbach et al., 2000). It is the wealthier and better-educated segment that benefits the most in reducing risk of CVD mortality (Lenfant, 1996). Many underserved populations have been overlooked such as the Deaf people in terms of health assessments and interventions.

Literature based on CVD among the Deaf population is scarce. Data about discrepancies between perceived and actual susceptibility for CVD along with perceived seriousness, perceived benefits, and perceived barriers among Deaf population are still limited. The Deaf may be viewed as an underserved and understudied group which puts them at higher risk for CVD (Barnett et al., 2011; Emond et al., 2015). Increased CVD risk in the Deaf population may be related to their cardiovascular health knowledge (Margello-Anast et al., 2006; McKee et al., 2011). This may be true among the hearing population as well in regards to poor health knowledge and poor health outcomes (Baker et al., 2007; Dewalt, Berkman, Sheridan, Lohr, & Pignone, 2004). As compared to the national study of CVD perceptions, Deaf study participants seem to share similar

characteristics of both the non-English speaking groups and the underserved English speakers in terms of communication and language barriers that prevented access to health information (Bryant et al., 2010; McKee et al., 2011).

Margello-Anast, Estarziau, and Kaufman (2006) from Sinai Health System revealed that the risk of cardiovascular disease of deaf and hard of hearing population in Chicago is higher compared to the general (hearing) population. Their knowledge of CVD is actually lower compared to their hearing counterparts (Margello-Anast et al., 2006). For instance, sixty percent of Deaf participants could not list a single symptom of a stroke (Margello-Anast et al., 2006) versus 30% for general (hearing) population (Schneider et al., 2003). In a heart attack symptoms knowledge study with 1294 (hearing) adult respondents, 89.7% of adults were able to report chest pain as a correct symptom; 67.3% for arm pain/numbness, 50.8% shortness of breath, and 21.3% sweating (Goff et al., 1998). Only 49% of the Deaf respondents in Margello-Anast et al.'s heart study (2006) were able to report chest pain as a correct symptom, 14.8% for arm pain, and 24.1% for shortness of breath.

Smith, Kushalnager, and Hauser (2015) conducted a study on Deaf adolescents' learning of cardiovascular health information and found inconsistencies in their knowledge of heart attack, stroke, and cholesterol. Further studies continue to justify that the hearing population generally has a good knowledge of heart attack and stroke symptoms and CVD risk factors (Greenlund et al., 2004; Lundelin et al., 2012; Mata, Frank, & Gigerenzer, 2014).

Risk factors of CVD among Deaf people are evident in several research studies. For instance in Adair's (2006) research, 151 deaf children aged 6-11 years were included in a study on obesity. The results were compared to the national values for same age and gender by Center for Disease Control and Prevention (CDC). The results indicate that the prevalence of overweight deaf children was above the national percentage for the same age and gender (Adair, 2006). Similar research was conducted for Deaf adults; the prevalence of overweight has been reported to be 33.9% and the prevalence of obesity 23.4% which demonstrated a higher rate of obesity than nondisabled adults (Weil et al., 2002). Many Deaf adults do not know their own family medical history which may put them at risk for diabetes and heart disease (Barnett, 1999).

Socioeconomic Facts and CVD

Research supports an inverse relationship between socioeconomic status (SES) and CVD mortality (Gebreab et al., 2015; Kamphuis, Turrell, Giskes, Mackenbach, & van Lenthe, 2012; Loucks et al., 2009; Pollitt, Rose, & Kaufman, 2005). Even individuals living in high-income inequality states were at increased risk of heart attack or mortality compared with individuals living in low-income-inequality states (Lochner, Pamuk, Makuc, Kennedy, & Kwachi, 2001; Pabayo, Kawachi, & Gilman, 2015). An inequality of income was positively associated with inequality in number of years lived (Neumayer & Plumper, 2016). Loucks et al. (2012) found education is also inversely associated with heart disease as they found college graduates to have a 27.9% lower risk of coronary heart disease compared with those with an education of high school degree or less. Health inequality is evident among racial groups as well. Barnett, Armstrong, and Casper (1999)

revealed that in North Carolina, Black men of lower class have a higher mortality of heart disease compared to White men of lower class.

What is striking about Margello-Anast et al.'s study (2006) is there are no significant differences in knowledge of CVD across most of the socioeconomic status characteristics for the Deaf participants. For instance, when comparing the two groups with different level of education (High school [HS] or less vs. more than HS), 39.6% were unable to correctly identify any risk factors compared to 22.8%, respectively (a 16.8% gap between those two groups). In contrast to another study of a hearing population, the gap is clear between the education level groups (HS or less vs. more than HS) with a 26.6% difference where people with more than HS are able to correctly identify risk factors of CVD better than people with and education level of HS or less (Roger et al., 2012). Lack of strong correlation between prevalence of CVD and SES factors in this study is an indication of other potential barriers beyond SES factors that can prevent Deaf people from achieving full health.

Perceived Barriers to a Healthy Lifestyle

A belief in health benefits is a common reason to adopt a healthy lifestyle, and in order to sustain the behavior, knowledge about health benefits needs to be accompanied with feeling of satisfaction (Schutzer & Graves, 2004). Yet, several groups do not appear to see the health benefits of adopting a healthy behavior/lifestyle. Therefore, it is important to explore their perceived barriers by assessing their knowledge and perception. This could lead to several studies that explore and describe the perceived reasons and barriers for a healthy behavior/lifestyle. For instance, African American

women had different perceived barriers (community factors, access to high-quality cancer prevention, early detection and treatment services) and experienced greater levels of cancer fatalism than White women (American Cancer Society, 2013). Younger and rural women had different perceived barriers than older women mainly because they lack the skills for a healthy eating plan (Krummel et al., 2002). Women ranked self-esteem as the most important barrier significantly higher than did men ($p = 0.0003$ [Mosca et al., 2009]). More acculturated minorities perceived that doctor can help avoiding heart disease is significant less likely to agree compared with less acculturated minorities (41% vs. 77%, $p < .0001$[Edelman, Christian, & Mosca, 2009]). Knowledge about factors influencing unhealthy behaviors is needed in order to tailor an understanding and/or intervention of an individual or group (Sjörs, Bonn, Lagerros, Sjölander, & Bälter, 2014).

Few studies have assessed perceived reasons and barriers of CVD among Deaf people. The Deaf population and minorities or subgroups of hearing people may share many similar perceptions on barriers in terms of accessing health information or care (Potvin, Richard, & Edwards, 2000; Winham & Jones, 2011). Research studies have shown that Deaf people are at higher risk of CVD due to lack of access to health information and literacy disparities (David, Tuttle, Barnett, & Kitzman, 2012; Margello-Anast et al., 2006; Smith et al., 2015). For example, one deaf participant said that he did not know about food stamps and would smoke so he would not be hungry anymore (McKee et al., 2011). However, these assessments are often of a small sample size, which may not be ideal for generalization (David et al., 2012; Margello-Anast et al., 2006).

Like the non-speaking English racial minority group, communication barriers play a factor for Deaf people with their health care or health opportunities (Nguyen et al., 2009; Smith, Massey-Stokes, & Lieberth, 2012; Zazove et al., 2009). For instance, an American Heart Association ran a telephone national survey in 2003 and noted in their report that they included only households with telephones and English speaking (Mosca et al., 2004). Clearly, Deaf people are easily excluded in this national study as they often do not have a telephone nor speak English (ASL only). Recruitment strategies for surveillance and health research need to be adapted and accessible for Deaf participants (Barnett et al., 2011). Another Deaf participant stated that he wanted to join a weight support group but felt "a language-inaccessible environment" prevented him from joining (McKee et al., 2011). It is well recorded that many Deaf people misunderstood a lot of health information from their medical visits due to poor communication (i.e., doctors do not know ASL; no ASL interpreter [David, Tuttle, Barnett, & Kitzman, 2012; Margello-Anast et al., 2006; McKee et al., 2011; Smith et al., 2015]).

Summary

In summary, Chapter 2 described cardiovascular disease and its risk factors, on the health belief model as it relates to cardiovascular disease, and reviewed the current yet limited literature on Deaf CVD studies. There were several studies about the Deaf population but there no studies have been done at Gallaudet University or in Washington D.C. which is home to one of the large deaf populations in the United States. In general, the SES among Gallaudet employees (both hearing and Deaf) is similar, as the staff and faculty positions require at least of a college degree. Research of the potential existence

of disparities in both groups may extend the knowledge in the discipline. In Chapter 3, I will provide information about the methodology for this research study.

Chapter 3: Research Method

Introduction

The purpose of this quantitative study was to compare the knowledge, perceived barriers, and preventive behaviors associated with CVDs among a diverse, random sample of Deaf and hearing employees at Gallaudet University. In this chapter, I will provide a description of the research design, methodology, population, instrumentation, data collection and analysis, as well as the ethical considerations for this study.

Research Design and Rationale

The research design I selected for this study was a quantitative survey design. Survey research is a scientific method based on inquiries that help to understand the characteristics of a population (Crosby, DiClemente, & Salazar, 2006). In this study, I used a cross-sectional design to collect quantitative data about the participants' knowledge/thoughts, opinions, feelings, and behaviors about CVD in an effort to advance knowledge in the discipline (see Crosby et al., 2006). Specifically, I chose this design to advance knowledge about CVD, including perceived barriers and preventative behaviors, among the Deaf population.

This design also has the ability to assess any relationship among variables for a population. Through statistics, this design can help a researcher establish any correlational relationship between two variables (Crosby et al., 2006). The variables (dependent and independent) for this study are shown in Table 4.

Table 4

Variables of this research

Dependent	Independent
CVD knowledge	Hearing status
CVD prevention	Age
Perceived barriers	BMI
Health lifestyle	Gender
Exposure to Health	Race
Information	Family history of
SES	CVD

Methodology

Population

The target population in this study was Gallaudet University employees. Currently, there are 890 employees at Gallaudet University, Washington D.C., with approximately 51% of them are Deaf (Gallaudet University, 2016). Gallaudet University is a higher education institution with programs that specifically designed to serve about 1,500 Deaf students (Gallaudet University, 2016), hence the explanation of high number of Deaf employees.

Sampling and Sampling Procedure

With a total 890 employees at Gallaudet University, of which slightly more than half are Deaf I determined the total sample size for this study to be 196, with 98 Deaf in

Group A and 98 hearing employees in Group B. This estimated size was based on calculation using G*Power 3.1.9.2 software (2009). The output from the calculation by the G*Power software is presented:

Table 5

Computation of Required Sample Size

Input	Tail(s)	Two
	Effect size *d*	0.52
	α err prob	0.05
	Power (1-β err prob)	0.95
	Allocation ratio N2/N1	1
Output	Noncentrality parameter δ	3.64
	Critical *t*	1.97
	df	194
	Sample size group 1	98
	Sample size group 2	98
	Total sample size	196
	Actual power	0.95

The inclusion criteria for the target population for this research study were as follows:

Group A - Deaf Employees

1) Adult (18 years of age or older)
2) Deaf or hard of hearing

3) Current employee of Gallaudet University (staff or faculty)
4) Makes own health decisions
5) Relies primarily on ASL for communication OR
6) Is proficient in ASL, and either (1) prelingually deaf (before the age of 3) or (2) self-identifies with the Deaf Community.

Group B - Hearing Employees

1) Adult (18 years of age or older)
2) Hearing
3) Current employee of Gallaudet University (staff or faculty)
4) Makes own health decisions
5) Relies primarily on English for communication

Convenience sampling. Convenience sampling was the official sampling procedure for this study. I invited employees to take part in the research through Gallaudet's communication channels including an e-mail to all University employees with three follow-up e-mails for those who had not yet responded to my survey. The advantage of convenience sampling is that it was easy to carry out. The relative cost and time are small compared to random sampling. The Gallaudet University Human Resources office confirmed that I was able to send out an e-mail to invite all employees to this study as long as I had IRB approval from the university. The e-mail originated from Survey Monkey, the website I used to create and house the survey for the study, also included a feature where its automation service can send a follow-up e-mail to those who had not yet participated. This follow-up feature increased my chances of gaining

more participants for my study. According to IRB office at Gallaudet University, this is most popular and effective recruitment method of many researchers in the past with this target population. The disadvantage of this procedure was bias as it can lead to the underrepresentation or overrepresentation of particular subgroups within the sample.

Procedures for Participation and Data Collection

Every participant received a patient information sheet along with a copy of the cooperation form from Gallaudet University, whether it is English (online) or ASL version or both if desired. Informed consent was not required since I did not collect any identifying information from the participants. The patient information sheet can be found as Appendix A. Once a participant agreed to participate in this study, there were two potential approaches I could take:

- Face-to-face interaction: This approach entailed a face-to-face interaction where I read the survey in ASL and then the participant recorded their answer in an online survey using Survey Monkey.

Self-reported survey: This approach included the use of an online survey using Survey Monkey whereby the respondent completed the survey at their convenience. If the participant chose a face-to-face interaction:

1. I contacted the participant via e-mail and made an appointment with the participant in a private office setting.
2. I provided the online survey to the participant's Gallaudet e-mail address.
3. I used an identification number.
4. I provided instructions to begin their online survey.

5. The survey was set up in a way that the potential participant had to type in a response indicating that they had read the patient information and agreed to participate. The research survey questions were not viewed yet at this point.
6. I provided an ASL version of the patient information sheet.
7. I provided an ASL version of any question(s), then the participant replied directly to the online survey until completion.

If the participant chose self-reported survey:

1. I contacted the participant via e-mail and sent the online survey.
2. The survey was set up in a way that the potential participant had to type in a response indicating that they had read the patient information sheet and agreed to participate. The research survey questions were not viewed yet at this point.
3. Once confirmed, the potential participant was redirected to the research survey questionnaire for completion.

It is best practice in public health to offer both approaches, face to face and self-reported, when it comes to Deaf participants as many of these individuals have studied English as their second language since ASL is their native language (Barnett, McKee, Smith, & Pearson, 2011; Margello-Anast et al., 2006).

The demographic information I collected were as follows:

- sex,
- employment (full time or part time),
- ethnicity/race,
- household information,

- insurance information,
- age,
- height,
- weight,
- education,
- urban/rural residence,
- smoker/nonsmoker, and
- income.

Participants exited the study upon survey completion. They received a thank you message for their participation. No additional follow-up was required.

Instrumentation

For this study, I created a survey in Survey Monkey with 45 questions. The questions were derived from two surveys from two published CVD research studies: Mosca et al.'s study (2013) from the AHA and Margello-Anast et al.'s (2006) from the Mount Sinai Health System. Both authors gave me permission to use their instruments. Their permissions via e-mail can be found in Appendices C and D. I incorporated some questions from both surveys, tailored to addressing my research questions. I chose these two existing surveys due to their association with Mount Sinai Health System and AHA. However, it is verified by the creators of both tools that they did not conduct the reliability and validity test on their instruments. This was a limitation of this study.

The Women's Health Study, a 38-item questionnaire, was commissioned by the American Heart Association to provide baseline data about current knowledge,

awareness, and preventive behaviors related to CVD towards to women (Mosca, Hammond, Mochari-Greenberger, Towfighi, & Albert, 2013). Open-ended and prompted questions were incorporated into four sections. The first section queried general awareness of health issues. Respondents were asked open-ended questions concerning the greatest health problems and leading cause of death today. The second section focus on communications and behaviors related to heart disease prevention. This section contained a mixture of open-ended questions, recognition items (e.g., true/false, yes/no), and questions that quantified how well informed the respondents saw themselves as being at risk for CVD. The third section evaluated the respondents' understanding of heart disease such was knowledge of risk factors, lifestyle choices, and the early warning signs of heart attack and stroke. The final section has questions about demographic characteristics. The survey was conducted via telephone nation-wide.

A 139 questionnaire named, *Improving Access to Health and Mental Health Care for Deaf and Hard of Hearing Populations*, was created by Margello-Anast et al. (2006) of Mount Sinai Health System. The goal of the survey was to collect baseline data about the current knowledge, awareness and preventive behavior toward of the Deaf and hard of hearing clients under the Mount Sinai Health System. A committee was formed to develop the survey which focused on five knowledge domains: dietary knowledge, epidemiology, medical information, risk factors, and heart attack symptoms with special attention in meeting the communication needs of the Deaf and hard of hearing population (Margello-Anast et al., 2006). This instrument also derived many questions from validated national health surveys, such as SF-12 and the Behavioral Risk Factor

Surveillance System (BRFSS), which helped ensure the validity of questions in order to be consistent with the national survey missed by Deaf people (Margello-Anast et al., 2006). The questions are aimed at demographics, measuring access to and quality of care, and health-related knowledge, attitudes, and behaviors for CVD. This survey instrument also includes questions about the presence of CVD risk factors including current and past cigarette smoking, high blood pressure, high cholesterol, and being overweight. A systematic review of publications found BRFSS to be reliable with high overall levels of validity when compared to other national self-reported surveys (Pierannunzi, Hu, & Balluz, 2013). BRFSS and NHIS surveys demonstrated Cronbach alpha internal consistency scores of .72 to .95 (Bethell et al., 2004).

Operationalization of Constructs

With the variables presented in Table 3, this section explains how the variables were defined and operationalized.

CVD Knowledge *(dependent). Self-reported on current knowledge of CVD and its trends. In this study, the measurement of CVD knowledge is based on information and recommendations established by American Heart Association (AHA) and Center for Disease Control and Prevention (CDC).*

CVD Prevention *(dependent). Measures designed to combat risk factors of CVD. Individuals who initiate prevention behaviors work toward to reduce risk for CVD incident.*

Health Lifestyle *(dependent). Self-reported health status is subjective and is a* global measure of health.

Exposure to Health Information (*dependent*). Contact or experience with health providers and public media concerning messages about health promotions and disease preventions. Health communications attempt as a trigger toward behavioral change.

Preventive behaviors (*independent*). The participant possesses knowledge of the hazard of CVD and is in the process of adopt the prevention measure.

Perceived Barriers *(independent).* Factors that discourage behavior change.

Family history of CVD *(independent).* Family history is a key indicator of inherited risk from related family members with the same disease.

Demographic Variables (*independent)*. Characteristics or attributes of the respondents that will be collected.

- Age (covariates)
- Gender (categorical)
- Race (nominal)
- SES (categorical)
- Hearing status (nominal)
- Body Mass Index (BMI [ordinal])

Table 6
Operationalization of each Variable

Name	Type	Survey Questions	Answer Choice	
CVD Knowledge	Categorical: nominal	Q1. What do you think is the one greatest health problem we are facing today? Q2. As far as you know, what is the leading cause of death for all men? Q3. As far as you know, what is the leading cause of death for all women?	01 02 03 04 05 06 07 08 09 10	AIDS Alzheimer's Cancer (general) Diabetes Drug addiction/Alcoholism Heart disease/Heart attack Obesity Osteoporosis Smoking Stroke
	Categorical: ordinal	Q1. How informed are you about heart disease in women? Would you say you are: Q2. How informed are you about stroke or "brain attack" in women? Would you say you are: Q3. How informed are you about heart disease in men? Would you say you are: Q4. How informed are you about stroke or "brain attack" in men? Would you say you are:	1 2 3 4	Very well informed Well informed Moderately informed Not at all informed
	Categorical: nominal	Q1. Based on what you know what warning signs do you associate with having a heart attack? (Multiple responses accepted)	01 02 03 04 05 06	Chest pain Fatigue Nausea Pain that spreads to the shoulders, neck, or arms Shortness of breath Tightness of the chest
	Categorical: nominal	Q2. If you thought someone was having a heart attack, what is the first thing you would do? Q5. If you thought someone was having a stroke, what is the first thing you would do?	1 2 3 4	Take them to the hospital Tell them to call their doctor Call 911 Call their spouse or family member
	Categorical: nominal	Q3. If you thought you were experiencing signs of a heart attack, what is the first thing you would do?	1 2 3 4 5	Take an aspirin Call your doctor Call a family member Call 911 Go to the hospital

	Categorical: nominal	Q4: Based on what you know what warning signs do you associate with having a stroke? (Multiple responses accepted)	01 Loss of/trouble talking or trouble understanding speech 02 Sudden dimness/loss of vision, often in one eye 03 Sudden, severe headache 04 Sudden weakness/numbness of face or limb on one side 05 Unexplained dizziness
	Categorical: nominal	Q6. If you thought you were experiencing signs of a stroke, what is the first thing you would do?	1 Call your doctor 2 Call a family member 3 Call 911 4 Go to the hospital
	Categorical: nominal	Q7. Based on what you know, what are the major causes of heart disease?	01 A family history of heart disease 02 Aging 03 Being overweight 04 Diabetes 05 Drinking alcohol 06 High blood pressure 07 High cholesterol 08 High triglycerides 09 Low levels of estrogen 10 Menopause 11 Not exercising 12 Smoking 13 Stress 14 Stroke 15 Your racial heritage
CVD prevention	Categorical: dichotomous	Q1. Do you have a health care professional who you see on a regular basis?	1. Yes 2. No
	Categorical: nominal	Q2. Have any of your doctors ever discussed the following with you when discussing your health?	1. High blood pressure 2. Cholesterol 3. Family history of heart disease 4. Your risk for heart disease 5. Your risk for stroke 6. Weight 7. Smoking cessation (Quit Smoking) 8. Appropriate heart healthy diet and nutrition 9. Exercise 10. None of these

	Categorical: ordinal	Q4. Please tell me the extent to which you worry about getting each of the following health conditions. *1.* Cancer *2.* Heart disease or heart attack *3.* AIDS *4.* Smoking *5.* Drug addiction or alcoholism 6. Stroke *7.* Alzheimer's *8.* Diabetes *9.* Osteoporosis *10.* Obesity	1. Not at all 2. A little 3. Worry a lot
Health lifestyle	Categorical: ordinal	Q1. In general, would you say your overall outlook on life is…? Q5. In general, would you say your <u>physical</u> health is… Q6. In general, would you say your <u>emotional</u> health is…	1. Poor 2. Fair 3. Good 4. Very good 5. Excellent
	Categorical: dichotomous	Q2. Which of the following do you currently experience? Please select all that apply even if it is controlled or managed by medication.	*1.* High blood pressure *2.* High cholesterol *3.* Family history of heart disease or stroke *4.* Smoking habit *5.* Weigh 20 pounds or more over ideal for your height and build *6.* Physical inactivity (i.e., exercising less than 20-30 minutes per day, 5 or more days of the week) *7.* Depression *8.* None of the above
	Categorical: dichotomous	Q3. Has a doctor, nurse, or other health professional ever told you that you had any of the following? *1.* Yes *2.* No	1. Heart attack 2. Stroke 3. Diabetes

	Categorical: ordinal	Q7. How much influence does how you feel physically impact how you feel emotionally? Q8. How much influence does how you feel emotionally impact how you feel physically?	*1.* *2.* *3.* *4.*	Not at all Some Very much A great deal
	Categorical: dichotomous	Q10. Are you a current/former smoker?	1 2	Yes No
Hearing Status	Categorical: nominal	Q12. Are you…	1 2	Deaf/Hard of Hearing Hearing
Preventive behavior		Categorical: ordinal	*1.* *2.* *3.* *4.* *5.* *6.* *7.* *8.*	I don't get enough sleep on a regular basis I am taking care of my health My health is a priority for me I'm so busy taking care of everyone else, I don't take good care of myself I usually follow recommended healthy eating habits (i.e., low sodium intake, low fat intake, eat fruits and vegetables, etc.) When life gets busy, exercising is one of my first things i skip My muscles and joints ache on a regular basis I am concerned about my alcohol intake

Categorical: dichotomous	Q1. Have you done any of the following things to monitor or improve your health in the last year? *1.* Quit smoking *2.* Get regular physical exercise *3.* Take special vitamins like E, C or A *4.* Lose weight *5.* Reduce dietary cholesterol intake *6.* Reduce stress *7.* Take multivitamins with folic acid *8.* Take hormone-replacement therapy *9.* Reduce sodium or salt in the diet *10.* Reduce animal products in my diet (such as meat, whole milk, butter and cream) *11.* Aromatherapy *12.* Take aspirin regularly *13.* Maintain a healthy blood pressure *14.* Maintain a healthy cholesterol level 15. Eat foods or take supplements that contain fish oil/Omega 3 fatty acids *16.* Increase fiber intake *17.* Eat foods containing antioxidants *18.* Eat plant stanols and sterols *19.* Floss my teeth regularly *20.* Pray or meditate *21.* Get adequate sleep *22.* A doctor's visit 23. Reduce my sugar intake	1. 2. 3.	Yes No N/A

	Categorical: nominal	Q2. Thinking about the things you have done to improve your own health, please tell us if any of the following prompted you to take action.	1 I saw, heard, or read information related to heart disease 2 My health care professional encouraged me to take action 3 A family member or relative encouraged me to take action 4 A friend encouraged me to take action 5 A family member/relative developed heart disease, got sick, or died 6 A friend developed heart disease, got sick or died 7 I experienced symptoms that i thought were related to heart disease 8 i wanted to feel better 9 I wanted to avoid taking medications 10 I wanted to improve my health 11 I wanted to live longer 12 I did it for my family 13 I was encouraged to take action during an event or program at my place of worship (church, mosque, or temple) 14 I was encouraged to take action during an event or program at my community center 15 something else 16 I have not done anything to improve my health

	Q3. Thinking about the following activities, are you doing these more often, less often or about the same amount of time as you did one year ago? *1.* Getting at least 20-30 minutes of vigorous exercise daily where you are winded, that is you can still talk, but not sing. *2.* Eating meals away from home at restaurants, fast food, quick serve, etc. *3.* Cooking meals at home with fresh ingredients 4. Eating prepackaged boxed, refrigerated or frozen meals *5.* Drinking sugar-sweetened beverages (i.e., non diet beverages)	1. 2. 3.	More often Less often About the same

Perceived Barriers	Categorical: nominal	Q4. Which of the following are the biggest barriers preventing you from leading a heart healthy lifestyle? (Select 5 options max)	1 I don't perceive myself to be at risk for heart disease 2 I dont want to change my lifestyle 3 I don't think changing my behavior will reduce my risk of developing heart disease 4 I am fearful of change 5 I am not confident that I can successfully change my behavior 6 I am too stressed to do the things that need to be done 7 I am too depressed to do the things that need to be done 8 I am too ill/old to make changes 9 I don't have the money or insurance coverage to do what needs to be done 10 I have family obligations and other people to take care of 11 My family/friends have told me that i don't need to change 12 I don't have the time to take care of myself 13 My health care professional does not think i need to worry about heart disease 14 My health care professional does not speak my language 15 I am confused by what I am supposed to do to change my lifestyle 16 I feel the changes required are too complicated 17 I don't know what i should do 18 There is too much confusion in the media about what to do 19 My health care professional does not explain clearly what I should do 20 God or some higher power ultimately determines my health 21 Other 22 None of these, i lead a heart healthy lifestyle

Age	Categorical: nominal	Q7. In which category is your age?	1 18-24 years 2 25-34 years 3 35-44 years 4 45-64 years 5 65-74 years 6 75 years or older
Gender	Categorical: dichotomous	Q1. Are you…?	1 – Male 2 - Female
BMI	Categorical: ordinal	Q5. What is your current height? Q6. What is your current weight?	
Race	Categorical: nominal	Q3. Are you of Spanish or Hispanic origin, such as Latin American, Mexican, Puerto Rican or Cuban?	1 Yes, of Hispanic origin 2 No, not of Hispanic origin 3 Decline to answer
	Categorical: nominal	Q4. Do you consider yourself…?	1 White 2 Black 3 Asian or Pacific Islander 4 Native American or Alaskan Native 5 Mixed Race 6 Some other race 7 Decline to answer
SES	Categorical: nominal	Q2. Which of the following best describes your employment status?	1 Employed full time 2 Employed part time 3 Not employed
	Categorical: nominal	Q4. Which of the following types of health insurance, if any, do you currently have?	1 health insurance provided by employer or school 2 health insurance through a family member's employer or school 3 Private insurance coverage that you pay for out-of-pocket 4 Medicare 5 Medicaid or other public insurance 6 Veteran's Affairs (VA) 7 Some other type of insurance 8 No insurance coverage 9 Don't know 10 Refused to answer

	Categorical: nominal	Q8. What is the highest degree or level of education you have completed	1 12th grade or less (no diploma) 2 High school diploma 3 Some college, no degree 4 Associate or technical degree 5 Bachelor's degree 6 Graduate degree/professional
	Categorical: nominal	Q11. Which category best describe your annual income?	1 Less than $24,999 2 $25,000 to $49,999 3 $50,000 to 99,999 4 $100,000 or more
Family history of CVD	Categorical: dichotomous	Q3. Who have you talked to about your family's medical history as it relates to heart disease? 1. Have talked to 2. Have not talked to 3. Not applicable	*1.* My parent(s) *2.* Siblings *3.* Children *4.* Other relatives

Data Analysis Plan

IBM SPSS Statistics, version 23.0, and Survey Monkey were used for data collection and analysis for this study. A set of rules for the data set was applied in SPSS related to basic checks such as analysis of variables, case identifiers, and flagging of empty cases. This data validation helped ensure variables being entered correctly and the process completed accurately. Since the study had less than 200 cases, visual examination was another method to validate the data.

Research Questions and Hypotheses. The following research questions and hypotheses guided this study:

Research Question #1: Is there a significant difference in the level of knowledge about cardiovascular diseases (CVD) between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD?

$H_0$1: There is no significant difference in the level of knowledge about cardiovascular diseases (CVD) between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD

$H_1$1: There is a significant difference in the level of knowledge about cardiovascular diseases (CVD) between Gallaudet University employees

who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD

Research Question #2: Is socioeconomic status (SES) a factor when other socio-demographic variables (age, gender, family history, and race) are taken into account in the examination of the difference in cardiovascular diseases knowledge among Gallaudet employees who are culturally Deaf and those who are hearing?

$H_0$2: Socioeconomic status is not a factor when accounting in the examination of the difference in cardiovascular diseases knowledge among Gallaudet University employees who are culturally Deaf and hearing employees when considering socio-demographic variables (age, gender, family history and race).

$H_1$2: Socioeconomic status is a factor when accounting in the examination of the difference in cardiovascular diseases knowledge among Gallaudet University employees who are culturally Deaf and hearing employees when considering socio-demographic variables (age, gender, family history and race).

Research Question #3: Is there a significant difference in preventive behavior in relation to cardiovascular disease between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD?

$H_0$3: There is no significant difference in preventive behavior in relations to cardiovascular diseases between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

$H_1$3: There is a significant difference in preventive behavior in relations to cardiovascular diseases (CVD) between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

Research Question #4: Is there a significant difference in perceived barriers to leading a healthy lifestyle between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD?

$H_0$4: There is no significant difference in perceived barriers to leading healthy lifestyle between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

$H_1$4: There is a significant difference in perceived barriers to leading healthy lifestyle between Gallaudet University employees who are culturally Deaf and employees who are able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

Data Analysis

- Basic percentages in assessing demographic characteristics of our study population.
- Basic frequency tables of each question.
- Bivariate and multiple regressions analysis.
- Simple frequencies (chi-square) will be compared for statistical significance across respondents differing on some other characteristics (e.g. income, race, education, source of insurance).
- T-test will be used to assess continuous variables for association between respondent characteristics and knowledge of CVD.
- Chi-square/Fisher will be used to assess categorical variables for association between respondent characteristics and knowledge of CVD.

A multivariate linear regression model was developed to determine if differences in CVD knowledge score were predicted by SES factors (age, gender, education, income) and health status (present of risk factors such as smoking, obesity, lack of exercise). The criteria for statistical significance was $p < 0.05$; if the p value is less than 0.05, the null hypothesis can be rejected.

Threats to Validity

For various reasons, people often feel a bit uncomfortable telling the truth in reporting health or risk behaviors (Crosby et al., 2006). This is an example of one of the challenges to the validity of the survey. Self-administered surveys are known to have several missed questions due to low literacy levels, navigational problems, or not being

complete (Crosby et al., 2006). There are some advantages to self-administered surveys. Respondents tend to report a higher prevalence of sensitive behaviors due to increase perceptions of privacy and reduce social desirability bias (Crosby et al., 2006). Survey Monkey has features to ensure every question is answered and to ensure the completeness of the survey. It is also found to be navigable and widely used by over 25 million users (SurveyMonkey, 2016). Web survey costs are economical and reduce time in transferring data for data analysis from emailed, written, or telephone surveys.

Internal Validity

Threats to internal validity compromise our confidence in the existence of a relationship between the independent and dependent variables.

Instruments (survey) may changes during the data collection and may produce changes in the obtained data. It will be ensured that the survey will not undergo any changes once it is finalized before the data collection.

History is a concern for one group design but this study is a two group design. There is no pre-test and post-test.

Maturation affects the changes in the dependent variable due to normal developmental processes within the subject as a function of time. It is not a threat in this comparative study as it is a two group design.

Statistical regression may affect the results when a tendency for subjects selected on the bases of extreme scores to move or regress towards the mean.

External Validity

Threats to external validity compromise our confidence whether the study's results are applicable for generalizability of the targeted population.

Sampling error is a concern whereas the results of the survey may have implications on not only the representative of the sample but also generalizability.

Self selection bias may threat the accuracy of the results toward the population to which inference is desired. Persons who volunteer to respond to my survey will prevent this issue as inherent bias is evident.

Coverage error may occur as some members of the population may be excluded or disproportionately included. For example, subjects may not be able to respond accurately to the survey due to limited understanding in English. In this study, subjects will be offered an option for face-to-face ASL interview.

Statistical conclusion validity is the degree to which conclusions about the relationship among variables based on data are correct. This involves ensuring the use of adequate sampling procedures, appropriate statistical surveys, and reliable measurement procedures. The statistical power should be greater than 0.8 in value, but there are several factors that interact to affect power. I can collect more than my current sample size which in turn will increase the power.

Ethical Considerations

In order to help ensure protection of human subjects, prior to initiating this study, I obtained Institutional Review Board (IRB) approval from Walden University (#09-28-16-0182018) and Gallaudet University (PJID #2803). A signed letter of cooperation from

Gallaudet University can be found in Appendix E. Often in any research, there is a potential risk for ethical violations. For this study, it is possible that the survey may cause emotional distress or loss of dignity for the participants. Participants may be embarrassed with their health conditions or issues. Confidentiality is another issue as Deaf culture is collectivist rather than individualistic (Mindess, 2006). In other words, culturally Deaf people usually know other Deaf people, which can increase the fear of rejection within the Deaf community if harmful information is leaked. Therefore, to ensure the anonymity and confidentiality of the data, no personal information was collected. Individual autonomy were respected by allowing participants to withdraw from the study at any time and by explaining to participants how their data will be used and that the data will be destroyed by deleting it from Survey Monkey.

Federal regulations require that information on consent forms given to a research subject must be in language understandable to the subject (Food and Drug Administration, 1998). Participants involved in this research are deaf and may be non-speaking English as American Sign Language is their primary language. In the culturally Deaf populations, there are wide ranges in type or degree of hearing loss, and differences in communication preference and language use (NIDCD, 1999). Thus, the principal investigator of a research study must ask and accommodate the preference for language and communication style (NIDCD, 1999). Even Gallaudet University's IRB requires that the principal investigator must ask and accommodate the preference for language and communication style of the subject (Gallaudet University, 2014). Margello-Anast et al. (2006) in their Chicago study addressed this issue by adding Deaf researchers as

members of the research team. Their input on cultural and ethnic values and addressing communication issues were vital in the development of their survey. Many of their Deaf participants were very enthusiastic about the opportunity to express their views and opinions during the data collection (Sinai Health System and Advocate Health Care, 2004). The survey was well received by the target population, which in turn made their research effective.

The National Institute on Deafness and Other Communication Disorders recommended that the consent form be developed at a 5th grade reading level that is readable and understandable for the Deaf and hard of hearing people (NIDCD, 1999). Adults who were born deaf have an average reading level of fourth grade (Margello-Anast et al., 2006). Even though the subjects are at a university, I cannot assume their reading levels are of entry-level college.

With the considerations above, I have written the patient information sheet at the 4th grade reading level. I also adopted Margello-Anast et al.'s approach concerning informed consent based on the fact it was carefully designed by a committee that included Deaf and hard of hearing members. During the consent form process in the current study, I presented two options to the potential participant:

1. Read the form online, ask questions via Email and if interested, proceed with the online survey;
2. Interviewer goes through the form in ASL, potential participant has an opportunity to ask questions, and if interested, proceed with the online survey.

This approach of having a Deaf interviewer via face-to-face ASL interviews will ensure clarity and transparency of the patient information form between the participants and the investigator. Unfortunately, many Deaf participants/patients in health care or health research often experience language barriers that lead to many misunderstanding (Barnett et al., 2011; Margello-Anast et al., 2006). Fortunately the author is born culturally Deaf, is fluent in the Deaf and hard of hearing's wide range of language and communication style, and is a member of Deaf and hard of hearing community. In turn, this approach will gain the confidence of the participants of any ethical concerns within the current study.

The data were anonymous as no personal data such as name, address, and/or social security number were collected. None of the individual's responses or results cannot be linked to his/her identity. The data were stored electronically on secure servers of Survey Monkey and my Walden University's Outlook account. Only I have the access to data. The data will be stored 5 years after the close of the study in compliance to federal regulations and IRB agreement. Then, I will destroyed it by deleted it permanently from my Outlook account and Survey Monkey.

The potential conflict I had by conducting a study in my own work environment would be privacy since it is a small university and pretty much everyone knows everyone. The online survey is the perfect option in this circumstance where participants can ensure their own privacy when taking the survey. If the participant choose face-to-face ASL interview, then I had them meet me in a private room on campus.

Once the study is complete, I will want to get it published. I also plan to arrange a public seminar at the Gallaudet University where students, faculty and staff can attend.

As part of verbal agreement with Dr. Helen Margello-Anast at Sinai Urban Health Institute, whom I got the measurement instrument from, I am to share my study with her. Another potential plan is for me to disseminate my data with Dr. Steven Barnett at National Center for Deaf Health Research at University of Rochester Medical Center with hope for potential future opportunity, as he is one of the leading Deaf health researchers.

Summary

In this quantitative study, I compared two groups, the hearing and the Deaf employees at Gallaudet University, and their knowledge, perceived barriers, and preventive behaviors associated with CVD. An online survey will be presented to at least 196 employees from Gallaudet University. Inclusion criteria and sampling procedures has been clearly outlined. Instruments were presented along with the definition and operationalization of variables involved in this study. Specific attention was brought on design adjustments to reduce threats to validity. Ethical procedures were established and so was the treatment of data with proper protocols to ensure the protections for confidentiality issues. In Chapter 4, I will present the results of the study.

Chapter 4: Results

Introduction

The purpose of this quantitative study was to compare the knowledge, perceived barriers, and preventive behaviors associated with CVDs between Deaf and hearing employees at Gallaudet University. The following four research questions and corresponding hypotheses guided this study:

Research Question #1: Was there a significant difference in the level of knowledge about CVDs between Gallaudet University employees who were culturally Deaf and employees who were able to hear when considering factors such as age, gender, race, SES, and family history of CVD?

$H_0$1: There was no significant difference in the level of knowledge about CVDs between Gallaudet University employees who were culturally Deaf and employees who were able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

$H_1$1: There was a significant difference in the level of knowledge about CVDs between Gallaudet University employees who were culturally Deaf and employees who were able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

Research Question #2: Was SES a factor when other socio-demographic variables (age, gender, family history, and race) were taken into account in the examination of the difference in CVD knowledge among Gallaudet employees who were culturally Deaf and those who were hearing?

$H_0$2: SES was not a factor when accounting in the examination of the difference in CVD knowledge among Gallaudet University employees who were culturally Deaf and hearing employees when considering socio-demographic variables (age, gender, family history, and race).

$H_1$2: SES was a factor when accounting in the examination of the difference in CVD knowledge among Gallaudet University employees who were culturally Deaf and hearing employees when considering socio-demographic variables (age, gender, family history, and race).

Research Question #3: Was there a significant difference in preventive behavior in relation to CVD between Gallaudet University employees who were culturally Deaf and employees who were able to hear when considering factors such as age, gender, race, SES, and family history of CVD?

$H_0$3: There was no significant difference in preventive behavior in relations to CVD between Gallaudet University employees who were culturally Deaf and employees who were able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

$H_1$3: There was a significant difference in preventive behavior in relations to CVD between Gallaudet University employees who were culturally

Deaf and employees who were able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

Research Question #4: Was there a significant difference in perceived barriers to leading a healthy lifestyle between Gallaudet University employees who were culturally Deaf and employees who were able to hear when considering factors such as age, gender, race, SES, and family history of CVD?

$H_0$4: There was no significant difference in perceived barriers to leading healthy lifestyle between Gallaudet University employees who were culturally Deaf and employees who were able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

$H_1$4: There was a significant difference in perceived barriers to leading healthy lifestyle between Gallaudet University employees who were culturally Deaf and employees who were able to hear when considering factors such as age, gender, race, SES, and family history of CVD.

In Chapter 4, I will explain the time frame of the data collection plan. I disclose the actual recruitment and response rates in here, too. I also provide the demographics of the sample and summarize the results of this study.

Data Collection

I began data collection on November 21, 2016 by sending an e-mail invitation with the survey to 919 employees of Gallaudet University via Survey Monkey. The employee's contact information was acquired from Gallaudet Institutional Research with permission from Gallaudet IRB (see Appendix E). Two e-mail reminders were sent out

on December 5, 2016 and December 12, 2016 respectively. Right after the launch of survey via e-mail, the personal advertisement of the survey among staff and faculty took place at popular spots on campus, such as Gallaudet Marketplace, Kellogg Bistro, and Union Market, during lunch hour on a regular basis from November 21st to December 19th, 2016 and January 3rd to January 5th, 2017. My request for an audience with Gallaudet Staff Council and Faculty Senate was denied as they recently imposed a policy to ban any form of advertisement at their meetings.

A total of 223 employees responded to the survey. My final sample consisted of 186 employees; I had to exclude 37 respondents because they did not meeting the criteria and/or did not complete the survey. The response rate was 21% out of 888 employees at Gallaudet. The number of employees included in the study sample ($N = 186$) did not reach the required sample size of 196. The Deaf respondents ($n = 121$) met the required sample of 98; however, the hearing respondents ($n = 65$) did not reach the required sample size of 98.

Table 6 presents the demographic characteristics of the sample. Sixty-five percent of respondents identified as Deaf ($n = 121$) and 35% were hearing ($n = 65$). Over half (65%) of the sample was female ($n = 122$) and 64 respondents were male (34%). The age of the respondents was distributed over the following four categories for analysis: 25–34 (13%), 35–44 (23%), 45–64 (60%), and 65–74 (4%). As expected for Gallaudet employees, a majority of this sample had at least a Bachelor's degree (92%). The ethnicity of the sample was 76% White, 13% Black, 3% Asian, and 5% Other. A majority (94%) of this sample had an income of at least $50,000.

Table 7

Demographic Characteristics of Respondents

Demographics		*n*	%
Deaf Status	Deaf	121	65%
	Hearing	65	35%
Gender	Female	122	66%
	Male	64	34%
Age	25–34	25	13%
	35–44	42	23%
	45–64	112	60%
	65–74	7	4%
Education	High school	2	1%
	Some college	8	4%
	Associate/technical	3	2%
	Bachelor	28	15%
	Graduate	144	77%
Race	Asian	5	3%
	Black	25	13%
	White	141	76%
	Others	10	5%
	Decline to answer	5	3%
Income	Less than $24,999	1	1%
	$25,000 to $49,999	11	6%
	$50,000 to $99,999	117	63%
	$100,000 or more	57	31%

Since the intent of this study was to make a comparison between Deaf and hearing employees in terms of knowledge and behavior, Table 7 provides a breakdown of

demographic characteristics between Deaf and hearing respondents. Many characteristics were similar between groups except for gender and race. Deaf men (40%) participated in greater numbers than hearing men (25%). Hearing Blacks (28%) participated at more than a four times higher rate than Deaf Blacks (6%) in this study.

Table 8

Demographics between Deaf and Hearing

Demographics		Deaf (*n*)	Hearing (*n*)	Total
Gender	Female	60% (73)	75% (49)	122
	Male	40%(48)	25% (16)	186
Age	25–34	15% (18)	11% (7)	25
	35–44	28% (34)	12% (8)	42
	45–64	55% (67)	69% (45)	112
	65–74	2% (2)	8% (5)	7
Education	High school	0	3% (2)	2
	Some college	3% (3)	8% (5)	8
	Associate/technical	2% (2)	2% (1)	3
	Bachelor	17% (20)	12% (8)	28
	Graduate	79% (96)	74% (48)	144
Race	White	84% (101)	62% (40)	141
	Black	6% (7)	28% (18)	25
	Asian	3% (4)	2% (1)	5
	Others	7% (9)	9% (6)	15
Income	Less than $24,999	1% (1)	0% (0)	1
	$25,000 to $49,999	7% (9)	3% (2)	11
	$50,000 to $99,999	65% (78)	60% (39)	117
	$100,000 or more	27% (33)	37% (24)	57

The demographics of the sample (Table 6) were similar to the overall employees at Gallaudet University (GU). According to Gallaudet University's Annual of Achievements 2016 Report (GU, 2017), the gender distribution (60% female) was similar to the study sample (67%) and the race distribution in both cases represented that Whites were a majority, with 59% White in overall employees versus 76% White as noted in the participants. A majority of Gallaudet employees had at least a Bachelor's degree, which coincides with the sample of those who had a Bachelor's degree (92%). A majority (63%) of the sample were within the $50,000 to $99,999 income range.

Results

In this section, I will present the descriptive statistics of the participants. In addition, my statistical analysis findings will be reported, organized around the four research questions. Table 8 provides the count of participants that were diagnosed with heart attack, stroke, and were in the overweight to obese range (BMI > 25 kg/m^2). People with a BMI at least 25 kg/m2 (overweight to obese) are known to have an increased risk of cardiovascular disease (AHA, 2016).

Table 9

Respondents Diagnosed with Heart Attack or Stroke by Deaf Status

Deaf status	Heart attack *(n)*	Stroke (*n*)	BMI > 25 kg m^2
Deaf	1% (1)	1% (1)	62% (75)
Hearing	9% (6)	2% (1)	62% (40)

Table 9 revealed respondents that currently experience what were considered as risk

factors of CVD. Risk factors were as follows: (a) high blood pressure, (b) high cholesterol, (c) family history of heart disease or stroke, (d) smoking habit, (e) overweight by at least 20 pounds, and (f) physical inactivity.

Table 10
Number of Risk Factors by Deaf Status

Number of risk factors	Deaf (*n*)	Hearing (*n*)
0	21% (25)	15% (10)
1	31% (37)	28% (18)
2	24% (29)	28% (18)
3	14% (17)	17% (11)
4	7% (9)	9% (6)
5	3% (4)	3% (2)
6	0%	0%

Research Question #1

Hearing participants had more heart attack diagnoses than Deaf participants (Table 8). Fisher exact test revealed that the $p = 0.008$. The result is significant at $p < .05$. In addition, both groups have similar number of CVD risk factor (Table 9) with no significant difference between them. In turn, 24% of Deaf and 15% of hearing chose heart disease as the greatest health problem we faced today (Table 10). However, there were no significant difference between Deaf and hearing on their answer of this question ($p = 0.08$ two tailed).

Table 11

Respondents' Answer on Greatest Health Problem We Face Today

Deaf status	Heart disease (n)	Others (n)
Deaf	24% (29)	76% (92)
Hearing	15% (10)	85% (147)

Table 11 revealed when asked for the leading cause of death in men today, hearing respondents (91%) answered heart disease as correct answer more than Deaf (79%; $p = 0.03$ two tailed; $z = 2.11$). Further analysis (Table 12) by demographic characteristics revealed no significant difference except for the ages between 45-64 years. Hearing in the age range of 45-64 score higher than their Deaf counterparts ($p = 0.04$ two tailed). Fisher Exact probability test was conducted in this case (age) since the Pearson value (4.8) was not equal to or greater than 5.

Table 12

Respondents Correctly Answer Heart Disease as Leading Cause of Death in Men by Deaf Status

Deaf status	Heart disease (n)	n
Deaf	79%	95
Hearing	91%	59

Table 13

Respondents with Age 45-64 Correctly Answer Heart Disease as Leading Cause of Death in Men

Demographics		Deaf Status	Total count	Heart disease (n)	P (fisher test)
Age	45-64	Deaf	67	75% (50)	0.04
		Hearing	45	91% (41)	

Significant difference was displayed in Table 13 between Deaf (28%) and hearing (43%) on identifying all six correct signs/symptoms of heart attack ($p = 0.04$ two tailed; z = -2.07). Further analysis in Table 14 with demographics revealed that among these with at least graduate degrees, only 30% of Deaf correctly identified six signs/symptoms of heart attack was lower compared to 43% hearing ($p = 0.04$ two tailed). The same was true for white Deaf (29%) and hearing (48%; $p = 0.03$ two tailed) group.

Table 14

Respondents Correctly Answered Six Symptoms of Heart Attack by Deaf Status

Deaf status	% Correct	N
Deaf	28%	34
Hearing	43%	28

Table 15

Respondents Correctly Answering Six Symptoms of Heart Attack

Demographics		Deaf Status	Total Count	Correct (*n*)
Education	Graduate	Deaf	96	30% (29)
		Hearing	48	48% (23)
Race	White	Deaf	101	29% (29)
		Hearing	40	48% (19)

The survey included questions for the five warning signs of having a stroke. Table 15 shows no significant difference between both groups when it comes to correctly identifying all 5 correct signs/symptoms of stroke ($p = 0.12$; $z = -1.19$). No significant difference was found in gender, age, education, and race when comparing both groups either.

Table 16

Respondents Correctly Answer 5 Signs/Symptoms of Stroke By Deaf Status

Deaf status	% Correct	N
Deaf	37%	45
Hearing	46%	30

Table 16 demonstrates the first response they will take with someone having a stroke. Hearing (96.2%) were slight likely to call 911 than Deaf (88.4%; $p = 0.057$ two tailed). It was found to be true across gender, age, education and race (Table 17). Deaf

(10.7%) 2nd popular option was that they will take them to the hospital as an action with someone having a stroke. It was significantly higher than hearing (1.5%; $p = 0.03$ two tailed).

Table 17

Respondents' Answer As First Response To With Someone Having A Stroke By Deaf Status

Deaf status	Call 911	*N*
Deaf	88%	107
Hearing	96%	63

Table 18

Respondents' Choice As First Response To Stroke By Gender, Age, Education And Race

Demographics		Deaf Status	Call 911 (*n*)
Gender	Female	Deaf	89% (65)
		Hearing	96% (47)
	Male	Deaf	88% (42)
		Hearing	100% (16)
Age	25-34	Deaf	83% (15)
		Hearing	86% (6)
	35-44	Deaf	88% (30)
		Hearing	100% (8)
	45-64	Deaf	90% (60)
		Hearing	100% (45)
	65-74	Deaf	100% (2)
		Hearing	80% (4)
Education	Some College	Deaf	67% (2)
		Hearing	100% (5)
	Bachelor	Deaf	90% (18)
		Hearing	100% (8)
	Graduate	Deaf	88% (85)
		Hearing	96% (46)
Race	White	Deaf	90% (91)
		Hearing	97% (39)
	Black	Deaf	86% (6)
		Hearing	100% (18)
	Asian	Deaf	50% (2)
		Hearing	100% (1)
	Others	Deaf	89% (8)

		Hearing	83% (5)
Income	Less than $24,999	Deaf	1% (1)
		Hearing	0%
	$25,000 to $49,999	Deaf	7% (7)
		Hearing	3% (2)
	$50,000 to $99,999	Deaf	64% (68)
		Hearing	59% (37)
	$100,000 or more	Deaf	29% (31)
		Hearing	38% (24)

The purpose of the CVD knowledge composite score (Table 18) was to compare how many of the respondents got all correct answers related to CVD knowledge questions. The score was valued at 10 points based on 10 questions from the survey (Section 1: Q1, Q2, Q3; Section 4: Q1, Q2, Q3, Q4, Q5, Q6, Q7). Table 18 also revealed the means of the score by Deaf status. Using a *t*-test to compare two independent means, the analysis demonstrated no significant difference in both groups ($p = 0.058$). Further analysis of average score between both groups across SES and socio-demographic variables revealed no significant difference either with exception of income.

Table 19
CVD Knowledge Composite Score By Deaf Status

Score (out of 10)	Deaf (*n*)	Hearing (*n*)
1	1% (1)	2% (1)
2	3% (3)	0
3	9% (11)	2% (1)
4	11% (13)	8% (5)
5	15% (18)	17% (11)
6	22% (26)	28% (18)
7	24% (29)	19% (12)
8	10% (12)	14% (9)
9	5% (6)	11% (7)
10	2% (2)	2% (1)
Average Score	5.9 (121)	6.4 (65)

Table 20

Average CVD Knowledge Composite Score by Demographics

Demographics		Deaf Status	Average Score (out of 10)
Gender	Female	Deaf	6.0
		Hearing	6.4
	Male	Deaf	5.6
		Hearing	6.4
Age	25-34	Deaf	5.6
		Hearing	5.7
	35-44	Deaf	5.7
		Hearing	5.9
	45-64	Deaf	6.0
		Hearing	6.7
	65-74	Deaf	7.5
		Hearing	5.6
Education	Some College	Deaf	5.3
		Hearing	5.6
	Bachelor	Deaf	5.3
		Hearing	5.8
	Graduate	Deaf	6.6
		Hearing	6.2
Race	White	Deaf	5.9
		Hearing	6.6
	Black	Deaf	6.6
		Hearing	6.3
	Asian	Deaf	3.8
		Hearing	9.0
	Others	Deaf	6.1
		Hearing	5.0
Income	Less than $24,999	Deaf	6.0
		Hearing	n/a
	$25,000 to $49,999	Deaf	4.8
		Hearing	6.5
	$50,000 to $99,999	Deaf	5.7
		Hearing	6.1
	$100,000 or more	Deaf	6.5
		Hearing	6.8

Research Question #2

In this section, linear regression was used to address Research Question #2. Linear regression was conducted on all the SES variables (education and income), sociodemographic variables (gender, age, race, and Deaf status) and present of risk factors (see Table 19) with CVD knowledge composite score (see Table 18). All the independent variables together revealed that adjusted r square to be 5.5% (sig = 0.016).

In Table 20, income was found to explain 5% of the variance of the CVD knowledge composite score (R^2 = .056), and had significant correlation (R= .237) and regression slope (B = .737). This is an indication that income is the strongest predictor of CVD knowledge score. Race (R^2 = .029), age (R^2 = .022), and Deaf status (R^2 = .019) accounted for about 2% of the variance of composite score. Race was found to have significant correlation (R = .171) as well as age (R = .148) with regression slope (B) of -0.231 and 0.345, respectively. Deaf status also had significant regression slope (B = .524) and correlation (R = .140). Risk factors does not account for any variance of CVD knowledge composite score (R^2 = .000) and revealed to have weak correlation (R = .004) and regression slope (B = .006).

Table 21

Linear Regression Model on Each Independent Variable by CVD Knowledge Composite Score

Independent Variable	*R*	R^2	Adjusted R^2	Significant figure (sig.)	*B* (unstandardized)	*SE* (standard error)
Age	.148	.022	.017	.043	.345	.170
Education	.104	.011	.005	.159	.213	.150
Income	.237	.056	.051	.001	.737	.223
Deaf Status	.140	.019	.014	.058	.524	.274
Gender	.100	.010	.005	.175	-.376	.276
Race	.171	.029	.024	.019	-.231	.098
Risk Factors	.004	.000	-.005	.953	.006	.100
All variable (*Z*)	.302	.091	.055	.016	n/a	n/a

Strength of association between CVD knowledge questions/variables, risk factor, SES, and demographic variables are computed with Pearson correlations (Table 22 and 23). The variables (V) are defined in Table 21. Sixteen correlations were found to be significant at the .01 level (2-tailed) and ten correlations were found to be significant at the .05 level (2-tailed). Deaf status was found to be significant correlated to V2 (.155), V6 (.144), and V9 (.252). Age was found to be significant correlated to V9 (.252).

Education was found to be significant correlated to V8 (.207) and V10 (.211). Race was found to be significant correlated to V9 (-.171) and V10 (-.159). Income was found to be significant correlated to V9 (.274) and V10 (.230).

Table 22

Definition of CVD Knowledge Questions

Variable	Definition/Question
V1	What do you think is the one greatest health problem we are facing today?
V2	As far as you know, what is the leading cause of death for all men?
V3	As far as you know, what is the leading cause of death for all women?
V4	If you thought someone was having a heart attack, what is the first thing you would do?
V5	If you thought you were having a heart attack, what is the first thing you would do?
V6	If you thought someone was having a stroke, what is the first thing you would do?
V7	If you thought you were having a stroke, what is the first thing you would do?
V8	Major causes of heart disease score
V9	Warning signs of heart attack scores
V10	Warning signs of stroke scores

Table 23

Pearson Correlations of CVD Knowledge Questions by Demographics and SES

Variables	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
V1	1	.130	.177	-.053	-.062	-.077	-.050	.048	.048	.050
V2		1	.166*	.018	-.045	.063	.014	-.059	.094	.088
V3			1	-.003	-.019	.112	.102	.123	.101	.116
V4				1	.290**	.437**	.172*	.031	.097	.089
V5					1	.153*	.232**	-.013	-.090	.037
V6						1	.472**	.019	.144	.219**
V7							1	.088	.108	.170*
V8								1	.401**	.323**
V9									1	.506**
V10										1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 24
Pearson Correlations of CVD Knowledge Questions by Demographics and SES

Variables	Deaf Status	Gender	Age	Education	Race	Income
V1	-.101	-.012	.031	-.047	.018	.041
V2	.155*	-.120	.007	-.036	.044	.113
V3	.087	-.128	-.041	.051	.054	.135
V4	.025	-.028	.044	.032	-.100	.057
V5	-.112	.072	.121	.088	-.010	.009
V6	.144*	-.020	.092	-.024	-.089	.126
V7	.078	-.023	.033	-.058	.062	.037
V8	.144	-.045	-.016	.207**	-.100	.102
V9	.195**	-.121	.252**	.101	-.171*	.274**
V10	.093	-.115	.095	.211**	-.159*	.230**
Deaf status	1	-.151*	.186*	-.170*	.128	.130
Gender		1	-.011	-.072	-.045	-.042
Age			1	-.140	.060	.256**
Education				1	-.184*	.244**
Race					1	-.084
Income						1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Research Question #3

In this section, data analysis in preventive behavior among this sample revealed several significant differences between Deaf and hearing. Fisher and Pearson test revealed some discrepancies appear across demographic characteristics. The following are specific behaviors that resulted as discrepancies between Deaf and hearing.

Smoking. The survey asked two questions about their smoking status. Table 24 was based on data combined from these two questions. In this sample, 22% of the respondents admitted that they were current/former smoker. Deaf respondents (23%) were similar to their hearing (19%) counterparts in terms of being current/former smoker. Nine Deaf admitted they were currently experiencing to have a smoking habit versus four hearing. Table 25 revealed that more Deaf (7%) took action to quit smoking the last year compare to hearing (0%; $p = 0.03$ one tailed, $p = 0.06$ two tailed) but the difference is not significant. There was no significant difference across demographic characteristics.

Table 25

Current/Former Smoker by Deaf Status

Deaf status	Current/former smoker (*n*)	Current smoker (*n*)	Former smoker (*n*)	Non-smoker (*n*)
Deaf	23% (28)	7% (9)	16% (19)	77% (93)
Hearing	19% (12)	6% (4)	12% (8)	82% (53)
Total	22% (40)	7% (13)	15% (27)	78% (146)

Table 26

Attempt To Quit Smoking in the Last Year

Deaf status	Quit (*n*)	Did not quit (*n*)
Deaf	7% (8)	9% (11)
Hearing	0	14% (8)

Vitamins/Multivitamins. Table 26 demonstrated that hearing (57%) were highly likely to take special vitamins (vitamins E, C, or A) in the last year as part of preventive behavior more than their Deaf counterparts ($p = 0.04$ two tailed; $z = 2.1$). Multivitamins revealed similar results as hearing (37%) were highly likely to take multivitamins than Deaf (21%; $p = 0.02$ two tailed; $z = 2.3$) No significant difference was found across demographic characteristics.

Table 27

Respondents Took Vitamins Like E, C, Or A and Multivitamins in the Last Year by Deaf Status

Deaf status	Vitamins like E, C, or A (*n*)	Multivitamins (*n*)
Deaf	40% (48)	21% (26)
Hearing	55% (36)	37% (24)

Maintain Healthy Blood Pressure. Sixteen percent of Deaf respondents ($n = 19$) and 26% of hearing ($n = 17$) admitted that they currently have high blood pressure. Table 27 demonstrated more hearing (80%) maintain their healthy blood pressure than their Deaf (61%) counterparts ($p = 0.01$ two tailed; $z = 2.58$). Table 28 revealed that Hearing

female were twice highly likely to maintain healthy blood pressure than Deaf female (p = 0.05 two tailed; z = 1.99). No significant difference was found in other demographics characteristics.

Table 28

Maintain a Healthy Blood Pressure in the Last Year by Deaf Status

Deaf status	Yes (*n*)	No (*n*)	N/A (*n*)
Deaf	61% (73)	21% (25)	18% (21)
Hearing	80% (49)	12% (7)	8% (5)

Table 29

Maintain a Healthy Blood Pressure in the Last Year by Demographics

Demographics		Deaf Status	Total count	Maintain healthy blood pressure (*n*)
Gender	Female	Deaf	73	60% (44)
		Hearing	49	77% (38)
	Male	Deaf	48	60% (29)
		Hearing	16	69% (11)
Age	25-34	Deaf	18	44% (8)
		Hearing	7	71% (5)
	35-44	Deaf	34	56% (19)
		Hearing	8	88% (7)
	45-64	Deaf	67	68% (45)

		Hearing	45	73% (33)
	65-74	Deaf	2	50% (1)
		Hearing	5	80% (4)
Education	Some College	Deaf	3	67% (2)
		Hearing	5	60% (3)
	Bachelor	Deaf	20	40% (8)
		Hearing	8	100% (8)
	Graduate	Deaf	96	65% (62)
		Hearing	48	75% (36)
Race	Asian	Deaf	4	50% (2)
		Hearing	1	100% (1)
	Black	Deaf	7	57% (4)
		Hearing	18	72% (13)
	White	Deaf	101	61% (62)
		Hearing	40	73% (29)
	Others	Deaf	9	56% (5)
		Hearing	6	100% (6)
Income	Less than $24,999	Deaf	1	0% (0)
		Hearing	0	0% (0)
	$25,000 to	Deaf	9	1% (1)

$49,999			
	Hearing	2	2% (1)
$50,000 to $99,999	Deaf	76	63% (46)
	Hearing	36	63% (31)
$100,000 or more	Deaf	33	36% (26)
	Hearing	23	35% (17)

Pray/meditate. Deaf (40%; *n* = 48) do pray/meditate as well as their hearing counterparts (55%; *n* = 36) as one of the preventive measure for CVD. Table 29 indicated that hearing female (66%) were highly likely to take the time to pray/meditate than Deaf female (47%; *p* = 0.05 two tailed; *z* = 1.96). No significant difference was found in other demographic characteristics.

Table 30

Respondents Pray/meditate by Gender and Deaf Status.

Demographics		Deaf Status	Total Count	Pray/meditate (*n*)
Gender	Female	Deaf	73	47% (33)
		Hearing	49	66% (31)
	Male	Deaf	48	33% (15)
		Hearing	16	39% (5)

Age	25-34	Deaf	18	28% (5)
		Hearing	7	43% (3)
	35-44	Deaf	34	46% (15)
		Hearing	8	38% (3)
	45-64	Deaf	67	42% (27)
		Hearing	45	63% (25)
	65-74	Deaf	2	50% (1)
		Hearing	5	100% (5)
Education	Some College	Deaf	3	33% (1)
		Hearing	5	100% (3)
	Bachelor	Deaf	20	35% (7)
		Hearing	8	63% (5)
	Graduate	Deaf	96	42% (39)
		Hearing	48	54% (25)
Race	Asian	Deaf	4	75% (3)
		Hearing	1	100% (1)
	Black	Deaf	7	43% (3)
		Hearing	18	83% (15)
	White	Deaf	101	38% (37)
		Hearing	40	51% (18)

	Others	Deaf	9	57% (5)
		Hearing	6	33% (2)
Income	Less than $24,999	Deaf	1	0% (0)
		Hearing	0	0% (0)
	$25,000 to $49,999	Deaf	9	1% (1)
		Hearing	2	2% (1)
	$50,000 to $99,999	Deaf	76	63% (46)
		Hearing	36	63% (31)
	$100,000 or more	Deaf	33	36% (26)
		Hearing	23	35% (17)

Adequate sleep. Even though no significant differences were found (Table 30) between both groups in terms of getting adequate sleep ($p = 0.54$), Deaf in age 45-64 group (Table 30) was highly likely to get adequate sleep compared to their hearing counterparts ($p = 0.03$ two tailed; $z = 2.1$). Same was true for Deaf with at least graduate education (Table 31) was highly likely to get adequate sleep compared to their hearing counterparts ($p = 0.01$; $z = 2.7$). However, there were no significant difference in gender,

race, and income.

Table 31

Respondents get Adequate Sleep by Deaf Status

Deaf status	Yes (*n*)	No (*n*)	N/A (*n*)
Deaf	68% (80)	25% (30)	7% (8)
Hearing	54% (49)	43% (27)	3% (2)

Table 32

Respondent gets Adequate Sleep by Deaf Status and Demographics Characteristics

Demographics		Deaf Status	Total Count	Adequate sleep (*n*)
Gender	Female	Deaf	73	70% (51)
		Hearing	49	58% (28)
	Male	Deaf	48	62% (29)
		Hearing	16	40% (6)
Age	25-34	Deaf	18	56% (10)
		Hearing	7	71% (5)
	35-44	Deaf	34	70% (23)
		Hearing	8	63% (5)
	45-64	Deaf	67	71% (46)
		Hearing	45	51% (22)
	65-74	Deaf	2	50% (1)

		Hearing	5	40% (2)
Education	Some College	Deaf	3	33% (1)
		Hearing	5	50% (2)
	Bachelor	Deaf	20	42% (8)
		Hearing	8	63% (5)
	Graduate	Deaf	96	75% (70)
		Hearing	48	51% (24)
Race	Asian	Deaf	4	75% (3)
		Hearing	1	100% (1)
	Black	Deaf	7	43% (3)
		Hearing	18	56% (10)
	White	Deaf	101	71% (70)
		Hearing	40	58% (22)
	Others	Deaf	9	44% (4)
		Hearing	6	17% (1)
Income	Less than $24,999	Deaf	1	0% (0)
		Hearing	0	0% (0)
	$25,000 to $49,999	Deaf	9	6% (5)
		Hearing	2	3% (1)
	$50,000 to $99,999	Deaf	75	64% (51)

	Hearing	37	56% (19)
$100,000 or more	Deaf	33	30% (24)
	Hearing	24	41% (14)

Research Question #4

Deaf and hearing respondents were asked for their top five biggest barriers that were preventing them from leading a heart healthy lifestyle. Table 32 and 33 revealed their top five barriers for the Deaf and hearing, respectively. With further analysis when comparing both groups, none of the matching barriers were found with significant differences.

Table 33

Deaf Respondents' Top Five Options as Biggest Barriers on Leading a Heart Healthy Lifestyle

Options	Deaf Count
I don't have the time to take care of myself	36
I am too stressed to do the things that needs to be done	35
I don't perceive myself to be at risk for heart disease	28
I have family obligations	26
Health care professional do not think I need to worry about heart disease	17

Table 34

Hearing Respondents' Top Five Options as Biggest Barriers on Leading a Heart Healthy Lifestyle

Options	Hearing Count
I don't perceive myself to be at risk for heart disease	20
I don't have the time to take care of myself	18
I have family obligations	15
I am too stressed to do the things that needs to be done	12
I am not confident	7

However, there were two barriers that were not in top 5 five were worth noticing: my health care does not speak my language and there was too much confusion in the media about what to do. Seven out of 121 Deaf respondents felt that their doctor who did not speak their language was one of barriers compared to none of their hearing respondents ($p = 0.05$ one tailed, $p = 0.1$ two tailed [Table 34]) felt the same.

Deaf feels there were too much confusion in the media (Table 34) about what to do with CVD compared to their hearing counterparts ($p = 0.039$ one tailed, $p = 0.057$ two tailed). It was true across gender, age, education, race and income (Table 35).

Table 35

Barrier Options by Deaf Status

Deaf Status (*n*)	My health care professional does not speak my language (*n*)	There was too much confusion in the media about what to do (*n*)
Deaf (121)	6% (7)	12% (14)
Hearing (65)	0	3% (2)

Table 36

Respondents get Confused with the Media by Deaf Status and Demographic Characteristics

Demographics		Deaf Status	There was too much confusion in the media about what to do (*n*)
Gender	Female	Deaf	11% (8)
		Hearing	2% (1)
	Male	Deaf	13% (6)
		Hearing	6% (1)
Age	25-34	Deaf	11% (2)

		Hearing	0
	35-44	Deaf	9% (3)
		Hearing	0
	45-64	Deaf	13% (9)
		Hearing	4% (2)
	65-74	Deaf	0
		Hearing	0
Education	Some College	Deaf	33% (1)
		Hearing	0
	Bachelor	Deaf	20% (4)
		Hearing	0
	Graduate	Deaf	10% (10)
		Hearing	2% (1)
Race	Asian	Deaf	25% (1)
		Hearing	0
	Black	Deaf	14% (1)
		Hearing	0
	White	Deaf	11% (11)
		Hearing	5% (2)
	Others	Deaf	11% (1)
		Hearing	0%

Income	Less than $24,999	Deaf	0%
		Hearing	0%
	$25,000 to $49,999	Deaf	2% (2)
		Hearing	0% (0)
	$50,000 to $99,999	Deaf	11% (11)
		Hearing	5% (2)
	$100,000 or more	Deaf	1% (1)
		Hearing	0% (0)

When asked whether any of their doctors ever discussed with them the CVD related symptoms (high blood pressure, cholesterol, family history of heart disease, risk for heart disease/stroke, and weight), both groups did not have any significant difference between them. Even discussing their doctors with CVD related behaviors (smoking, healthy diet, and exercise), both groups did not have any difference between them, either. However, when broken down by race, discrepancies with communication about heart disease with doctors were found.

Based on their BMI given in this study, 76% of Blacks (19 out of 25 Black respondents) were found to be at least overweight which was higher than Whites (58%; 82 out of 141 White respondents). It was logical to conclude that Black respondents in this study are at higher risk of CVD compared to their White counterparts. Yet with further analysis shown in Table 36, doctors respond differently with Deaf and hearing Blacks on high blood pressure. Doctors were highly likely to discuss high blood pressure

with Hearing Blacks (78%) than their Deaf Black (28%; $p = 0.05$ two tailed) counterparts. This is found not be an issue for the doctor to discuss the same topic with Deaf (26%) and hearing (15%; $p = 0.17$ two tailed) White respondents (Table 37).

Table 37
Topics Discussed with their Doctor by Black and Deaf Status

Topic discussed by their doctors	Black Deaf ($n = 7$)	Black Hearing ($n = 18$)
BMI > overweight	71% (5)	78% (14)
High blood pressure	28% (2)	78% (14)
Cholesterol	57% (4)	61% (11)
Weight	43% (3)	56% (10)
Exercise	57% (4)	78% (14)
Diet	43% (3)	50% (9)

Table 38

Topics Discussed with their Doctor by White and Deaf Status

Topic discussed by their doctors	White Deaf ($n = 101$)	White Hearing ($n = 40$)
BMI > overweight	62% (63)	50% (20)
High blood pressure	26% (26)	15% (6)
Cholesterol	42% (42)	43% (17)
Weight	46% (46)	45% (18)
Exercise	51% (52)	60% (24)
Diet	31% (31)	38% (15)

Overview of Research Questions

Table 38 showcased whether the hypothesis was accepted or rejected based on the data analysis including correlations and linear regression.

Table 39
Research Question Hypotheses Results

Research Question	Hypothesis	Factor	Significant?	Accept or reject
1	There was a significant difference in the level of knowledge about cardiovascular diseases (CVD) between Gallaudet University employees who were culturally Deaf and employees who were able to hear when considering factors such as age, gender, race, SES, and family history of CVD	Deaf Status	Yes	Accept
1b		By Age	No	Reject
1c		By Gender	No	Reject
1d		By Race	No	Reject
1e		By SES	Yes	Accept
1f		By family history of CVD	No	Reject
2	Socioeconomic status was a factor when accounting in the examination of the difference in cardiovascular diseases knowledge among Gallaudet University employees who were culturally Deaf and hearing employees when considering socio-demographic variables (age, gender, family history and race).	Deaf Status	Yes	Accept
2b		By Age	Yes	Accept
2c		By Gender	No	Reject
2d		By Race	Yes	Accept
2e		By SES	Yes	Accept
2f		Family history of CVD	No	Reject
3	There was a significant difference in preventive behavior in relations to cardiovascular diseases (CVD) between Gallaudet University employees who were culturally Deaf and employees who were able to hear when considering factors such as age, gender, race, SES, and family history of CVD	Deaf Status	Yes	Accept
3b		By Age	Yes	Accept
3c		By Gender	Yes	Accept
3d		By Race	No	Reject
3e		By SES	Yes	Accept
3f		By family history of CVD	No	Reject
4	There was a significant difference in perceived barriers to leading healthy lifestyle between Gallaudet University employees who were culturally Deaf and employees who were able to hear when considering factors such as age, gender, race, SES, and family history of CVD.	Deaf Status	Yes	Accept
4b		By Age	No	Reject
4c		By Gender	No	Reject
4d		By Race	Yes	Accept
4e		By SES	No	Reject
4f		By family history of CVD	No	Reject

Reliability

Cronbach's alpha measures the reliability of the items in a scale. All the scales in this study had an acceptable alpha score for this sample (Table 39) with exception of barriers section. Barriers section was not in a scale format. Instead it asked for top 5 out of 22 options. Hence the number of cases was too small to compute for a reliability analysis.

Table 40

Reliability Test

Scale	# of Items in Scale	Cronbach's alpha
Knowledge	43	0.80
Preventive Behavior	23	0.88
Barriers	22	N/A

Summary

Four research questions related to CVD knowledge, preventive behavior, and barriers were explored in accordance with data analysis from 186 respondents/employees at Gallaudet University. For the CVD knowledge composite score, hearing average score (6.4) was slightly higher than their Deaf counterparts (5.9; $p = 0.11$). Using only CVD knowledge composite score, the linear regression model shows income is the strongest predictor of CVD knowledge with 5% variance and $p = 0.001$ (Table 20). Race ($R^2 = .029$), age ($R^2 = .022$) and Deaf status ($R^2 = .019$) accounted for about 2% of the variance

of CVD knowledge composite score. Education (R^2 = .005) and gender (R^2 = .01) was revealed not significant. For preventive behavior, hearing individuals are highly likely to take special vitamins (E, C, or A) or multivitamins (57%) and to maintain healthy blood pressure (80%) in the last year along with as part of preventive behavior more than their Deaf counterparts (40%, and 61%, respectively). Hearing female (66%) was highly likely to take the time to pray/meditate than their Deaf (47%) female counterparts. No significant differences were found within their top five options as biggest barriers in leading a healthy heart lifestyle in both groups.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

CVD is well documented among racial minority populations but is not well documented for the culturally Deaf population. The purpose of this quantitative study was to compare the knowledge, perceived barriers, and preventive behaviors associated with CVD among a diverse, random sample of Deaf and hearing employees at Gallaudet University. The data from the study verified the trends of CVD among the Deaf population. When comparing both Deaf and hearing employees at Gallaudet University on knowledge, preventive behavior and barriers of CVD along with SES factors, the data showed mixed results associated with the four research questions. Deaf and hearing employees were similar in their CVD knowledge composite scores, and I found no significant difference in perceived barriers related to CVD. However, this sample differs significantly in preventive behaviors. SES played a factor when examining the difference in CVD knowledge.

Interpretation of the Findings

Knowledge of CVD

Hearing (M = 6.4 out of 10) and Deaf (M = 5.9 out of 10) respondents in this study were similar in terms of overall CVD knowledge based on CVD knowledge score. My further analysis of each research question revealed several disparities between both groups. Hearing was slightly more highly likely to be more knowledgeable of CVD than Deaf.

The Deaf group (79%) was significant lower than hearing (91%) in identifying heart disease as the leading cause of death today ($p = 0.03$). When it came to identifying symptoms of heart attack, only 28% of the Deaf group was able to identify all six symptoms compared to 43% of the hearing group ($p = 0.04$).

Other studies have shown that women tend to have more CVD knowledge than men (Potvin et al., 2000; Thomas et al., 2009). In this study, women did score higher on the CVD knowledge composite score than men. Deaf women ($M = 6.0$) scored as well as hearing women ($M = 6.4$). However, Deaf men ($M = 5.6$) scored slightly lower than their hearing male counterparts ($M = 6.4$).

Respondents with higher levels of education and higher SES have reported a higher level of knowledge about CVD (Alkadry et al., 2005; Lynch et al., 2006; Potvin et al., 2000). This was shown to be true in this study where the CVD knowledge composite score was correlated to a higher level of education and income. For those participants with at least a graduate education, Deaf respondents ($M = 6.6$) scored slightly higher than hearing respondents ($M = 6.2$). However, respondents with at least a graduate education revealed that Deaf participants (30%) were significantly lower in their ability to correctly identify all six warning signs of a heart attack compared to hearing participants (48%). Deaf respondents ($M = 4.8$), with an income between $25,000 to $49,000, scored lower than their hearing counterparts ($M = 6.5$) in the same category. However, for those with an income of at least $50,000, no disparity in composite scores was found between both groups.

People in the middle adult age group of 40–64 years tended to be more knowledgeable than the rest of age groups (Christian et al., 2007; Mosca et al., 2004; Thomas et al., 2009). Yet, Deaf participants (75%) ages 45-64 in this study scored significant lower than their hearing counterparts (91%) when it came to identifying CVD as the leading cause of death in men. It is possible that the hearing group (11%) in this sample experienced more heart attack and stroke than the Deaf group (2%), which other researchers have shown to be correlated to their increased knowledge of CVD (Thomas et al., 2009). However, 85% of hearing group experienced at least one risk factor, which was similar to 80% of the Deaf group. Perhaps hearing participants were highly likely to share personal CVD-related information among their colleagues or the scores were due to lack of access to CVD information for the Deaf. Literature shows that Deaf people's CVD health knowledge and literacy disparities may contribute to their increased CVD risks (Margello-Anast et al., 2006; McKee et al., 2011).

Blacks and Hispanics had a lower level of CVD knowledge than Whites (Christian et al., 2007; Mosca et al., 2004; Thomas et al., 2009). I found this to be true for the hearing sample in this study. However, the opposite was true for the Deaf sample as Black Deaf participants ($M = 6.6$) scored slightly higher on the CVD knowledge score than White Deaf participants ($M = 5.9$).

Forty percent of Margello-Anast et al.'s (2006) Deaf respondents could not list any symptoms whereas every Deaf participant in my sample could name at least one symptom. Margello-Anast et al. claimed that less than half of her Deaf respondents listed chest pain as a symptom of a heart attack versus 94% of my Deaf respondents ($n = 114$).

Sixty-one percent of Margello-Anast et al.'s respondents said they would call 911 in response to CVD signs whereas 94% of my Deaf sample would call 911. These results demonstrate that my sample may be more knowledgeable of CVD compared to Margello-Anast et al.'s sample. It was well documented that that persons with higher SES are known to keep up with health information and have greater access to quality health resources (Link & Phelan, 1995) and have better understanding of the consequences of risky behavior such as smoking, obesity, or alcoholism. My subjects have higher SES compared to Margello-Anast et al's sample. Ninety-two percent of my sample has an education of Bachelor degree and higher and 94% of them have an income of at least $50,000. In comparison to Margello-Anast et al's (2006) sample, 48% of respondents have an education at least of high school and 61% of them have an income lower than $20,000. In turn, my sample's CVD knowledge is higher than Margello-Anast et al's which coincides with Link and Phelan's study when it comes to SES.

The results of this study do not just empirically support those of Margelo-Anast et al.'s study (2006), but they extend the generalizability on the CVD trends of the Deaf population. In Margello et al.'s study, about 48% of the participants had more than a high school education versus 100% of respondents in this study who had more than high school education. However, the results led both Margelo-Anast et al. and me to reach the same conclusion that Deaf people are lower in CVD knowledge when compared to the hearing/general population. This is an indication that the trends in the Deaf population are still not known and creates an imperative demand for more data as there are at least 30

million people with hearing loss in the United States (Lin, Niparko, & Ferrucci, 2011). There is no definitive record of how many among them are culturally Deaf.

CVD Preventive Behaviors

More Deaf participants saw, heard, or read information related to heart disease than hearing. More Deaf participants were worried at least a little to a lot (83%; *n* = 100) about heart attack/disease, which was similar to their hearing counterparts (77%; *n* = 49). Also, both Deaf (89%, *n* = 108) and hearing (83%, *n* = 54) participants were good about seeing their health care provider on a regular basis. Yet Deaf participants were less likely to take certain preventive measures of CVD, such as taking vitamins, maintaining a healthy blood pressure, and taking the time to pray/meditate, when compared to the hearing participants. However, Deaf participants were more likely to get adequate sleep and attempt to quit smoking than their hearing counterparts.

Perceived Barriers of CVD

Barriers, such as not understanding the media on CVD education and not having their health care provider know their first language of ASL, were somewhat correlated to the Deaf participants' knowledge. However, it was possible that most of the Deaf respondents had ASL interpretation service due to the fact of the large number of culturally Deaf people in the metropolitan area of Washington D.C. The large population of Deaf along with the prestige of Gallaudet University appears to be associated with an increased awareness in the metropolitan area of the American with Disabilities Act.

Theoretical Framework

The HBM explains the health behavior of people based on first understanding the beliefs of a certain population (Glanz et al., 2008)). This theoretical framework helped me establish a baseline for information on the knowledge and beliefs of employees at Gallaudet University.

Deaf respondents (79%) in this study did not see CVD as a leading cause of death compared to hearing respondents (91%). This was an indication that regardless of SES, the Deaf participants did not perceive CVD as a serious disease. Their lower perceived seriousness may explain their slightly lower scores in CVD knowledge when compared to their hearing counterparts.

The Deaf participants in this study seem to have certain beliefs of obstacles when it comes to acquiring CVD information. Not only that, their health care providers seem to behave slightly differently towards them in terms of providing CVD information based on race and Deaf status. Further research is warranted on the perceived beliefs of health providers when it comes to their Deaf patients. Nevertheless, perceived barriers on both sides may have led the Deaf participants to be less likely to adopt a new behavior in leading a healthier lifestyle such as maintaining blood pressure and taking vitamins. Nevertheless, more Deaf participants in this study were more likely to get adequate sleep and quit smoking than their hearing counterparts.

When compared to Chicago's Deaf population in Margello-Anast's et al.'s (2006) study, the Deaf population at Gallaudet University seemed to be able to keep up with health information and had greater access to health services. This may be correlated to

the fact that this Deaf sample had significantly higher SES than the Deaf population in Margello-Anast et al.'s study. Logically, the perceived susceptibility, seriousness, and benefits of the Deaf participants in this study were much higher and they encountered less barriers than the Deaf sample in Margello-Anast et al.'s study. In turn, Deaf employees at Gallaudet University are more knowledgeable of CVD with better access to leading a healthier lifestyle than the Deaf population in Margello-Anast et al.'s study.

Limitations of the Study

Recall bias remained a significant limitation of this study due to my collection of data via self-reported survey. Selection bias was not an issue since the survey was sent out to all employees at the same time. Considering that ASL is the primary language of the Deaf, misunderstanding of the English version of the survey was a strong probability. However, none of the Deaf respondents asked for the ASL version of the survey. This may have been due to the fast pace in academia with no time to make an appointment for the ASL version. The calculated sample size for Deaf was met, but this was not the case for the hearing sample as I came up short by recruiting 65 instead of the hoped for 98 participants. This sample size may lead to the generalizability of the hearing employees at Gallaudet being questionable. The number of respondents who were people of color were relatively low in this study, and this may affect the reliability in any data analysis related to race.

My review of previous research on trends of CVD primarily focused on hearing/general population and extant research on the Deaf population is limited. My methodology including instruments from a hearing to Deaf population was a concern in

terms of cultural sensitivity. Even though, Margello-Anast et al.'s (2006) survey was tailored to meet the needs of Deaf population, it was still derived from the constructs used in hearing population and this fact needs to be considered when examining the results. The survey I used in this study was derived from two existing surveys that had not been tested for their reliability and validity. However, two out of three scales in this study were found to be within acceptable range of alpha scores with the third scale being too small to be measured for reliability.

Recommendations

The results of this study are not generalizable to the CVD trends of all Deaf in the United States. More data with stronger recruitment tools, preferably in ASL, is necessary in order to gain a better comprehensive picture of CVD trends in the U.S. culturally Deaf population. Future researchers should focus on the populations of Deaf people of color, Deaf college students, and Deaf high school students. Previous research has already indicated health inequality in terms of CVD among traditional underrepresented groups (Barnett et al., 1999; Go et al., 2014; Lutifyya et al., 2008). A CVD focus and better recruitment strategies for Deaf people of color is warranted. Deaf college students are another area for future research since several studies revealed that college students are at risk for CVD due to their lifestyle (Green et al., 2003; Pilote & Hlatky, 1995; Rigotti et al., 2000). Research is warranted at colleges with a large number of Deaf students such as Gallaudet, Rochester Institute of Technology, University of California of Northridge, Ohlone College, and SouthWest Collegiate Institute for the Deaf as well as for Deaf high schools students. A comparison of Deaf high school students at residential and

mainstream schools with a national average of hearing students should offer a better picture on the health trends of CVD in this specific population.

Implications

This study was the first of its kind to be conducted at Gallaudet University according to the Gallaudet's health and wellness program director. The results of this study could lead to a better understanding of knowledge, attitude, and perceived barriers of cardiovascular disease among Gallaudet employees. Comparing the difference between hearing and Deaf employees was beneficial as it gave deeper insights on the difference between the two groups. Both groups with demographics and SES on very similar grounds provide validation of data in terms of comparisons. From the findings in this study, practical application with development of appropriate CVD educational interventions can be made available for all employees at Gallaudet University. This original contribution can be applied to other universities with Deaf programs as part of a collaborated effort to curb the trend of CVD among Deaf population. This study offered an opportunity to test the validity and reliability of this survey as the questions were originally derived from survey by Margello-Anast et al.'s (2006) and AHA (2012).

Not only do the results of this study give a better picture of health trends at Gallaudet University, but also in the Washington D.C. Metro (including parts of Maryland and northern Virginia) as they house one of the largest groups of culturally Deaf people in the United States. This study may inspire more initiatives on Deaf health in D.C. metro. At a societal level, this study can give a good picture of where Deaf people can be encouraged to lead a healthy lifestyle in the United States. The results of

this study along with 52% of Margello-Anast et al's (2006) Deaf sample with only a high school education compared to almost 100% of Deaf respondents in this study with at least college education, does empirically lead to more appropriate generalization of health trends of the Deaf population in the United States as compared to the general (hearing) population. This study may inspire more research on CVD and other health topics (i.e., smoking, drugs, obesity, etc.) for the Deaf population. In addition, the necessity for more initiatives on development of effective standardized screening tools that is culturally appropriate for Deaf is greater. With appropriate tools and more research/publications on the health trends of the Deaf, health care providers across the country could gain a better understanding of needs when Deaf people seek services from them. Ultimately, it could lead to a reduction or elimination of the deficit in CVD knowledge among Deaf in the United States. In turn, the CVD morbidity among this population may decrease along with barriers within the health care system. A future where Deaf people will be able to have equal opportunity/access to lead a healthy lifestyle just as hearing people is within reach.

Conclusion

In conclusion, CVD is the leading cause of death in the United States with disproportionate rates in racial minority health, particularly the Deaf population. There is an urgent need for aggressive strategies to increase awareness and to develop culturally appropriate CVD educational tools/materials targeted for the Deaf. The findings of this study which considered socioeconomic status and socio-demographic variables

demonstrated a better understanding on the current trends of Deaf employees at Gallaudet University but still did not reflect on the Deaf population in the United States.

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Appendix A: Patient Information Sheet

Knowledge, Perceived Barriers and Preventive Behaviors associated with Cardiovascular Disease among Gallaudet University Employees.

Patient Information Sheet

Principal Investigator: ANDY TAO

Project Sponsor: Walden University

You are invited to participate in a study conducted by a researcher named Andy Tao, a doctoral student at WALDEN UNIVERSITY. You may already know the researcher as a XXXXXXXX at Gallaudet University, but this study is separate from that role.

The researcher is randomly selecting and inviting adults age 18 or older who are current employees of Gallaudet University to be in the study. Please read this consent form to allow you to understand this study and ask any questions you have before deciding whether to participate.

Background Information:

We want to increase our understanding about cardiovascular disease knowledge, barriers, and behaviors among Gallaudet employees. Comparisons will be made between Deaf and hearing employees. We are inviting you to participate in our study because you are an employee of GALLAUDET UNIVERSITY.

How the Study Works

If you agree to join in the study, we will ask you questions about your health beliefs related to cardiovascular disease. You have two options: 1) online survey or 2) face-to-face interview in ASL. Please try to be as honest with your answers as possible. Some of the questions may be very personal. The survey will take 30 to 45 minutes. The interview will take between 45 minutes to one hour. You will need to complete the survey in one session.

Risks

Your participation in this study will not hurt you physically. You may be upset with some of the questions, or you may not feel comfortable answering them. If you do not want to answer a question, you do not have to answer it. You can go to the next questions. If you wish to quit the interview, you may do so at any time.

Benefits

There is no other direct benefit to you.

Confidentiality

Your participation in this study is confidential and all records will be kept confidential. Your name will not be on the records. You will be identified with a number. If we publish the study, your name or personal information will not be in it. Also the researcher will not include your name or anything that could identify you in the study reports. Data

will be kept secured by using electronic documents that are password protected, and only the researcher will know the password. Data will be kept for a period of at least 5 years, as required by the university.

Voluntary Nature of the Study

You do not have to participate in the study. You are under no pressure to participate. If you do not want to do it, it will not hurt your relationship with your doctors, with GALLAUDET UNIVERSITY AND WALDEN UNIVERSITY. **You may change your mind and quit the survey at any time.**

Contacts and Questions

If you have any questions about the study, you can ask by emailing me at XXXXXXXX. If you have any questions concerning your rights as a research subject, you can contact the university IRB at IRB@gallaudet.edu. Gallaudet University's approval number for this study is PJID #2803 and it expires on 10/20/2017.

Appendix B: Gallaudet Health Survey

Gallaudet's Health Study

Section Screening (4 questions):

Hello, my name is Andy Tao. I am currently a PhD student in epidemiology at Walden University. This university is known for where students have the opportunity to transform themselves as scholar-practitioners so that they can effect positive social change. We are talking to Gallaudet employees about cardiovascular diseases (CVD). We are not selling anything. The information will be used to develop important health communications for Deaf and all responses will be kept strictly confidential.

Q1. Are you…?

1 Male

2 Female

Q2. Which of the following best describes your employment status?

1 Employed full time

2 Employed part time

3 Not employed THANK AND TERMINATE

Q3. Are you of Spanish or Hispanic origin, such as Latin American, Mexican, Puerto Rican or Cuban?

1 Yes, of Hispanic origin

2 No, not of Hispanic origin

3 Decline to answer

Q4. Do you consider yourself…?

1 White

2 Black

3 Asian or Pacific Islander

4 Native American or Alaskan Native

5 Mixed Race

6 Some other race

7 Decline to answer

Section 1: General Awareness of Health Issues (4 questions)

Our first few questions are about your views on health issues today.

Q1. What do you think is the one greatest health problem we facing today?

01 AIDS

02 Alzheimer's

03 Cancer (general)

04 Diabetes

05 Drug addiction/Alcoholism

06 Heart disease/Heart attack

07 Obesity

08 Osteoporosis

09 Smoking

10 Stroke

Q2. As far as you know, what is the leading cause of death for all men?

01 AIDS

02 Alzheimer's

03 Cancer (general)

04 Diabetes

05 Drug addiction/Alcoholism

06 Heart disease/Heart attack

07 Obesity

08 Osteoporosis

09 Smoking

10 Stroke

Q3. As far as you know, what is the leading cause of death for all women?

01 AIDS

02 Alzheimer's

03 Cancer (general)

04 Diabetes

05 Drug addiction/Alcoholism

06 Heart disease/Heart attack

07 Obesity

08 Osteoporosis

09 Smoking

10 Stroke

Q4. Please tell me the extent to which you worry about getting each of the following health conditions.

1. Not at all
2. A little
3. Worry a lot

1. Cancer
2. Heart disease or heart attack
3. AIDS
4. Smoking
5. Drug addiction or alcoholism
6. Stroke
7. Alzheimer's
8. Diabetes
9. Osteoporosis
10. Obesity

Section 2: Respondent's General Health Section (8 questions)

Q1. In general, would you say your overall outlook on life is…?

1. Poor
2. Fair
3. Good
4. Very good
5. Excellent

Q2. Which of the following do you currently experience? Please select all that apply even if it is controlled or managed by medication.

1. High blood pressure
2. High cholesterol
3. Family history of heart disease or stroke
4. Smoking habit
5. Weigh 20 pounds or more over ideal for your height and build
6. Physical inactivity (i.e., exercising less than 20-30 minutes per day, 5 or more days of the week)
7. Depression
8. None of the above

Q3. Has a doctor, nurse, or other health professional ever told you that you had any of the following?

1. Yes
2. No

1. Heart attack
2. Stroke
3. Diabetes

Q4. Please indicate how much you agree or disagree with the following statements.

1. Strongly disagree
2. Somewhat disagree
3. Somewhat agree
4. Strongly agree

1. I don't get enough sleep on a regular basis
2. I am taking care of my health
3. My health is a priority for me
4. I'm so busy taking care of everyone else, I don't take good care of myself
5. I usually follow recommended healthy eating habits (i.e., low sodium intake, low fat intake, eat fruits and vegetables, etc.)
6. When life gets busy, exercising is one of my first things i skip
7. My muscles and joints ache on a regular basis
8. I am concerned about my alcohol intake

Q5. In general, would you say your <u>physical</u> health is…

1. Poor
2. Fair
3. Good

4. Very good
5. Excellent

Q6. In general, would you say your emotional health is…

1. Poor
2. Fair
3. Good
4. Very good
5. Excellent

Q7. How much influence does how you feel physically impact how you feel emotionally?

1. Not at all
2. Some
3. Very much
4. A great deal

Q8. How much influence does how you feel emotionally impact how you feel physically?

1. Not at all
2. Some
3. Very much

4. A great deal

Section 3: Aware of Heart Disease (4 questions)

Q1. How informed are you about heart disease in women? Would you say you are:

1 Very well informed

2 Well informed

3 Moderately informed

4 Not at all informed

Q2. How informed are you about stroke or "brain attack" in women? Would you say you are:

1 Very well informed

2 Well informed

3 Moderately informed

4 Not at all informed

Q3. How informed are you about heart disease in men? Would you say you are:

1 Very well informed

2 Well informed

3 Moderately informed

4 Not at all informed

Q4. How informed are you about stroke or "brain attack" in women? Would you say you are:

1 Very well informed

2 Well informed

3 Moderately informed

4 Not at all informed

Section 4: Specific Understanding of Heart Attacks and Stroke (7 questions)

Q1. Based on what you know what warning signs do you associate with having a heart attack? (Multiple responses accepted)

01 Chest pain

02 Fatigue

03 Nausea

04 Pain that spreads to the shoulders, neck, or arms

05 Shortness of breath

06 Tightness of the chest

Q2. If you thought someone was having a heart attack, what is the first thing you would do?

1 Take them to the hospital

2 tell them to call their doctor

3 Call 911

4 Call their spouse or family member

Q3. If you thought you were experiencing signs of a heart attack, what is the first thing you would do?

1 Take an aspirin

2 Call your doctor

3 Call a family member

4 Call 911

5 Go to the hospital

Q4: Based on what you know what warning signs do you associate with having a stroke? (Multiple responses accepted)

01 Loss of/trouble talking or trouble understanding speech

02 sudden dimness/loss of vision, often in one eye

03 Sudden, severe headache

04 Sudden weakness/numbness of face or limb on one side

05 Unexplained dizziness

Q5. If you thought someone was having a stroke, what is the first thing you would do?

1 Take them to the hospital

2 tell them to call their doctor

3 Call 911

4 Call their spouse or family member

Q6. If you thought you were experiencing signs of a stroke, what is the first thing you would do?

1 Call your doctor

2 Call a family member

3 Call 911

4 Go to the hospital

Q7. Based on what you know, what are the major causes of heart disease?

01 A family history of heart disease

02 Aging

03 Being overweight

04 Diabetes

05 Drinking alcohol

06 High blood pressure

07 High cholesterol

08 High triglycerides

09 Low levels of estrogen

10 Menopause

11 Not exercising

12 Smoking

13 Stress

14 Stroke

15 Your racial heritage

Section 5: Communication about Heart Disease (3 questions)

Q1. Do you have a health care professional who you see on a regular basis?

1. Yes

2. No

Q2. Have any of your doctors ever discussed the following with you when discussing your health?

1. High blood pressure
2. Cholesterol
3. Family history fo heart disease
4. Your risk for heart disease
5. Your risk for stroke
6. Weight
7. Stopping smoking
8. Appropriate heart healthy diet and nutrition
9. Exercise
10. None of these

Q3. Who have you talked to about your family's medical history as it relates to heart disease?

1. Have talked to
2. Have not talked to
3. Not applicable

1. My parent(s)
2. Siblings
3. Children
4. Other relatives

Section 6: Behaviors Associated With Prevention (4 questions)

Q1. Have you done any of the following things to monitor or improve your health in the last year?

1. Yes
2. No
3. N/A

1. Quit smoking
2. Get regular physical exercise
3. Take special vitamins like E, C or A
4. Lose weight
5. Reduce dietary cholesterol intake
6. Reduce stress
7. Take multivitamins with folic acid
8. Take hormone-replacement therapy

9. Reduce sodium or salt in the diet
10. Reduce animal products in my diet (such as meat, whole milk, butter and cream)
11. Aromatherapy
12. Take aspirin regularly
13. Maintain a healthy blood pressure
14. Maintain a healthy cholesterol level
15. Eat foods or take supplements that contain fish oil/Omega 3 fatty acids
16. Increase fiber intake
17. Eat foods containing antioxidants
18. Eat plant stanols and sterols
19. Floss my teeth regularly
20. Pray or meditate
21. Get adequate sleep
22. A doctor's visit
23. Reduce my sugar intake

Q2. Thinking about the things you have done to improve your own health, please tell us if any of the following prompted you to take action.

1 I saw, heard, or read information related to heart disease

2 My health care professional encouraged me to take action

3 A family member or relative encouraged me to take action

4 A friend encouraged me to take action

5 A family member/relative developed heart disease, got sick, or died

6 A friend developed heart disease, got sick or died

7 I experienced symptoms that i thought were related to heart disease

8 i wanted to feel better

9 I wanted to avoid taking medications

10 I wanted to improve my health

11 I wanted to live longer

12 I did it for my family

13 I was encouraged to take action during an event or program at my place of worship (church, mosque, or temple)

14 I was encouraged to take action during an event or program at my community center

15 something else

16 I have not done anything to improve my health

Q3. Thinking about the following activities, are you doing these more often, less often or about the same amount of time as you did one year ago?

1. More often

2. Less often

3. About the same

1. Getting at least 20-30 minutes of vigorous exercise daily where you are winded, that is you can still talk, but not sing.
2. Eating meals away from home at restaurants, fast food, quick serve, etc.
3. Cooking meals at home with fresh ingredients
4. Eating prepackaged boxed, refrigerated or frozen meals
5. Drinking sugar-sweetened beverages (i.e., non diet beverages)

Q4. Which of the following are the biggest barriers preventing you from leading a heart healthy lifestyle? (Select 5 options max)

1 I don't perceive myself to be at risk for heart disease

2 I don’t want to change my lifestyle

3 I don't think changing my behavior will reduce my risk of developing heart disease

4 I am fearful of change

5 I am not confident that I can successfully change my behavior

6 I am too stressed to do the things that need to be done

7 I am too depressed to do the things that need to be done

8 I am too ill/old to make changes

9 I don't have the money or insurance coverage to do what needs to be done

10 I have family obligations and other people to take care of

11 My family/friends have told me that i don't need to change

12 I don't have the time to take care of myself

13 My health care professional does not think i need to worry about heart disease

14 My health care professional does not speak my language

15 I am confused by what I am supposed to do to change my lifestyle

16 I feel the changes required are too complicated

17 I don't know what i should do

18 There is too much confusion in the media about what to do

19 My health care professional does not explain clearly what I should do

20 God or some higher power ultimately determines my health

21 Other

22 None of these, i lead a heart healthy lifestyle

Section 7: Custom Demographics (11 questions)

Q1 Which of the following currently live in your household?

1 Parents/in-laws

2 Siblings/in-laws

3 Grandparents/in-laws

4 Children under 18

5 Children over 18

6 Other relatives over 18

7 Other relatives under 18

8 None of the above

Q2. Do you currently care of a disabled, chronically ill, or aging family member?

1. Yes
2. No

Q3. In total, how many generations currently live in your household?

For example, if you live alone or only with a spouse or roommate, that would be one generation. If you live with your parents or children, that would be two generations. If you live with your parents and your children, that would be three generations.

Q4. Which of the following types of health insurance, if any, do you currently have?

1 health insurance provided by employer or school

2 health insurance through a family member's employer or school

3 Private insurance coverage that you pay for out-of-pocket

4 Medicare

5 Medicaid or other public insurance

6 Veteran's Affairs (VA)

7 Some other type of insurance

8 No insurance coverage

9 Don't know

10 Refused to answer

Q5. What is your current height?

Q6. What is your current weight?

Q7. In which category is your age?

1 18-24 years

2 25-34 years

3 35-44 years

4 45-64 years

5 65-74 years

6 75 years or older

Q8. What is the highest degree or level of education you have completed?

1 12th grade or less (no diploma)

2 High school diploma

3 Some college, no degree

4 Associate or technical degree

5 Bachelor's degree

6 Graduate degree/professional

Q9. Do you live in the city or in the suburbs?

1 Urban

2 Suburban

3 Rural

Q10. Are you a current/former smoker?

1 Yes

2 No

Q11. Which category best describe your annual income?

1 Less than $24,999

2 $25,000 to $49,999

3 $50,000 to 99,999

4 $100,000 or more

Q12. Are you…

1 Deaf/Hard of Hearing

2 Hearing

Thank you for your participation in this survey! We appreciate your time and thank you for your opinions.

Appendix C: Permission for AHA Women's Health Survey

Gmail by Google

Andy Tao <andy.tao@waldenu.edu>

Request for a copy of AHA National Survey

Karen Robb <Karen.Robb@heart.org> Thu, Jan 29, 2015 at 2:11 PM
To: Andy Tao <andy.tao@waldenu.edu>

Hi Andy

Nice to hear of your interest in the subject and willingness to explore more about women's CV health among your target population.

Attached is the 2012 survey instrument. If you do choose to use any information, please be sure to reference the American Heart Association. And if included and you are able to share any results, please send me a copy.

Best,

Karen

Karen Robb

Manager, Customer and Marketing Research

American Heart Association/American Stroke Association

Office: 214-706-1409, karen.robb@heart.org

From: Andy Tao [mailto:andy.tao@waldenu.edu]
Sent: Wednesday, January 28, 2015 8:54 AM
To: Karen Robb
Subject: Request for a copy of AHA National Survey

[Quoted text hidden]

41866 QNR_FINAL_publication.docx
72K

Appendix D: Permission for survey: Improving Access to Health and Mental Health Care for Deaf and Hard of Hearing Populations

https://mail.google.com/mail/u/0/?ui=2&ik=31ec5343cf&view=pt&q=helen.margellos@sinai.org&qs=true&search=query&msg=13e42e211932bf4f&siml=13e...

Gmail by Google

Andy Tao <andyktao@gmail.com>

CVD among culturally deaf patients.

Margellos, Helen <helen.margellos@sinai.org> Thu, Apr 25, 2013 at 4:28 PM
To: Andy Tao <andyktao@gmail.com>

Hi Andy,

It would be great if you decided to utilize our survey instrument and collect some information about the health status of Deaf persons living in the Washington D.C. area. In addition to the study you have read, there is an article summarizing the process of designing and implementing the survey that you might be interested in. You can find it on our website: http://www.suhichicago.org/files/publications/B.pdf

It will likely answer a lot of your questions regarding methodology, and if it doesn't, then there is also a detailed report you can look at: http://www.suhichicago.org/files/publications/C.pdf

I would be able to send you everything from the survey instrument itself, the ASL gloss version of the instrument (which we developed to train our interviewers on the intention of each question and how to ensure that each was asked consistently across interviews), our consent forms, data bases, etc. I would probably want to put it on a DVD and mail it to you, so you would need to let me know where to send it. Or I might be able to transfer it to you via DropBox if you know how to utilize that technology.

We would of course want you to keep us informed of your progress and to acknowledge us and our funders in any presentations of the work, etc. I can send you the exact statement we'd want you to use.

Let me know if you are still interested after you review the above documents and whether you have any additional questions for me.

I'm excited by this possibility to build on our work!

Helen

Helen Margellos-Anast, MPH

Appendix E: Letter of Cooperation from Gallaudet University's IRB

Gmail by Google

Andy Tao <andy.tao@waldenu.edu>

Andy Tao - IRB Review Request

Gallaudet irb <irb@gallaudet.edu> Thu, Oct 20, 2016 at 8:14 AM
To: Andy Tao <andy.tao@waldenu.edu>

Dear Mr. Tao,

Your IRB application for your project entitled "Knowledge, Perceived Barriers and Preventative Behaviors associated with Cardiovascular Disease Among Gallaudet University Employees" PJID# 2803 has been recommended for **expedited approval** by an IRB reviewer.

You may now begin your research project and use this email as proof of approval. Please keep the approval letter in your files, and remember to apply for an extension if you are not able to complete your project within one year.

Best wishes for a successful project.

Sincerely,

Liz Courtney
IRB Graduate Assistant
Gallaudet University
Fowler Hall, 202-A
800 Florida Avenue, NE
Washington, DC 20002

(202)250-2753(VP)
(202) 651-5295 (FAX)

[Quoted text hidden]

Appendix F: Letter of Cooperation from Walden University's IRB

Gmail by Google

Andy Tao <andy.tao@waldenu.edu>

IRB Approval Granted, Conditional upon Partner Approval - Andy Tao

IRB <irb@waldenu.edu> Wed, Sep 28, 2016 at 6:49 PM
To: "Andy Tao (andy.tao@waldenu.edu)" <andy.tao@waldenu.edu>
Cc: Diana Naser <diana.naser@waldenu.edu>

Dear Mr. Tao,

This email is to notify you that the Institutional Review Board (IRB) has approved your application for the study entitled, "Knowledge, perceived barriers and preventive behaviors associated with cardiovascular disease among Gallaudet University employees," conditional upon the approval of the research partner, as documented in the partner's signed notification of IRB approval or exemption (depending on their policies), which will need to be submitted to the Walden IRB when obtained. The researcher may not commence the study until the Walden IRB confirms receipt of that notification of IRB approval or exemption.

Your approval # is 09-28-16-0182018. You will need to reference this number in your dissertation and in any future funding or publication submissions. Also attached to this e-mail is the IRB approved consent form. Please note, if this is already in an on-line format, you will need to update that consent document to include the IRB approval number and expiration date.

Your IRB approval expires on September 27, 2017. One month before this expiration date, you will be sent a Continuing Review Form, which must be submitted if you wish to collect data beyond the approval expiration date.

Please note that this letter indicates that the IRB has approved your research. You may **NOT** begin the research phase of your doctoral study, however, until you have received official notification from the IRB to do so. Once you have received this notification by email, you may begin your data collection. Your IRB approval is contingent upon your adherence to the exact procedures described in the final version of the IRB application materials that have been submitted as of this date. This includes maintaining your current status with the university. Your IRB approval is only valid while you are an actively enrolled student at Walden University. If you need to take a leave of absence or are otherwise unable to remain actively enrolled, your IRB approval is suspended. Absolutely NO participant recruitment or data collection may occur while a student is not actively enrolled.

If you need to make any changes to your research staff or procedures, you must obtain IRB approval by submitting the IRB Request for Change in Procedures Form. You will receive confirmation with a status update of the request within 1 week of submitting the change request form and are not permitted to implement changes prior to receiving approval. Please note that Walden University does not accept responsibility or liability for research activities conducted without the IRB's approval, and the University will not accept or grant credit for student work that fails to comply with the policies and procedures related to ethical standards in research.

When you submitted your IRB application, you a made commitment to communicate both discrete adverse events and general problems to the IRB within 1 week of their occurrence/realization. Failure to do so may result in invalidation of data, loss of academic credit, and/or loss of legal protections otherwise available to the researcher.

Both the Adverse Event Reporting form and Request for Change in Procedures form can be obtained at the IRB section of the Walden website: http://academicguides.waldenu.edu/researchcenter/orec