The Physiological Factors Of Diabetes And Their Effect On The Cognitive And Emotional Functioning In Older Populations: A Secondary Data Analysis

Celeste Anahi Alvidrez
University of Texas at El Paso

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THE PHYSIOLOGICAL FACTORS OF DIABETES AND THEIR EFFECT ON THE 
COGNITIVE AND EMOTIONAL FUNCTIONING IN OLDER POPULATIONS: A 
SECONDARY DATA ANALYSIS

CELESTE ANAHI ALVIDREZ

Master’s Program in Public Health

APPROVED:

________________________________________
Christina Sobin, Ph.D., Chair

________________________________________
Maria O. Duarte-Gardea, Ph.D.

________________________________________
Gregory S. Schober, Ph.D.

________________________________________
Stephen L. Crites, Jr., Ph.D.
Dean of the Graduate School
DEDICATION

Thank you to my Husband, for making everything possible. For his enduring love, believing in me long after I'd lost belief in myself, and for supporting my passion to reach this goal in life.

To my child, for blessing me when I needed you the most. Mommy loves you and wants you to know that anything in life is possible.

To my parents for supporting me through all the valleys and mountain peaks in life. Your love is unconditional, always.

In loving memory of my grandma, who couldn’t be here but is always in my heart.
THE PHYSIOLOGICAL FACTORS OF DIABETES AND THEIR EFFECT ON THE
COGNITIVE AND EMOTIONAL FUNCTIONING IN OLDER POPULATIONS: A
SECONDARY DATA ANALYSIS

by

CELESTE ANAHI ALVIDREZ, B.S., CHES®

THESIS

Presented to the faculty of the Graduate School of
The University of Texas at El Paso
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of the Requirements
for the Degree of

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ABSTRACT

**Background:** The rates of Type 2 Diabetes (T2D) have increased over the past 20 years in all age groups. The physiological factors that underlie T2D could have impact on specific brain pathways that support cognitive and emotional functioning.  

**Aims and Objective:** The goal of this study was to examine whether older Mexican American individuals with a history of T2D were more likely to develop later cognitive impairment and/or depression.  

**Hypotheses:** It was predicted that elderly participants (mean age at time of interview = 87.87 years) with a history of T2D onset prior to age 65, are more likely to have dementia-related symptoms and/or symptoms of depression, as compared to elderly participants with no earlier history of T2D. Specifically, respondents with T2D were predicted to have greater likelihood of diagnosed dementia (yes/no); lower (worse) Total Mini-Mental Status Examination scores; and higher depression rating scale scores.  

**Methods:** The hypotheses were tested using respondent data from the *Hispanic Established Populations for the Epidemiologic Study of the Elderly (HEPESE)* Wave 8, 2012-2013 [Arizona, California, Colorado, New Mexico, and Texas] (ICPSR 36578). The original Wave 8 dataset included 744 respondents; N = 506 had data points needed for the proposed analyses. The mean age of Wave 8 respondents included for analysis was 87.87 years. The analyzed sample was 65.6% female; 29.8% had a T2D diagnosis; and 19.8% had a formal diagnosis of Alzheimer’s or Dementia. Descriptive statistics were calculated for all variables. Hypotheses involving categorical variables were tested using Chi-Square tests. For continuous variables, distribution analyses (N, standard deviation, variance, skewness) were examined and data were analyzed using two-way ANOVAs.  

**Results:** Chi-square tests were not significant. The frequency of dementia diagnoses among respondents with early or any T2D, were not significantly increased as compared to respondents without early T2D or any T2D. Overall, the
ANOVA results were also not significant but revealed some interesting trends. Regarding mental function scores, the overall model predicting MMSE scores from T2D, sex, and the interaction, was statistically significant, but none of the individual factors were significant. When the direction of effects was examined, it was opposite to the original prediction. Respondents with T2D had higher rather than lower mental function scores, as compared to those without T2D. Regarding ratings for reported depression, the overall model was significant, and the tests of individual factors showed that this was attributable to higher levels of depression symptoms reported by females as compared to males. **Conclusions:** Despite using all the available respondents for these exploratory secondary data analyses, small sub-group sizes limited the statistical power to detect possible effects. Nonetheless, the findings suggested that a T2D diagnosis may yield protective effects for the brain, perhaps due to T2D medication effects, and/or healthier lifestyle and dietary recommendations usually given to those with a T2D diagnosis. As compared to elderly males, elderly females with earlier T2D reported significantly more depression than males. While largely not significant, the findings suggested several novel directions for future research. Studies are needed to determine whether increased mental function among T2D participants may be attributable to medication use or lifestyle changes. Recent studies have suggested that Metformin, a common treatment for T2D, is directly and indirectly anti-inflammatory. Further studies are needed to understand whether the increased MMSE scores among T2D participants in this study could be attributable to the medications prescribed, and or lifestyle and dietary changes typically recommended, including increased exercise and reduced sugar intake. Additional studies are also needed to determine whether female T2D participants are uniquely vulnerable to depressive symptoms. As life expectancy continues to increase, it may be important to develop standards that aid in appropriately diagnosing, treating, and
managing symptoms of Type 2 Diabetes (T2D), in an effort to help lower the risk for developing Alzheimer’s Disease/Dementia in later life. Further research is needed to explore the connection between these disorders, specifically in Hispanic populations.
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CHAPTER 1: INTRODUCTION

Across the globe, it is estimated that roughly 422 million people are living with diabetes (WHO, 2020). In the United States alone, more than 34 million Americans have diabetes (about 1 in 10 people), and around 90-95% of those have type 2 diabetes (CDC, 2019). Primarily, there is a high prevalence of Type 2 Diabetes specifically in Hispanics living in the United States. According to the National Diabetes Statistics Report, (NDSR, 2020), the prevalence of diagnosed diabetes in the United States is as follows: American Indians/Alaska Natives (14.7%), people of Hispanic origin (12.5%), non-Hispanic blacks (11.7%), non-Hispanic Asians (9.2%) and non-Hispanic whites (7.5%). With Hispanics accounting for 23% of the US population, there is a definite overburden of Type 2 Diabetes within this demographic (CDC, 2019). Age adjusted data for 2017-2018 in the NDSR shows that in US adults aged 18 years or older, non-Hispanic blacks and people of Hispanic origin had a higher incidence of diagnosed diabetes as compared to non-Hispanic whites.

1.1 PREVALENCE OF DIABETES

The prevalence of diabetes has seen an increasing trend in adults in the United States. Data collected from the National Health and Nutrition Examination Survey (NHANES) through the years 1999 – 2016 shows that there was an increase in the estimated prevalence of diabetes in adults aged 18 years or older in the United States (National Diabetes Statistics Report, 2020). The National Diabetes Statistics Report (2020) also reported that there are roughly 24.2 million people aged 65 years or older who have prediabetes. The NHANES data collected in 1999 – 2002 shows that there was about 9.5 percent of adults living with diabetes in the U.S. The NHANES data from the years 2009 – 2012, also showed time showed that there were roughly 11.3 percent of adults living with diabetes in the U.S. In the decade from 1999 to 2012 alone,
NHANES data showed that there was a 1.8 percent increase in the prevalence of diabetes in adults. When looking at the NHANES data from 2013-2016, there were a total of 12 percent of adults living with diabetes. This is a 0.7 percent increase from the data collected from 2009 – 2012 and a 2.5 increase from the data collected from 1999 – 2002.

1.2 INCIDENCE OF DEMENTIA

It is well known that the incidence of dementia increases with advancing age. Because people are living longer life expectancies than previously before, the number of adults with dementia is expected to increase 3-fold by 2050 (Martin Prince, Renata Bryce, Emiliano Albanese, Anders Wimo, Wagner Ribeiro, Cleusa P. Ferri, 2013). Although this is the case, currently the prevalence of dementia has decreased overall in the United States from the year 2000 to 2012 (Langa KM, Larson EB, Crimmins EM, et al., 2017). After analysis of a large nationally representative survey, Langa KM, Larson EB, Crimmins EM, et al. found that the prevalence of dementia in adults aged 65 years or older had decreased from 11.6% in 2000 to 8.8% in 2012. While this temporary trend was promising, it is worth noting that as the number of older Americans continues to increase, the number of existing cases will continue to increase just as rapidly. According to the Alzheimer’s association, by 2050, there will be a projected 12.7 million people aged 65 years or older with Alzheimer’s dementia alone (2021). Furthermore, the severity of morbidity should not be overlooked. The Alzheimer’s association states that 1 in 3 seniors dies with Alzheimer’s or other dementias, which is more than breast and prostate cancer combined (2021). With the rapid increase in life expectancy and the projected increase of dementia, there is an urgent need for research to help prevent, slow, and/or cure this disease.
CHAPTER 2: BACKGROUND AND SIGNIFICANCE

2.1 TYPE 2 DIABETES (T2D) AND DEMENTIA AMONG MEXICAN AMERICANS/HISPANICS IN EL PASO, TX

While not always discussed together, it is perhaps not a coincidence that Type 2 diabetes (T2D) and dementia have become common in a growing proportion of the population, especially among older Mexican American individuals living in the El Paso Border Region where the population is 82.9% Hispanic (Census, 2018). As will be discussed in detail below, T2D and dementia share some key physiological mechanisms. According to the 2018 U.S. Census, of a total population of 840,758 people, about 15% of adults aged 18 years and older in El Paso, Texas had diabetes. In 2017, the Centers for Medicare and Medicaid Services also reported that about 32.7% of the Medicare beneficiaries in El Paso, Texas were treated for diabetes. Compared to the national U.S. average of 27.2% and the Texas value of 29.1%, it is clear to see that more needs to be done to reduce the prevalence of diabetes among Medicare recipients in El Paso, Texas. It is important to note that about 27.7% of the population aged 65 years and older reported being told they have diabetes by a health professional (CDC, Behavioral Risk Factor Surveillance System, 2017). The Centers for Medicare and Medicaid services also reported that about 12.7% of Medicare beneficiaries were treated for Alzheimer’s disease or dementia in El Paso, Texas (2018).

2.2 PHYSIOLOGY OF T2D AND COGNITIVE DECLINE

Some research has begun to suggest that T2D may actually predispose some participants to cognitive decline. As many have pointed out, this possible association is biologically plausible.
Type 2 diabetes is a chronic disease in which cells do not respond to insulin, a hormone produced by the pancreas. This is otherwise known as insulin resistance (CDC, 2019). Insulin resistance causes there to be too much glucose in the blood rather than in the appropriate cells (NIDDK, 2016). Uncontrolled levels of blood glucose can lead to serious complications such as heart disease, stroke, vision loss, dental disease, and nerve damage (NIDDK, 2016). The World Health Organization attributes diabetes as a “major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation” (2020). Not only is Type 2 diabetes costly on its own, but there are also furthermore physical and mental repercussions that are the consequence of unmanaged diabetes such as dementia.

2.3 THE EFFECTS OF INSULIN RESISTANCE AND HYPERINSULINEMIA ON BRAIN FUNCTION

Although type 2 diabetes mellitus can develop at any age, it is most often developed in people who are over the age of 45 (CDC, 2019). This is a serious concern as it increases the risk of mortality, reduced functional status and institutionalization in older adults, typically over the age of 65 (Kirkman et al., 2012). Both aging and diabetes are known to be risk factors for functional impairment but more importantly, for cognitive dysfunction (Kirkman et al., 2012). This is primarily due to the presence of insulin resistance and hyperinsulinemia. Insulin resistance and hyperinsulinemia, both of which are associated with type 2 diabetes, are major risk factors for dementia, regardless of cerebrovascular disease (Felice, Lourenco, & Ferreira, 2014).

According to Banks et al. (1997), insulin is a peptide that is secreted by pancreatic beta cells. They are then transported into the central nervous system (CNS) across the blood brain barrier through a receptor mediated process. These insulin receptors are abundantly found in
astrocyte and neuron synapses which are then moved into different portions of the brain. Specifically, they are transported to the olfactory bulb, cerebral cortex, hippocampus, hypothalamus, amygdala, and septum (Cholerton, B., Baker, L. D., & Craft, S., 2013).

Insulin is known to influence cognition and memory through the induction of “long term potentiation,” which is one of the cellular bases for memory function and formation. High levels of circulating insulin have adverse effects on memory and cognitive function. According to Cholerton, Baker and Craft, “prolonged peripheral hyperinsulinemia down-regulates insulin receptors at the blood-brain barrier and reduces insulin transport into the brain” (2013). This action then results in high levels of insulin which can substantially damage muscle, liver, adipose, endothelium, and brain tissue, because overtime, these tissues become unresponsive to insulin. In normal function, the pancreas can physiologically compensate by generating the needed amount of insulin to help maintain glucose at appropriate levels. Because of this process, the development of cognitive disfunction and memory loss is attributable to years and decades of abnormally high levels of insulin (Xu et al., 2009).

Studies indicated that there was a positive correlation between diabetes and cognitive impairment, indicating that those with diabetes mellitus are at a higher risk of developing dementia or Alzheimer’s disease. A prospective analysis of 5,099 participants from the Atherosclerosis Risk in Communities (ARIC) study conducted in 2011-2013 discovered that diabetes status such as poor glycemic control and diabetes duration was associated with worse cognitive health outcomes (Rawlings et al., 2019). Specifically, the study identified that midlife onset of diabetes was a strong risk factor for dementia as compared to late-life onset. In a separate analysis of the ARIC study, glucose peaks in participants with diabetes were also identified as a risk factor for cognitive decline and dementia (Rawlings et al., 2017). A meta-
analysis carried out by Chatterjee et al. looked at possible differences between women and men with type 2 diabetes and the risk for dementia (2016). Although individuals with type 2 diabetes were at a 60% greater risk for developing dementia, the risk for vascular dementia was 120% higher in women with type 2 diabetes.

For many reasons, there is a great need for research that further explores the connection between these disorders. As life expectancy continues to increase, it will be important to develop standards that aid in appropriately diagnosing, treating, and managing symptoms of T2D, in an effort to help lower the risk for developing dementia in later life. For example, it is important to examine whether socio-demographic or health metrics (e.g., bmi, blood pressure, blood glucose, etc.) predispose older adults with T2D to dementia. It is also important to determine whether particular signs and symptoms of type 2 diabetes may increase the potential of developing dementia, specifically among older individuals with T2D.

2.4 T2D AND DEMENTIA U.S.-MEXICO BORDER HEALTH

As stated above, 32.7% of the Medicare beneficiaries were treated for diabetes and 12.7% of Medicare beneficiaries were treated for Alzheimer’s disease or dementia in El Paso, Texas. The data currently available however reports the incidences for these diseases separately. It is critical to determine the extent to which T2D might be predictive of dementias in this the border region population and more importantly, whether certain demographic or clinical characteristics distinguish those participants who go on to develop dementia following an earlier diagnosis of T2D. If such characteristics can be identified, this could define a subgroup of T2D participants for interventions specifically educate the participants on their higher risk of dementia. It is also possible that understanding their increased risk of later-life dementia could provide increased
motivation for T2D participants to make life-style changes aimed at resolving T2D before it progresses to a more severe form of the disease.
CHAPTER 3: RESEARCH PURPOSE

There central aim of this research is to determine whether older Mexican American individuals with a history of type 2 diabetes (T2D) who later developed cognitive decline, differ in quantitatively identifiable ways as compared to those with earlier T2D who did not go on to experience subsequent cognitive decline. Different variables will be examined for all participants and compared across participants who did and did not develop T2D. The variables will include T2D diagnosis (yes/no), age when diagnosed with T2D (pre-age 65, post-age 65, Never diagnosed), diagnosed Alzheimer’s Disease/Dementia, cognitive ability (Total MMSE Score), emotional functioning (CES-D score). Additionally, differences in gender (male/female) will also be examined to determine if there are significant differences between the two that might have any identifiable influence on these outcomes.
CHAPTER 4: STUDY AIM AND HYPOTHESES

4.1 SPECIFIC AIM

Aim 1: The aim of this study was to examine whether older Mexican American individuals with a history of T2D were more likely to develop later cognitive impairment and/or depression.

4.2 HYPOTHESIS

It is hypothesized that elderly participants (mean age at time of interview = 87.87 years) with a history of T2D onset prior to age 65, are more likely to have dementia-related symptoms and/or symptoms of depression, as compared to elderly participants with no earlier history of T2D. Specifically, respondents with T2D were predicted to have greater likelihood of diagnosed dementia (yes/no); lower (worse) Total Mini-Mental Status Examination scores; and higher depression rating scale scores.
CHAPTER 5: MPH PROGRAM FOUNDATIONAL COMPETENCIES

The following foundational competencies were applied throughout this research:

A. Evidence-based Approaches to Public Health

1. Apply epidemiological methods to the breadth of settings and situations in public health practice.

5. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming, and software, as appropriate.

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

C. Planning & Management to Promote Health

7. Assess population needs, assets and capacities that affect communities’ health.

D. Policy in Public Health

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

14. Advocate for political, social, or economic policies and programs that will improve health in diverse populations.

E. Leadership

F. Communication

18. Select communication strategies for different audiences and sectors.

19. Communicate audience-appropriate public health content, both in writing and through oral presentation.

H. Systems Thinking
CHAPTER 6: METHODS

6.1 SECONDARY DATA ANALYSIS

For this study, secondary data will be used to examine whether a participant's T2D diagnosis, may distinguish those older adults who went on to develop dementia. The data to be analyzed in this study was taken from the series of studies entitled “Hispanic Established Populations for the Epidemiologic Studies of the Elderly (Hispanic EPESE)”. HEPSE Wave 8, the specific series used in these analyses, is a part of the Hispanic EPESE longitudinal study series. This longitudinal study carried out its first wave from 1993 to 1994. The HEPSE Wave 8 was the last set of data from the series which collected its’ data from 2012-2013. The data collected from this series of studies was modeled after the design of the Established Populations For Epidemiologic Studies Of The Elderly, 1981-1993: [East Boston, Massachusetts, Iowa And Washington Counties, Iowa, New Haven, Connecticut, And North Central North Carolina] (Icpsr 9915) and Established Populations For Epidemiologic Studies Of The Elderly, 1996-1997: Piedmont Health Survey Of The Elderly, Fourth In-Person Survey [Durham, Warren, Vance, Granville, And Franklin Counties, North Carolina] (Icpsr 2744).

The dataset was established by utilizing the Inter-university Consortium for Political and Social Research (ICPSR) database. To select and appropriate study to analyze, a general text search for “diabetes dementia” in the “Search Data and Site” toolbar was made. A total of 206 search results were displayed and then filtered for applicability to the research question. The dataset had to include Hispanic respondents over 65 years of age, be a longitudinal study and must include data on diagnosed diabetes and dementia. The data set was then selected and inspected for suitable variables that could be applied to the research question.
In the sample, n=479 participants were female, and n=265 participants were male, for a total of n=744 participants. The age range of participants at the last survey timepoint was 82 to 103 years of age. The total number of respondents who self-reported a diabetes diagnosis consisted of n=248 people in the sample, including 166 females and 82 males. The total number of participants who had Alzheimer’s Disease/Dementia was n=213, which includes 137 females and 76 males.

6.2 ACCESS TO DATA

This dataset was available for public access through the National Archive of Computerized Data on Aging (NACDA). In order to gain access to the complete dataset, one must agree to the terms of use listed by NACDA. Once a user agrees to the terms of use, a MyData count must be created. This will allow the user download data, use online analysis tools, generate reports, and download statistics. The download will then begin once sign up or sign in has been completed. A codebook, which detailed the study, was available by gaining access to the original dataset when the study was first carried out from 1993-1994. No further requests were needed for access to this publicly available dataset.

6.3 DATA PLAN

Variables were reviewed from the dataset for applicability to the research question. There was a total of 313 variables included in the dataset. Some of the variables were additionally created by the original researchers to help calculate total scores for specific sections of the questionnaire which was required for complete analysis. The variables that were primarily selected were related to both diabetes and dementia.
6.3.1 DIABETES

For diabetes, the following variables the following were selected for analysis:

1. **Factor:** Diagnosed Diabetes

   **Variable name in database:** MDIAB81

   **Determined by:** Self-report (“Have you ever been told by a doctor that you have diabetes…”)

   **Scale:** Nominal/Dichotomous – 1=”Yes, 2=”No”

2. **Factor:** Diagnosed Diabetes Age

   **Variable name in database:** MDIAB82

   **Determined by:** Self-report (“At what age did a doctor first tell you that you have diabetes?”)

   **Scale:** Continuous/Numeric – Measured in years to 2 decimal places

When looking at diabetes, the main variable utilized for this analysis is diagnosed diabetes (MDIAB81) (yes/no). This variable will be used to analyze any differences in those who have diabetes versus those who do not have diabetes. Of 744 valid responses, 248 responded that they have been told by a doctor that they have diabetes. Another factor that will be observed for diabetes is age when diagnosed with diabetes. This will allow for analysis on whether age when diagnosed with diabetes changes the risk for developing dementia. 200 respondents provided an age of when they were diagnosed with diabetes. Ages will be grouped into three groups; 1) T2D pre-age 65, 2) T2D post-age 65, and 3) No T2D. This was established to better visualize age when diagnosed with T2D and to aid in analyses.
6.3.2 DEMENTIA

For the variable dementia, the following were selected for analysis:

1. **Factor:** Cognitive Ability (Total MMSE Score)

   **Variable name in database:** TOTMMSE8 (Testing done on the same day current age was recorded)

   **Determined by:** Cognitive test/Mini-Mental Status examination

   **Scale:** Total score on test (Range (0-30), Mean 19.9, Std. 7.8 (n=665)

2. **Factor:** Diagnosed Dementia

   **Variable name in database:** U83U

   **Determined by:** Self-report (“Have you ever been told by a doctor that you have Alzheimer’s Disease/Dementia?”)

   **Scale:** Nominal– 1=“Yes, 2=”No”, 8=”Don’t know”

For Dementia, one of the variables for this analysis is total Mini Mental State Examination (MMSE) Score (TOTMMSE8), which is used to determine cognitive ability of the participant. This variable will be used to analyze any differences in those who have poor cognitive scores versus those who do not have poor cognitive scores on the MMSE. The variable was recoded to create a new variable “Dementia Status” that differentiated the score of each participant to indicate dementia status. Of 744 valid responses, 97 participants scores indicated “Normal Cognition” (25-30 points), 165 participant scores indicated “Mild Dementia” (24-21 points), 213 participant scores indicated “Moderate Dementia” (20-10 points), and 97 participants scored indicated “Severe Dementia” (9-0 points). For the variable diagnosed dementia (U83U), out of 744 valid responses, 213 participants reported being told by a doctor that they
have Alzheimer's Disease/Dementia, while 522 participants responded that they have never been
told by a doctor that they have Alzheimer's Disease/Dementia.

6.3.3 OTHER VARIABLES

The following have been identified as supporting variables for the purposes of this
analysis which includes variables not limited to diabetes and dementia:

1. **Factor:** Chronological Age

   **Variable name in database:** AGE8

   **Determined by:** Self-report

   **Scale:** Continuous/Numeric - Measured in years to 3 decimal places

2. **Factor:** Sex/Gender

   **Variable name in database:** SEX8

   **Determined by:** Self-report

   **Scale:** Nominal/Dichotomous – 1=”Male”, 2=”Female”

3. **Factor:** History of brain stroke/hemorrhage

   **Variable name in database:** JSTROK81

   **Determined by:** Self-report

   **Scale:** Nominal – 1=”Yes”, 2=”No”, 8= Don’t know”

   **Scale:** Ordinal – (0) Rarely/None, (1) Some/Little, (2)

   Occasionally/Moderate, (3) Most/All
6.4 SAMPLE UNIVERSE

The geographical area of interest in this longitudinal study was the 5 southern states on the United States-Mexico border. These include Arizona, California, Colorado, New Mexico, and Texas. The purpose of the Hispanic EPESE series was to determine the prevalence of physical, mental, and functional impairments in older Mexican Americans 65 years or older. The intent of the study was to compare the estimates to other populations to determine the occurrence of these conditions in older Mexican American populations. In particular, the researchers’ purpose was to identify if certain risk factors for mortality and morbidity operate differently in Mexican Americans than in non-Hispanic White Americans, African Americans, and other major ethnic groups. To do so, they collected demographic characteristics (age, sex, type of Hispanic race, income, education, marital status, number of children, employment, and religion), height, weight, social and physical functioning, chronic conditions, related health problems, and health habits. As well, self-reported use of dental, hospital, and nursing home services, along with self-reported depression was also collected.

6.5 QUALITY OF DATA

The data collected for the purposes of the Hispanic EPESE were completed using survey questionnaires. Harris Interactive Inc., a contract agency, was responsible for hiring and training interviewers to do the majority of the field work such as, completing interviews, and obtain physical measurements of participants. Interviews were carried out in the preferred language of the respondents: English or Spanish. The data consisted of a combination of clinical and survey data. Primarily, interviews were conducted in person at the respondent’s residence. During these interview sessions, questionnaires and physical assessments were conducted at each visit. Physical assessments included the collection of:
• Blood pressure measurement at baseline and at first follow up interview
• Performance-based assessments of physical functioning
• Height and weight measures
• Waist and hip measures
• Vision assessment
• Medication use

The HEPESE 8th wave (2012-2013), was the eighth and final visit in this longitudinal study. Because of the nature of this study, these interviews were repeated over the course of eight times. A mini mental exam was also given to assess the mental capabilities of each respondent. As well, CES-D, a depression screen, was utilized to help collect data regarding respondent’s mental health status regarding depression. Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs) was also assessed in addition to the general demographics collected.

The content of the survey (Appendix 1) itself is broken down to collect data through the utilization of the following categories:

A. **Demographic characteristics**

1a. Age
2a. Marital Status
3a. Education
4a. Annual Income
5a. Work and Retirement Status
6a. Occupation
7a. Language of Interview
8a. Immigrant Status

B. Social functioning

1b. Household Composition (Living Arrangements)

2b. Number of Children

3b. Religion

4b. Non-religious Group Membership

5b. People One (Self) Can Count On

C. Physical functioning

1c. Activities of Daily Living (ADL) - basic mobility and neurological activities required for community living.

2c. Instrumental Activities of Daily Living - identifies elderly individuals who are having difficulty performing important activities of living and as such may be at risk for loss of independence in a community setting.

3c. Performance-Based Measures – measures objectively used to evaluate mobility, strength, gait, and balance, and may predict transitions from a non-disabled state to a disabled state in older persons.

4c. Sensory Impairment - vision and hearing impairments that can adversely influence daily functioning and are associated with ADL disability and performance-based functional decline.

D. Chronic conditions

1d. Diabetes

2d. Hypertension

3d. Cancer
4d. Hip and Bone Fractures

5d. Heart Attack

6d. Stroke

7d. Arthritis

8d. Gallbladder Disease

9d. Multiple Medical Conditions (Comorbid Chronic Conditions)

E. Related health problems

1e. Height and Weight

2e. Control of Urination

3e. Depressive Symptoms

4e. Mental Status - Mini-Mental State Examination (MMSE) used to assess cognitive function.

5e. Sleep Problems

F. Health habits

1f. Cigarette Smoking

2f. Alcohol Use

G. Self-reported health services utilization

1g. Type of Insurance

2g. Hospitalization

3g. Dental Services

H. Chronic and acute stressors
1h. Life Events - death of someone close, personal illness or injury, illness of close relative or friend, and worsening financial situation, having been the victim of crime, becoming a caregiver, and having a spouse hospitalized.

2h. Chronic Economic strains - not having enough money to afford food, medical care, or bills.

6.6 SAMPLING STRATEGY UTILIZED IN HEPESE STUDY

The initial baseline sample was determined in the summer of 1993. The first of the initial interviews began in August of 1993 and were completed by June 1994. Harris Interactive, Incorporated. Dr. Marty Frankel, statistical consultant for Harris Interactive, developed the sampling design. Specifically, by listing counties of the Southwestern states by rank by the number of older Mexican Americans, the area probability sample design to be used was developed.

The sample population in this series was selected through the use of multistage, stratified and probability sampling. Firstly, universe counties were ranked in each state from Census Bureau figures on the basis of the greatest number of Mexican American elderly, 65 years or older, residing in the area. To help determine this, a cut off number was established where counties with ninety percent of the Mexican Americans were included in the study universe. They also included any county below the cutoff with more than 60 percent of the population being Mexican American elderly. The study then selected three hundred census tracts from 1990 that met inclusion criteria and were the primary sampling units (PSU’s). A list was then compiled to determine a cumulative total of households in each tract, which amounted to a minimum of four hundred households per unit. Listings were then developed for each housing unit and mapped for interviewing purposes.
Interviewers were able to identify and screen 175 households per sampling unit and was completed in two phases. Ultimately, the total number of eligible respondents from the selected 30,000 households helped to determine the size needed for phase two. Interviewers identified interview eligible respondents for phase one and were able to contact the first 100 housing units, then in a second phase, an additional 75 contacts (households) were made. To complete interviews, up to four attempts were made to contact each household. Letters were left behind at households where no one was home to inform them of their visit. When a respondent was identified, up to four additional attempts were made to complete the full interview but allowed up to a fifth visit in instances that met exemptions. If an interview was attempted but a household member refused, a separate interviewer may visit again the next day to attempt to gain another household for interviewing purposes.

A total of 3,050 home interviews were conducted with subjects who were Mexican or Mexican American origin. They were identified as applicable interviewees through the use of the U.S. Census procedures and the Hazuda algorithm for identifying Mexican Americans. For this specific EPESE, the 83% response rate is said to be better than that of other EPESE surveys which required adjustments for design effects due to the complex sample design. Trained interviewers interviewed and examined subjects in the respondents’ own homes. All interviewers were specifically trained by a third party, Harris Interactive, but were also trained through medical personnel, and by Hispanic EPESE investigators. Training was provided for blood pressure measurement, performance-based assessments of physical functioning, height and weight, waist and hip, vision assessment, medication use, and other measures.

Sample weighting was post-stratified for Mexican Americans 65 years and over at the state level. The first step of sample weighting was to utilize weights that were “inversely
proportional to the probability of selection at the household level within the tract.” The initial weight (SW1i) was created using the following parameters:

\[ \frac{HHi}{MA65i} \times \frac{SCHH1}{175} \times Ki \]

The summation of the initial weight for all subjects in all PSU’s (SW1ij) equaled 5794.726. The constant (K) was then solved with the equation:

\[ K = \frac{3050 \text{ (the sample size)}}{5794.726 \text{ (SW1ij)}} \]

Using the above information, the first stage weights (W1) were calculated. The formula for (W1) was K multiplied by the initial weights (SW1i) : W1=SW1i x K.

Descriptive statistics and crosstabulations by gender and state were created from the first stage weights (W1) in SAS. Ultimately, the ratio for each state and gender (census/sample) was computed and multiplied by sample size, then divided by the census size. In total, ten ratios (L) were applied to each state and gender separately. Furthermore, to calculate final weights (FW), or post-stratification, the first stage weights (W1) were multiplied by the ten ratios (L) using the following formula: FW=Wi x L. This process helps to ensure the weighted sample proportional distribution is equal to the states. As well, inflation rates were calculated to be able to appropriately compare the sample results to the sample of the Southwest. To obtain these weights, stage weight (W1) was multiplied by the census total 498,176 and by the ten ratios (L), then divided the total sample size (3,050). The equation was as follows: IW = (W1*498,176*L)/3050.
6.7 STATISTICAL ANALYSES

Because this data is publicly available for download, this study will make use of statistical software package to develop descriptive analysis of the HEPESE Wave 8 dataset. IBM® SPSS® Statistics software will be used as a general tool to quickly analyze the variables, create cross tabulations, create new variables, and generate counts. Once completed, SPSS will be used to carry out the main statistical analysis and for the purposes of statistical modeling in order

The hypotheses were tested using respondent data from the Hispanic Established Populations for the Epidemiologic Study of the Elderly (HEPESE) Wave 8, 2012-2013 [Arizona, California, Colorado, New Mexico, and Texas] (ICPSR 36578). The original Wave 8 dataset included 744 respondents; N = 506 had data points needed for the proposed analyses. These were determined by filtering out to only include those with valid MMSE scores, CES-D scores, and those that answered whether they had a T2D diagnosis (yes or no), and an Alzheimer’s disease/Dementia diagnosis (yes or no). The mean age of Wave 8 respondents included for analysis was 87.87 years. The analyzed sample was 65.6% female; 29.8% had a T2D diagnosis; and 19.8% had a formal diagnosis of Alzheimer’s or Dementia. Descriptive statistics were calculated for all variables. Hypotheses involving categorical variables were tested using Chi-Square tests. For continuous variables, distribution analyses (N, standard deviation, variance, skewness) were examined and data were analyzed using two-way ANOVAs.
CHAPTER 7: RESULTS

The physiological effects of T2D as reviewed in the Introduction might be expected to impact brain functions over time. Using pre-existing data from HEPESE, Wave 8, this study examined whether early diagnosis of T2D (before an age of 65) predicted increased risk of later diagnosed dementia, cognitive decline, and/or depressive symptomatology. Tests were also run examining whether diagnosis of T2D at any age predicted increased risk of diagnosed dementia, cognitive decline, and/or depressive symptomatology. For these exploratory secondary data analyses, all subjects meeting study criteria were used. The dataset included 174 males and 332 females (N = 506) determined to have no history of stroke and/or brain hemorrhage. (N = 29 subjects were excluded from the original dataset of N = 535 due to past reported history of stroke/hemorrhage.)

7.1 DESCRIPTIVE ANALYSIS

Descriptive analyses were performed to understand the characteristics of the sample, and thus to whom the results might apply. Table 1 shows the frequency/counts for respondents by sex, T2D diagnosis status, and Alzheimer’s/Dementia diagnosis status. For the purposes of this analysis, participants were split into 3 groups based on respondents’ ages when diagnosed with T2D. These included No T2D diagnosis; T2D before age 65; and T2D after age 65. Out of 506 cases, 355 (70.2%) of participants did not have a T2D diagnosis; 46 (9.1%) were diagnosed with T2D before age 65, and 105 (20.8%) were diagnosed with T2D after age 65. Thus, as shown in Table 1 below, approximately 30% had a formal diagnosis of T2D at some point in their lives, and approximately 20% of the sample had a formal diagnosis of Alzheimer’s/Dementia. The sample included more females (65.6%) than males (34.5).
Table 1. Frequency table for categorial variables

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>174</td>
<td>34.4</td>
<td>34.4</td>
<td>34.4</td>
</tr>
<tr>
<td>Female</td>
<td>332</td>
<td>65.6</td>
<td>65.6</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>T2D Diagnosis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No T2D</td>
<td>355</td>
<td>70.2</td>
<td>70.2</td>
<td>70.2</td>
</tr>
<tr>
<td>T2D &lt; age 65</td>
<td>46</td>
<td>9.1</td>
<td>9.1</td>
<td>79.2</td>
</tr>
<tr>
<td>T2D ≥ age 65</td>
<td>105</td>
<td>20.8</td>
<td>20.8</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Alzheimer’s/Dementia Diagnosis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>105</td>
<td>20.8</td>
<td>20.8</td>
<td>20.8</td>
</tr>
<tr>
<td>No</td>
<td>401</td>
<td>79.2</td>
<td>79.2</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 2 below shows the frequencies and counts for all continuous variables. The group sample sizes were sufficient to proceed with the analyses. To determine if the continuous variables met assumptions for planned parametric analyses (ANOVA), skewness and kurtosis were considered.

Table 2. Descriptive statistics for continuous variables

<table>
<thead>
<tr>
<th></th>
<th>Interview Age</th>
<th>T2D Age Dx</th>
<th>Total MMSE</th>
<th>Total CESD</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Valid</td>
<td>506</td>
<td>506</td>
<td>506</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>355</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>87.87</td>
<td>67.72</td>
<td>20.99</td>
<td>12.35</td>
</tr>
<tr>
<td>Median</td>
<td>87.00</td>
<td>70.00</td>
<td>21.00</td>
<td>10.00</td>
</tr>
<tr>
<td>Mode</td>
<td>87</td>
<td>70</td>
<td>30</td>
<td>8</td>
</tr>
<tr>
<td>Range</td>
<td>21</td>
<td>71</td>
<td>28</td>
<td>49</td>
</tr>
<tr>
<td>Minimum</td>
<td>82</td>
<td>20</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Maximum</td>
<td>103</td>
<td>91</td>
<td>30</td>
<td>51</td>
</tr>
</tbody>
</table>

Table 3 and Figures 1 and 2 show the distributions for each of the continuous variables used in the analyses. Of 506 participants, the youngest participant at the time of interview for Wave 8 of this study, was 82 years old while the oldest was 103 years old. The distribution shows that the range of ages tended to lay between 80 - 90 years of age (Figure 1). The ages at which T2D was
diagnosed ranged from 20 to 91 years old and tended to be around 60 – 80 years of age (Figure 2).

Table 3. Distributions of continuous variables

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Variance</th>
<th>Skewness Statistic</th>
<th>Std. Error</th>
<th>Kurtosis Statistic</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview Age</td>
<td>50</td>
<td>6</td>
<td>82</td>
<td>103</td>
<td>87.8</td>
<td>7</td>
<td>.946</td>
<td>.109</td>
<td>.778</td>
<td>.217</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>.3517</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2D Dx Age</td>
<td>15</td>
<td>1</td>
<td>20</td>
<td>91</td>
<td>67.7</td>
<td>2</td>
<td>-1.107</td>
<td>.197</td>
<td>1.108</td>
<td>.392</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>14.865</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total CESD</td>
<td>50</td>
<td>6</td>
<td>2</td>
<td>30</td>
<td>20.9</td>
<td>9</td>
<td>-.443</td>
<td>.109</td>
<td>-.282</td>
<td>.217</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.190</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total MMSE</td>
<td>50</td>
<td>6</td>
<td>2</td>
<td>51</td>
<td>12.3</td>
<td>5</td>
<td>1.190</td>
<td>.109</td>
<td>1.668</td>
<td>.217</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.289</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valid N (listwse)</td>
<td>15</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. Distribution for Age at Time of Interview

Mean = 87.87
Std. Dev = 3.517
N=506
7.2 INFERENTIAL STATISTICS

For all inferential tests, a significance level of $p<0.05$ was used. The general hypothesis predicted that elderly respondents with a history of T2D diagnosis prior to age 65, had a higher incidence of diagnosed dementia; and/or poorer cognitive functioning (MMSE score); and/or more depressive symptoms (CESD-20 score) as compared to elderly respondents with no earlier history of T2D.

7.3 CHI-SQUARE ANALYSES

Four chi-square analyses were conducted. The analysis examined whether participants with an earlier history of T2D (before age 65) were more likely to be diagnosed with dementia (yes/no). The cross-tabulations are shown in Table 4 and the Chi-Square results are shown in
Table 5. There was no significant association between history of T2D diagnosis before age 65 and developing Alzheimer’s disease/Dementia (p = 0.705). Thus, as compared to participants with no history of T2D, participants with earlier history of T2D were not more likely to have been diagnosed with dementia (yes/no). Alzheimer’s/Dementia status appeared to be independent from T2D diagnosis. Participants 65 years of age and older with a history of T2D onset prior to age 65, do not have a higher incidence of Alzheimer’s/Dementia as compared to elderly participants with no history of T2D.

Table 4. Cross-tabulation of Alzheimer’s Diagnosis by T2D Diagnosis, Pre-65 vs. No T2D

<table>
<thead>
<tr>
<th>T2D Diagnosis Age</th>
<th>No T2D</th>
<th>T2D Pre-Age 65</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosed Alzheimer's Disease/Dementia</td>
<td>Yes</td>
<td>No</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>76a</td>
</tr>
<tr>
<td>Expected Count</td>
<td></td>
<td></td>
<td>77.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11a</td>
</tr>
<tr>
<td>Expected Count</td>
<td></td>
<td></td>
<td>10.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>87</td>
</tr>
<tr>
<td>Expected Count</td>
<td></td>
<td></td>
<td>87.0</td>
</tr>
</tbody>
</table>

Each subscript letter denotes a subset of Diagnosed Alzheimer's Disease/Dementia categories whose column proportions do not differ significantly from each other at the .05 level.
Since the initial chi-square test was not significant, a second chi-square was calculated to test whether respondents with T2D at any age were more likely to have a diagnosis of Alzheimer’s/dementia. The cross-tabulations are shown in Table 6 and the Chi-Square results are shown in Table 7. There was no significant association (p = 0.633) seen between history of T2D (yes/no) diagnosis and developing Alzheimer’s disease/Dementia. As compared to participants with no T2D diagnosis, participants with a T2D diagnosis were not more likely to have been diagnosed with dementia (yes/no). Alzheimer’s/Dementia status appeared to be independent from T2D diagnosis. Participants with a history of T2D diagnosis at any age, do not have a higher incidence of Alzheimer’s/Dementia as compared to participants with no history of T2D.

### Table 5. Chi-Square – Alzheimer’s Diagnosis by T2D Diagnosis, Pre-65 vs N

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymptotic Significance (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>.150a</td>
<td>1</td>
<td>.698</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correctionb</td>
<td>.039</td>
<td>1</td>
<td>.843</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>.147</td>
<td>1</td>
<td>.701</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td>.150</td>
<td>1</td>
<td>.699</td>
<td>.705</td>
<td>.411</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.150a</td>
<td>1</td>
<td>.698</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>401</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.98.  
b. Computed only for a 2x2 table
Table 6. Cross-tabulation of Alzheimer’s Diagnosis by T2D Diagnosis (yes/no)

<table>
<thead>
<tr>
<th>T2D Diagnosis</th>
<th>Yes</th>
<th>Count</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>29a</td>
<td>122a</td>
<td>151a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Expected Count</td>
<td>31.3</td>
<td>119.7</td>
<td>151.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>29a</td>
<td>122a</td>
<td>151a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Count</td>
<td>76a</td>
<td>279a</td>
<td>355a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Expected Count</td>
<td>73.7</td>
<td>281.3</td>
<td>355.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>Count</td>
<td>87</td>
<td>105</td>
<td>401</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>Expected Count</td>
<td>87.0</td>
<td>105.0</td>
<td>401.0</td>
</tr>
</tbody>
</table>

Each subscript letter denotes a subset of Diagnosed Alzheimer's Disease/Dementia categories whose column proportions do not differ significantly from each other at the .05 level.

Table 7. Chi-Square – Alzheimer’s Diagnosis by T2D Diagnosis (yes/no)

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>df</th>
<th>Asymptotic Significance (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>.313a</td>
<td>1</td>
<td>.576</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correctionb</td>
<td>.193</td>
<td>1</td>
<td>.660</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>.316</td>
<td>1</td>
<td>.574</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td></td>
<td></td>
<td></td>
<td>.633</td>
<td>.333</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.312</td>
<td>1</td>
<td>.576</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>506</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 31.33
b. Computed only for a 2x2 table

Another chi-square was run to test whether, within the group of participants with a T2D diagnosis, age of diagnosis – that is, pre-age 65 vs. post-age 65 – was associated with Alzheimer’s disease/Dementia. The cross-tabulations for this analysis are shown in Table 8 and the Chi-Square results are shown in Table 9. There was no significant association was observed between T2D participants with earlier versus later diagnoses diagnosis and developing
Alzheimer’s disease/Dementia (p = 0.372). Thus, as compared to participants with pre-65 T2D diagnosis, participants with post-age 65 T2D were not more likely to have been diagnosed with dementia (yes/no). Alzheimer’s/Dementia status was not influenced by age of T2D diagnosis.

Table 8. Cross-tabulation of Alzheimer’s Diagnosis by Diagnosed T2D, Pre- vs Post-Age 65

<table>
<thead>
<tr>
<th>T2D Diagnosis</th>
<th>T2D Pre-age 65</th>
<th>Count</th>
<th>Expected Count</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>T2D Pre-age 65</td>
<td></td>
<td>11a</td>
<td>35a</td>
<td>46</td>
</tr>
<tr>
<td>Expected Count</td>
<td></td>
<td>8.8</td>
<td>37.2</td>
<td>46.0</td>
</tr>
<tr>
<td>T2D Post-age 65</td>
<td></td>
<td>18a</td>
<td>87a</td>
<td>105</td>
</tr>
<tr>
<td>Expected Count</td>
<td></td>
<td>20.2</td>
<td>84.8</td>
<td>105.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>29</td>
<td>122</td>
<td>151</td>
</tr>
<tr>
<td>Count</td>
<td></td>
<td>29.0</td>
<td>122.0</td>
<td>151.0</td>
</tr>
</tbody>
</table>

Each subscript letter denotes a subset of Diagnosed Alzheimer's Disease/Dementia categories whose column proportions do not differ significantly from each other at the .05 level.

Table 9. Chi-Square – Alzheimer’s Diagnosis by Diagnosed T2D, Pre- vs Post-Age 65

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymptotic Significance (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>.945a</td>
<td>1</td>
<td>.331</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correction</td>
<td>.559</td>
<td>1</td>
<td>.455</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>.917</td>
<td>1</td>
<td>.338</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td></td>
<td></td>
<td></td>
<td>.372</td>
<td>.225</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.939</td>
<td>1</td>
<td>.333</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>151</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 31.33
b. Computed only for a 2x2 table
Prior to the analyses, respondents with a history of stroke/hemorrhage were excluded from the analyses. However, an exploratory analysis with these subjects (n=29) was run to test whether early T2D (pre-age 65) might have pre-disposed the brain to later stroke/hemorrhage. Specifically, the chi-square tested whether participants with an earlier history of T2D (pre-age 65) were more likely to experience stroke/brain hemorrhage (yes/no) as compared to those with no history of T2D. As shown in the cross-tabulation (Table 10), the one cell size was below the acceptable limit for a valid chi-square (N < 5) and the chi-square analysis was not conducted.

Table 10. Cross-tabulation of History of Stroke or Brain Hemorrhage Diagnosis by Diagnosed T2D, Pre-Age 65 vs No T2D

<table>
<thead>
<tr>
<th>T2D Diagnosis</th>
<th>No T2D</th>
<th>Count</th>
<th>History of Stroke or Brain Hemorrhage</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>T2D Pre-age 65</td>
<td></td>
<td></td>
<td>23_a</td>
<td>332_a</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>23.0</td>
<td>332.0</td>
<td>355.0</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>3_a</td>
<td>43_a</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>3.0</td>
<td>43.0</td>
<td>46.0</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>29</td>
<td>26</td>
<td>375</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>29.0</td>
<td>26.0</td>
<td>375.0</td>
</tr>
</tbody>
</table>

Each subscript letter denotes a subset of History of Stroke or Brain Hemorrhage categories whose column proportions do not differ significantly from each other at the .05 level.
7.4 ANOVA ANALYSES

Four ANOVA models were calculated. Each of these models used gender and T2D diagnosis to predict outcomes on continuous outcome variables including the Mini-Mental Status Exam (MMSE) scores and the Center for Epidemiologic Studies Depression (CESD20) scale scores. Each model tested sex (M/F) and T2D (yes/no) as independent factors, and the possible interaction effect of sex x T2D.

The first hypothesis predicted that respondents with a pre-age 65 diagnosis T2D have lower (worse) Total MMSE Mini-Mental Status Examination scores, indicative of poorer current cognitive ability, as compared to respondents with no history of T2D. Sex was included as an additional factor. As shown in Table 12, this model was not significant (F (3,397) = 0.705, p = 0.550, partial eta squared = .005). The individual effects will be reviewed, nonetheless. When looking at the main effect of gender, there was insufficient evidence to conclude that gender influenced MMSE scores (F (1,397) = 0.033, p = 0.865. Similarly, regarding the effect of T2D diagnosis (pre-age 65 vs none), there was not sufficient evidence to conclude that have an earlier diagnosis of T2D diagnosis increased MMSE score means (F (1, 397) = 1.596, p = 0.207). Further, the interaction of gender x T2D was not significant suggesting that males and females did not differ with regard to whether T2D influenced MMSE scores (F (1, 397) = 0.456, p = 0.500). The adjusted R square (-0.002) suggested that almost none of the observed variance was explained by the model.
Table 11. ANOVA Descriptive Statistics for Group Comparisons on MMSE Scores

<table>
<thead>
<tr>
<th>Gender of the Respondent</th>
<th>Age of T2D Diagnosis (Never diagnosed OR before age 65)</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>No T2D</td>
<td>20.26</td>
<td>6.741</td>
<td>126</td>
</tr>
<tr>
<td></td>
<td>T2D Before Age 65</td>
<td>22.45</td>
<td>3.751</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20.44</td>
<td>6.570</td>
<td>137</td>
</tr>
<tr>
<td>Female</td>
<td>No T2D</td>
<td>20.82</td>
<td>6.001</td>
<td>229</td>
</tr>
<tr>
<td></td>
<td>T2D Before Age 65</td>
<td>21.49</td>
<td>6.368</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20.91</td>
<td>6.043</td>
<td>264</td>
</tr>
<tr>
<td>Total</td>
<td>No T2D</td>
<td>20.62</td>
<td>6.270</td>
<td>355</td>
</tr>
<tr>
<td></td>
<td>T2D Before Age 65</td>
<td>21.72</td>
<td>5.826</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20.75</td>
<td>6.224</td>
<td>401</td>
</tr>
</tbody>
</table>

Table 12. ANOVA Results for MMSE Scores by Gender and Age Dependent T2D Status

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
<th>Noncent. Parameter</th>
<th>Observed Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>82.074*a</td>
<td>3</td>
<td>27.358</td>
<td>.705</td>
<td>.550</td>
<td>.005</td>
<td>2.114</td>
<td>.200</td>
</tr>
<tr>
<td>Intercept</td>
<td>54854.463</td>
<td>1</td>
<td>54854.463</td>
<td>1413.051</td>
<td>.000</td>
<td>.781</td>
<td>1413.051</td>
<td>1.000</td>
</tr>
<tr>
<td>SEX</td>
<td>1.274</td>
<td>1</td>
<td>1.274</td>
<td>.033</td>
<td>.856</td>
<td>.000</td>
<td>.033</td>
<td>.054</td>
</tr>
<tr>
<td>T2D_Status</td>
<td>61.955</td>
<td>1</td>
<td>61.955</td>
<td>1.596</td>
<td>.207</td>
<td>.004</td>
<td>1.596</td>
<td>.243</td>
</tr>
<tr>
<td>SEX * T2D_Status</td>
<td>17.714</td>
<td>1</td>
<td>17.714</td>
<td>.456</td>
<td>.500</td>
<td>.001</td>
<td>.456</td>
<td>.103</td>
</tr>
<tr>
<td>Error</td>
<td>15411.487</td>
<td>397</td>
<td>38.820</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>188118.000</td>
<td>401</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>15493.561</td>
<td>400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .005 (Adjusted R Squared = -.002)
b. Computed using alpha = .05
Since the first ANOVA was not significant, another two-way ANOVA was conducted to test whether respondents with T2D diagnosed at any age (Yes/No) have lower (worse) Total MMSE Mini-Mental Status Examination scores (indicative of poorer current cognitive ability) as compared to respondents with no history of T2D. The ANOVA model tested gender and T2D diagnosis status (Yes/No) as independent factors, and also tested the interaction of gender x T2D. As shown in Table 14, once again, the overall model was not statistically significant ($F (3,502) = 2.027, p = 0.109$). In this case however, the model trended towards significant ($p = 0.109$) and the individual factor effects were considered with caution.

When looking at the main effect of gender, there was insufficient evidence to conclude that gender influenced MMSE scores ($F (1,502) = 0.252, p = 0.616$). Regarding the effect of T2D diagnosis at any age, the result is interpreted with caution, acknowledging that the overall model was not significant. The MMSE scores of participants with T2D appeared to differ from those without T2D ($F(1,502) = 5.700, p = 0.017$). When the mean scores were examined (Table 13) it was seen that the effect was in the direction opposite to the prediction. The mean MMSE score of respondents with T2D was in fact higher (better), and not lower, than scores seen in respondents with no T2D. This intriguing result will be considered in Discussion below. The interaction of gender x T2D was not significant suggesting that males and females did not differ regarding whether T2D influenced MMSE scores ($F (1,502) = 1.898, p = 0.169$). The adjusted R square for the model approached zero (0.006) suggesting that the model explained almost none of the variance observed.
Table 13. ANOVA Descriptive Statistics for MMSE Scores by Gender and T2D (yes/no)

<table>
<thead>
<tr>
<th>Gender of the Respondent</th>
<th>T2D Diagnosis</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Yes</td>
<td>22.67</td>
<td>5.037</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>20.26</td>
<td>6.741</td>
<td>126</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20.93</td>
<td>6.395</td>
<td>174</td>
</tr>
<tr>
<td>Female</td>
<td>Yes</td>
<td>21.47</td>
<td>6.289</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>20.82</td>
<td>6.001</td>
<td>229</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>21.02</td>
<td>6.090</td>
<td>332</td>
</tr>
<tr>
<td>Total</td>
<td>Yes</td>
<td>21.85</td>
<td>5.929</td>
<td>151</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>20.62</td>
<td>6.270</td>
<td>355</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20.99</td>
<td>6.190</td>
<td>506</td>
</tr>
</tbody>
</table>

Table 14. ANOVA Results for MMSE Scores by Gender and T2D (yes/no)

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
<th>Noncent. Parameter</th>
<th>Observed Power&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>231.615</td>
<td>3</td>
<td>77.205</td>
<td>2.027</td>
<td>.109</td>
<td>.012</td>
<td>6.082</td>
<td>.521</td>
</tr>
<tr>
<td>Intercept</td>
<td>169485.912</td>
<td>1</td>
<td>169485.912</td>
<td>4450.284</td>
<td>.000</td>
<td>.899</td>
<td>4450.284</td>
<td>1.000</td>
</tr>
<tr>
<td>SEX</td>
<td>9.608</td>
<td>1</td>
<td>9.608</td>
<td>.252</td>
<td>.616</td>
<td>.001</td>
<td>.252</td>
<td>.079</td>
</tr>
<tr>
<td>T2D</td>
<td>217.092</td>
<td>1</td>
<td>217.092</td>
<td>5.700</td>
<td>.017</td>
<td>.011</td>
<td>5.700</td>
<td>.664</td>
</tr>
<tr>
<td>SEX * T2D</td>
<td>72.273</td>
<td>1</td>
<td>72.273</td>
<td>1.898</td>
<td>.169</td>
<td>.004</td>
<td>1.898</td>
<td>.280</td>
</tr>
<tr>
<td>Error</td>
<td>19118.314</td>
<td>502</td>
<td>38.084</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>242244.000</td>
<td>506</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>19349.929</td>
<td>505</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .012 (Adjusted R Squared = .006)
b. Computed using alpha = .05
ANOVA was also used to test group differences on CES-D 20 scores. This analysis examined whether participants with an earlier history of T2D as compared to those with no T2D diagnosis had higher CESD 20 scores (16 points or more = “depression”).

Similar to the above models, this ANOVA tested whether sex, T2D, pre-age 65 vs. no T2D, and/or the interaction, predicted CESD 20 scores. As shown in Table 16, the overall model was significant (F (3,397) = 4.553, p = 0.004) suggesting that the full complement of factors predicted CESD 20 scores, and the individual effects were examined to determine the source of the significant effects.

Interestingly in this model, while the overall model was significant, none of the individual effects were significant. Gender did not appear to significantly influence CESD scores in this model (F (1,397) = 0.586, p = 0.177). Similarly, regarding the influence of T2D diagnosis before age 65 on CESD20 scores, the effect was not significant (F (1, 397) = 1.507, p = 0.220) and the interaction was also not significant (F (1,397) = 0.586, p = 0.445). The adjusted R square for the model was low (0.026) suggesting that the model explained very little amount of the variance observed.
Table 15. ANOVA Descriptive Statistics for CESD20 Scores by Gender and Pre-65 T2D

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable: Total CES-D Score</td>
</tr>
<tr>
<td>Gender of the Respondent</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Table 16. ANOVA Results for CESD20 Scores by Gender, pre-65 T2D, and the Interaction

<table>
<thead>
<tr>
<th>Tests of Between-Subjects Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable: Total CES-D Score</td>
</tr>
<tr>
<td>Source</td>
</tr>
<tr>
<td>Corrected Model</td>
</tr>
<tr>
<td>Intercept</td>
</tr>
<tr>
<td>SEX</td>
</tr>
<tr>
<td>T2D_Status</td>
</tr>
<tr>
<td>SEX * T2D_Status</td>
</tr>
<tr>
<td>Error</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>Corrected Total</td>
</tr>
</tbody>
</table>

a. R Squared = .033 (Adjusted R Squared = .026)
b. Computed using alpha = .05
Finally, one additional two-way ANOVA was conducted to compare whether respondents with diagnosed T2D (Yes/No) have lower (worse) Total CES-D scores as compared to respondents with no history of T2D. Similar to the above models, this ANOVA tested whether gender, T2D and/or the interaction, predicted CESD20 scores.

As shown in Table 19 the overall model was significant (F (3,506) = 4.965, p = 0.002) suggesting that factors provide a better fit than would be provided by a model with no predictive factors. To understand the possible source of this significant outcome, the individual effects and interaction were considered. The main effect of gender was significant (F (1,502) = 9.320, p = 0.002). When the mean values were examined (Table 17), females were found to have mean CESD20 scores approximately 3 points higher than males. Regarding the effect of T2D diagnosis on CESD20 scores, there was no significant effect (F (1,502) = 1.247, p = 0.265). Also, there were no statistically significant effect of the interaction (F (1,502) = 0.347, p = 0.556) suggesting that the effect of T2D diagnosis on CESD20 scores did not differ in males and females. Despite these findings, it was noted that the adjusted R square for the model was low (0.023) suggesting that the model explained very little amount of the total variance observed.
Table 17. ANOVA Descriptive Statistics for CESD20 Scores by Gender and T2D (yes/no)

<table>
<thead>
<tr>
<th>Gender of the Respondent</th>
<th>T2D Diagnosis</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Yes</td>
<td>11.54</td>
<td>6.885</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>10.10</td>
<td>6.311</td>
<td>126</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>10.49</td>
<td>6.487</td>
<td>174</td>
</tr>
<tr>
<td>Female</td>
<td>Yes</td>
<td>13.63</td>
<td>9.916</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>13.18</td>
<td>8.498</td>
<td>229</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>13.32</td>
<td>8.949</td>
<td>332</td>
</tr>
<tr>
<td>Total</td>
<td>Yes</td>
<td>12.97</td>
<td>9.092</td>
<td>151</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>12.09</td>
<td>7.922</td>
<td>355</td>
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<tr>
<td></td>
<td>Total</td>
<td>12.35</td>
<td>8.289</td>
<td>506</td>
</tr>
</tbody>
</table>

Table 18. ANOVA Results for CESD20 Scores by Gender, T2D (yes/no) and the Interaction

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
<th>Noncent. Parameter</th>
<th>Observed Power b</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3</td>
<td>333.345</td>
<td>4.965</td>
<td>.002</td>
<td>.029</td>
<td>14.896</td>
<td>.913</td>
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<td>Intercept</td>
<td>54790.866</td>
<td>1</td>
<td>54790.866</td>
<td>816.147</td>
<td>.000</td>
<td>.619</td>
<td>816.147</td>
<td>1.000</td>
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<tr>
<td>SEX</td>
<td>625.673</td>
<td>1</td>
<td>625.673</td>
<td>9.320</td>
<td>.002</td>
<td>.018</td>
<td>9.320</td>
<td>.861</td>
</tr>
<tr>
<td>T2D/any</td>
<td>83.733</td>
<td>1</td>
<td>83.733</td>
<td>1.247</td>
<td>.265</td>
<td>.002</td>
<td>1.247</td>
<td>.200</td>
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<td>23.282</td>
<td>1</td>
<td>23.282</td>
<td>.347</td>
<td>.556</td>
<td>.001</td>
<td>.347</td>
<td>.090</td>
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<tr>
<td>Error</td>
<td>33701.051</td>
<td>502</td>
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<td></td>
<td></td>
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<tr>
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<td>111875.000</td>
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<td></td>
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</tbody>
</table>

a. R Squared = .029 (Adjusted R Squared = .023)
b. Computed using alpha = .05
CHAPTER 8: DISCUSSION

According to the CDC, in 2018, approximately 1.5 million new cases of T2D were diagnosed in the United States (National Diabetes Statistics Report, 2020). Among these cases, people of Hispanic origin (9.7 per 1,000) and non-Hispanic blacks (8.2 per 1,000) had a higher incidence of T2D as compared to non-Hispanic whites (5.0 per 1,000) (CDC, 2020). While the overall incidence of T2D decreased between 2008 and 2018, the ethnic disparities persist. According to the National Diabetes Statistics Report, 2020, there has been an identifiable increase in the incidence of T2D in youth, ages 10-19, specifically in racial and ethnic minorities, while rates among non-Hispanic whites are stable. This report also shows evidence provided by the SEARCH for Diabetes in Youth study, which showed that from 2002 – 2012 the rate of new diagnosed cases of T2D increased by 4.8% in youth (NIH, 2017). It is important to further explore the increased incidence of T2D in younger populations in order to develop studies that can help prevent/delay and treat T2D and ultimately allow for better health outcomes as age progresses.

When considering undifferentiated dementia, there seems to have been a decreasing trend in incidence, while Alzheimer’s alone has steadily increased in the last for decades, according to a systematic review (Gao et al., 2019). Studies also showed that the decreases in undifferentiated dementia may be attributed to an increase in both levels of education and improved cardiovascular control (Alzheimer’s Association, 2021). According to the estimates collected through the CHAP study and U.S. Census, there were about 910,000 people aged 65 years or older who developed Alzheimer’s disease/Dementia in the U.S. in 2011 (Alzheimer’s Association, 2021). From these data, the Alzheimer’s Association estimated that the annual
number of cases is expected to increase, primarily with the increasing number of people aged 65 and older.

Both T2D and Alzheimer’s Disease/Dementia have serious physiological impacts and symptoms that are important to discuss. With the increase in the nation’s older population, it is necessary to understand the negative impacts both chronic diseases carry in regard to a person’s overall wellbeing. Moreover, the physiological impact and symptoms these diseases exhibit are primarily afflicting communities of color. Managing T2D is essential in reducing or eliminating the risk of both cardiovascular and diabetic neuropathy, all of which can lead to serious complications. Regarding Alzheimer’s disease/Dementia, apart from cognitive decline, death is a serious complication that is often experienced with this disease. Overall, by addressing the concerning physiological nature of both diseases, severe health problems may be delayed or prevented altogether.

8.1 PURPOSE

The purpose of this study was to determine if further designed studies could be warranted based on the results of this secondary data analysis performed on publicly available data (HEPESE Wave 8). The specific goal of this study was to examine whether older Mexican American individuals with a history of T2D were more likely to develop later cognitive impairment and/or depression without cognitive decline. It was predicted that elderly participants (mean age at time of Wave 8 interview = 87.87 years) with a history of T2D onset prior to age 65, were more likely to have dementia-related symptoms and/or symptoms of depression, as compared to elderly participants with no earlier history of T2D. Specifically, respondents with T2D were predicted to have greater likelihood of diagnosed dementia (yes/no); lower (worse) Total Mini-Mental Status Examination scores; and higher depression rating scale scores.
8.2 FINDINGS

The secondary data analysis of HEPESE Wave 8 data revealed different findings than predicted. Although the overall model for the analysis of MMSE scores using two-way ANOVA revealed no statistical significance, when direction of possible effects was examined, scores were in opposite direction as predicted. Participants who had T2D were shown to have higher scores on MMSE, rather than lower. Since participants who reported a T2D diagnosis had higher scores on the MMSE, indicative of little to no cognitive impairment, it would be valuable to determine if treatment of T2D offers a protective factor on brain function.

A meta-analysis conducted by Ye et al. (2016), discovered that insulin sensitizer drugs (metformin and thiazolidinediones), reduced the incidence of dementia 544,093 participants. Currently, there is little research on the overall effect of diabetes medications and how they impact the risk of developing dementia.

When looking at the possible impact of earlier T2D diagnosis on emotional functions, specifically depression, CES-D scores were considered and analyzed in those with and without T2D. The overall model in which two-way ANOVA testing was run to test the effect on CES-D scores were significant, and the effects were attributable to females reporting more depression than males. These findings may suggest that males with T2D are underreporting their symptoms, and/or may be suppressing their expression of depression. It is also possible that females are more subject to depression with a diagnosis of T2D.

According to the ADA, women have depression about twice as much as men in general, but the incidences increase when a woman has diabetes. Increased depression in women with diabetes has been attributed to different biological, hormonal, and/or social factors women experience in their lifetimes (NAMI, 2020). For instance, women undergo many hormonal
changes (menstruation, pregnancy, miscarriage, postpartum period, pre-menopause, and menopause), and additional life stressors such as work and caregiving that impact the risk of developing depression (ADA, 2021). The ADA also suggests that women having higher rates of depression because of the clinical diagnosis itself (2021). According to the National Institute on Mental Health, a reason men may not be diagnosed as much as their female counterparts is because they are less likely to talk about or seek treatment and even recognize their symptoms as depression (2017).

8.3 FUTURE STUDIES

Future follow up studies are necessary and need to be conducted to help determine if the treatment of T2D with medication and healthy lifestyle choices (exercise and diet), are potentially protective for the brain and for cognitive functioning. Additional studies specifically designed to examine the associations between T2D, and later cognitive functioning and impairment should be carried out. Future studies would benefit from using more comprehensive neurocognitive testing batteries rather than relying on a quick screen method such as the MMSE.

For example, for a future study, participants could be split into three identifiable groups for analysis, consisting of (1) no T2D diagnosis, (2) T2D diagnosis pre-age 65, and (3) T2D diagnosis post-age 65. In total, each group should have at least an \( n = 150 \). They should also be more than 65 years or older to participate in the study. The following variables should be collected for all participants in the exploratory research study: (1) Gender (M/F), (2) T2D diagnosis status (yes/no), (3) Age when diagnosed with T2D -if applicable, (4) taking insulin (yes/no), (5) taking prescribed medication for T2D (yes/no), and (6) neurocognitive test battery scores.
Another possible explanation of the trend that those with T2D had higher MMSE scores, is that recommended dietary changes may have had protective effects on brain function. To determine how different dietary behaviors may impact cognitive function in those with T2D, another type of study design could be considered. For example, the study could include groups distinguished by the levels of blood sugar identified (high, medium, low – higher having worse implications), the age of T2D diagnosis (younger have worse implications), BMI, and blood pressure (high, low, normal) reading. Participants could be assessed using the Healthy Eating Index (HEI-2015), in which a person’s diet is assessed to determine the overall quality of their diet and how well they align with the 2015-2020 dietary guidelines for Americans. Higher scores would be indicative of closely aligning with these dietary guidelines (USDA, 2018).

Additionally, participants could also be tested using a neurocognitive battery, to gauge cognitive functioning related to dementia. Each group (T2D pre-age 65, T2D post-age 5, and No T2D), should have a minimum of \( n = 105 \). Overall, these factors should be explored to get closer to understanding if healthy dietary behaviors in people with T2D act as protective factors in cognitive functioning.

When looking at the outcomes of the CES-D scores regarding those who have T2D, it is also important, from a research standpoint, to further investigate why the observed effects may exist. Studies could be conducted to re-test the differences in depression between males and females with T2D. The overall design of the study compares those with and without a T2D diagnosis in persons aged 65 years or older. This study could be split into two identifiable groups for analysis, (1) No T2D diagnosis and (2) T2D diagnosis, with a minimum of \( n = 300 \) for each group. They should also be further split by gender (M/F). For instance, two groups should exist for each level of T2D diagnosis: Males (\( n = 150 \)) and females with T2D (\( n = 150 \)) vs. males (\( n =
150) and females (n = 150) without T2D (N = 600). For all individuals, a CES-D test could be conducted and scored. Additionally, secondary variables should also be collected to identify depression in participants. For example, these variables could look at whether the participant has accessed psychiatric services (yes/no) as well as ever attended therapy (yes/no). Overall, this exploratory study would aim to determine whether the differences in depression symptoms by gender are due to male underreporting of depressive symptoms, or because of the different effects of T2D on males and females.

8.4 LIMITATIONS

Because this was a secondary data analysis, the quality of data collection and how well responses were monitored could not be known and were out of the researcher’s control. While all possible subjects were used for these analyses, the sample size became limited among some subgroups reducing the statistical power for detecting effects. The effect of the limited sample size was most evident when looking at ANOVA analyses.

8.5 CONCLUSION

Few studies have examined the effects of T2D on later cognitive and emotional functioning. Given the large numbers of people with T2D in the U.S. today, understanding its long-term effects on brain systems is very important. In this exploratory study using secondary data, responses were analyzed from N = 506 elderly males and females between the ages of 82 and 103. Overall, there were few significant findings. At the same time however, an interesting trend in the data suggested that having earlier T2D may have increased (rather than decreased) MMSE scores later in life for both males and females. Regarding emotional functioning, only females appeared to suffer substantially more symptoms of depression. Additional studies are needed to further examine effects on mental status, and to also determine whether depression
among females is attributable to the earlier history of T2D or reflects the commonly found reporting bias for symptoms of depression among males and females.
REFERENCES

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https://doi.org/10.1016/j.ejphar.2013.08.008


https://www.niddk.nih.gov/health-information/diabetes/overview/what-is-diabetes

Appendix 1. Survey

Hispanic Established Populations for the Epidemiologic Study of the Elderly (HEPESE) Wave 8, 2012-2013 [Arizona, California, Colorado, New Mexico, and Texas]

Kyriakos S. Markides  
*University of Texas-Medical Branch*

Nai-Wei Chen  
*University of Texas-Medical Branch*

Ronald Angel  
*University of Texas-Austin*

Raymond Palmer  
*University of Texas-San Antonio, Health Science Center*

HEPESE Wave 8 English Questionnaire
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http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/36578/terms

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Hello, I’m __________ from Harris Interactive Inc., the national survey research firm in New York best known for The Harris Poll. May I speak to (RESPONDENT NAME)? You may remember us - we interviewed you about two years ago and we are conducting a follow-up study about health in your community.

We are particularly interested in speaking to older Mexican-Americans and Hispanics about their health and health care experiences. As you may recall, we are conducting this study for the University of Texas Medical Branch at Galveston.

(INTERVIEWER: WHEN CONDUCTING PROXY INTERVIEW, QUESTIONS MARKED "P" SHOULD BE ASKED OF PROXY; "P-R" QUESTIONS, WHEN POSSIBLE, SHOULD BE ASKED OF RESPONDENT. DURING A PROXY INTERVIEW, ALL QUESTIONS REFER TO THE RESPONDENT.)

S3.P
First, let me check that I have your name written correctly: (READ NAME)

Respondent name: ____________

FIRST   MIDDLE   LAST (both)

S4.P Respondent’s birth date: __ / __ / __

MONTH   DAY   YEAR

P   __ / __ / __ YEARS OF AGE

PROXY ONLY:

S5.P Relationship of Proxy to Respondent: __ / __ / __ (Use relationship codes from list) PROXYREL8

CODES FOR RELATIONSHIPS:

01   Respondent is head of household (B2 only)
02   Spouse
03   Son/Daughter (including Stepchildren)
04   Son-In-Law/Daughter-In-Law
05   Grandchild
06   Parent
07   Brother or Sister
08   Nephew or Niece
09   Cousin
10   Aunt/Uncle
11   Great Grandchild
12   Other Relative (SPECIFY):
13   Friend
14   Boarder or Roomer
15   Paid Employee
16   All Others (SPECIFY):
17   Sister/Brother In-Law
18   Don’t Know
19   Refused
BASE: ALL RESPONDENTS
FROM OBSERVATION: P Respondent Gender

Male.............................. 1 SEXB
Female........................... 2

BASE: ALL RESPONDENTS
A10.P Are you presently married, divorced, separated, widowed, or never married?

Married.................................................. 1
Common Law / Just living together.................... 2
Separated ............................................. 3
Divorced ............................................... 4
Widowed ............................................... 5

Never married ........................................ 6
Don't know ........................................... 888
Refused ............................................... 999

ASK Q.A11
MARSTATB

BASE: MARRIED/SEPARATED/DIVORCED/WIDOWED (A10/1-4)
A11.P How long have you been (married/cohabiting/separated/divorced/widowed)?
(ENTER "0" IF LESS THAN ONE YEAR).

/____/____/ Years

Don't know ........................................... 888
Refused ............................................... 999

MARLENB

BASE: LIVING ARRANGEMENTS

B1.P How many people live in this household?

/____/____/

Don't know ........................................... 888
Refused ............................................... 999

NHOUSEB

BASE: ALL RESPONDENTS
B2.P Who is the head of this household, what is their relationship to you/to the respondent?

Name and Relationship:

Relationship Code: /____/____/ (Use relationship codes from page 1) HHRELB

IF ONLY 1 PERSON IN Q.B1, SKIP TO Q.B6 - ALL OTHERS ASK Q.B4

BASE: MORE THAN 1 PERSON IN HOUSEHOLD (B1>1)
B4.P We would like to know how the OTHER people who live here with you are related to you.
(ASK FOR FIRST NAME OR INITIALS AND RELATIONSHIP OF EACH PERSON. DO NOT REPEAT THE RESPONDENT'S NAME OR THE HEAD OF HOUSEHOLD. RECORD INFORMATION FOR THE FIRST SIX PEOPLE IN ANY ORDER)

Relationship Code  INITIALS / NAME (Use relationship codes from page 1)

/____/____/ OREL1
/____/____/ OREL2
/____/____/ OREL3
/____/____/ OREL4
/____/____/ OREL5
/____/____/ OREL6
BASE: ALL RESPONDENTS

B6.P Have you moved since the last time we talked to you?
Yes ................................................................. 1
No .................................................................. 2
Don't know .................................................. 888
Refused ......................................................... 999

G. GLOBAL HEALTH RATING

BASE: ALL RESPONDENTS
G1.P USE SHOW CARD #2
Now I would like to ask you some questions about your health.
Overall, how would you rate your health - excellent, good, fair, or poor?
Excellent ....................................................... 1
Good ................................................................ 2
Fair ................................................................ 3
Poor ................................................................ 4
Don't know .................................................. 888
Refused ......................................................... 999

M. DIABETES

BASE: ALL RESPONDENTS
M1.P Have you ever been told by a doctor that you have diabetes, sugar in your urine or high blood sugar?
(IF RESPONDENT MENTIONS "GLUCOSE INTOLERANT" OR "GLUCOSE PROBLEM" or "BORDERLINE" CODE AS "YES").
Yes .................................................................. 1
No .................................................................. 2
Don't know .................................................. 888
Refused ......................................................... 999
ASK Q. M2.

BASE: HAVE BEEN TOLD BY DOCTOR HAVE DIABETES, SUGAR IN URINE OR HIGH BLOOD SUGAR
(M1/1)
M2.P At what age did a doctor first tell you that you had diabetes? (IF NECESSARY: PROBE FOR AGE OR AGE DECADE AT DIAGNOSIS TO ESTIMATE AGE OF DIAGNOSIS.)
/ / / Age of diagnosis in years of age

Don't know .................................................. 888
Refused ......................................................... 999

BASE: HAVE BEEN TOLD BY DOCTOR HAVE DIABETES, SUGAR IN URINE OR HIGH BLOOD SUGAR
(M1/1)
M3.P Are you taking any medicine for diabetes now?
Yes ................................................................. 1
If "yes," what type of medication

ASK Q. M6.- INCLUDE NAME, DOSAGE & FREQUENCY of MEDICINE/S

(Please record medications as they appear on the bottle)
No .................................................................. 2
Don't know .................................................. 888
Refused ......................................................... 999
SKIP TO Q.M8a.
### BASE: TAKING MEDICINE FOR DIABETES (M3/1)

**M6.P Are you now taking insulin shots?**

Yes: 1
No: 2
Don't know: 888
Refused: 999

**M6b.P Are you now taking diabetes pills?**

Yes: 1
No: 2
Don't know: 888
Refused: 999

### BASE: HAVE BEEN TOLD BY DOCTOR HAVE DIABETES, SUGAR IN URINE OR HIGH BLOOD SUGAR (M1/1)

**M8a. P As a result of your diabetes, have you ever had any problems with your kidneys?**

Yes: 1
No: 2
Don't know: 888
Refused: 999

**M8d. P As a result of your diabetes, have you ever had any problem with your eyes?**

Yes: 1
No: 2
Don't know: 888
Refused: 999

**M8f. P As a result of your diabetes, have you ever had any problems with the circulation in your legs or arms?**

Yes: 1
No: 2
Don't know: 888
Refused: 999

**M8g. As a result of your diabetes, have you ever had any part of your body amputated?**

Yes: 1
No: 2
Don't know: 888
Refused: 999
Q. INCONTINENCE

BASE: ALL RESPONDENTS
Q1a. USE SHOW CARD #6 In the past month, how often have you had difficulty holding your urine until you can get to a toilet – never, hardly ever, some of the time, most of the time, or all of the time?

Never................................................. 1
Hardly ever........................................ 2
Some of the time.................................. 3
Most of the time................................. 4
All of the time.................................... 5
All of the time (catheter or cancer)........... 6
Don't know .......................................... 888
Refused............................................. 999 QINCON81

BASE: ALL RESPONDENTS
Q12. USE SHOW CARD #6 In the past month, how often have you lost control of your bowels (when you didn’t want to) - never, hardly ever, some of the time, most of the time, or all of the time?

Never................................................. 1
Hardly ever........................................ 2
Some of the time.................................. 3
Most of the time................................. 4
All of the time.................................... 5
All of the time (catheter or cancer)........... 6
Don’t know ................................. 888
Refused............................................. 999 QINCON812

P. FALLS

BASE: ALL RESPONDENTS
“we are now going to talk about falling and almost falling. A fall is unintentionally coming to a rest on the ground, floor, or other lower level, whether or not you were injured. We are not talking about falls where you came to rest on a chair or a bed.”

P. P. USE SHOW CARD #3
During the past 12 months, how many times did you fall and land on the floor or ground?

None.................................................. 1
1 time .............................................. 2
2 times............................................. 3
3 or more times ................................. 4
Don’t know ................................. 888
Refused............................................. 999

ASK Q.P9 IF RESPONDENT HAS FALLEN 1 TIME OR MORE IN Q.P8. ALL OTHERS ASK Q.P10

BASE: FALLEN ONE OR MORE TIMES (P8/2-4)
P9.P As a result of (this fall/any of these falls) did you have to go to the hospital or emergency room?

Yes................................................... 1
No..................................................... 2
Don’t know ................................. 888
Refused............................................. 999 P9FALLS8
**BASE: ALL RESPONDENTS**

**P10 USE SHOW CARD #4** How afraid are you of falling? Would you say...

<table>
<thead>
<tr>
<th>Not at all afraid</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somewhat afraid</td>
<td>2</td>
</tr>
<tr>
<td>Fairly afraid</td>
<td>3</td>
</tr>
<tr>
<td>Very afraid</td>
<td>4</td>
</tr>
<tr>
<td>Don't know</td>
<td>888</td>
</tr>
<tr>
<td>Refused</td>
<td>999</td>
</tr>
</tbody>
</table>

**P. PAIN**

**BASE: ALL RESPONDENTS**

**P5.** In the last month, did you notice any pain or discomfort when you stood or walked?

<table>
<thead>
<tr>
<th>Yes</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Don't know</td>
<td>888</td>
</tr>
<tr>
<td>Refused</td>
<td>999</td>
</tr>
</tbody>
</table>

**BASE: EXPERIENCED PAIN IN PAST MONTH (Q.P5/1)**

**P5a.** Where was this pain? (SELECT YES OR NO FOR EACH ITEM LISTED)

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>Hips</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>Knees</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>Ankles/feet</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>Legs</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>Entire body</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>Somewhere else (SPECIFY):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BASE: EXPERIENCED PAIN IN PAST MONTH (Q.P5/1)**

**P5b.** Does this bodily pain last for more than 4 weeks?

<table>
<thead>
<tr>
<th>Yes</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Don't know</td>
<td>888</td>
</tr>
<tr>
<td>Refused</td>
<td>999</td>
</tr>
</tbody>
</table>

**BASE: EXPERIENCED PAIN IN PAST MONTH (Q.P5/1)**

**P5c. USE SHOW CARD #5**

In the past month, how much has this pain or discomfort restricted your daily activities -- a lot, some or not at all?

<table>
<thead>
<tr>
<th>A lot</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some</td>
<td>2</td>
</tr>
<tr>
<td>Not at all</td>
<td>3</td>
</tr>
<tr>
<td>Don't know</td>
<td>888</td>
</tr>
<tr>
<td>Refused</td>
<td>999</td>
</tr>
</tbody>
</table>
BASE: EXPERIENCED PAIN IN PAST MONTH (Q.P5/1)
P5d. **USE SHOW CARD #5.** In the past month, how much has this pain or discomfort kept you from getting a good night's sleep— a lot, some or not at all?

A lot.......................................................... 1
Some.......................................................... 2
Not at all ..................................................... 3
Don’t know .................................................... 888
Refused......................................................... 999 PAIN5D8

BASE: EXPERIENCED PAIN IN PAST MONTH (Q.P5/1)
P6a. Have you ever seen a doctor about your pain?

Yes.................................................................. 1
No.................................................................. 2
Don’t know ..................................................... 888
Refused......................................................... 999 PAIN6A8

BASE: EXPERIENCED PAIN IN PAST MONTH (Q.P5/1)
P6b. Do you take any medication for your pain?

Yes.................................................................. 1
No.................................................................. 2
Don’t know ..................................................... 888
Refused......................................................... 999 PAIN6B8

R. SLEEP PROBLEMS

BASE: ALL RESPONDENTS
Now we would like to get some information about how well you sleep.

R1. How often in the past month did you (READ EACH ITEM)? (DO NOT READ CHOICES)

<table>
<thead>
<tr>
<th>Have trouble falling asleep</th>
<th>Not at all</th>
<th>1-3 Days</th>
<th>4-7 Days</th>
<th>8-14 Days</th>
<th>15+ Days</th>
<th>Don’t Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>888</td>
<td>999</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wave up severe time per night</th>
<th>Not at all</th>
<th>1-3 Days</th>
<th>4-7 Days</th>
<th>8-14 Days</th>
<th>15+ Days</th>
<th>Don’t Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>888</td>
<td>999</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Have trouble staying asleep (including waking up too early)</th>
<th>Not at all</th>
<th>1-3 Days</th>
<th>4-7 Days</th>
<th>8-14 Days</th>
<th>15+ Days</th>
<th>Don’t Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>888</td>
<td>999</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wake up after your usual amount of sleep feeling tired and worn</th>
<th>Not at all</th>
<th>1-3 Days</th>
<th>4-7 Days</th>
<th>8-14 Days</th>
<th>15+ Days</th>
<th>Don’t Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>888</td>
<td>999</td>
</tr>
</tbody>
</table>

BASE: ALL RESPONDENTS

R2. **USE SHOW CARD #7**
During the past month, how would you rate your sleep quality overall?

Very good......................... 1
Fairly good....................... 2
Fairly bad........................ 3
Very bad......................... 4
Don’t know ........................ 888
Refused............................ 999 RSLPQUAL8
BASE: ALL RESPONDENTS
R3. P USE SHOW CARD #6 On average, over a 24 hour period, do you sleep (READ EACH ITEM):
(ASK RESPONDENT TO INCLUDE HOURS SPENT NAPPING)

Less than 5 hours.............1
5 hours.........................2
6 hours.........................3
7 hours.........................4
8 hours.........................5
9 hours.........................6
10 or more hours..............7
Don't know.....................888
Refused..........................999 R5LPAYG8

S. HEARING

BASE: ALL RESPONDENTS
S5.P. Are you wearing a hearing aid?

Yes.................................................................1
No.................................................................2
Don't know .....................................................888
Refused.........................................................999 SHEARAI8D8

BASE: ALL RESPONDENTS
S5a. P (With/Without a hearing aid) can you usually hear and understand what a person says without seeing his face if that person talks in a normal voice to you in a quiet room?

Yes, without a hearing aid.................................1
Yes, with a hearing aid.......................................2
No.................................................................3
Respondent is deaf..........................................4
Don't know .....................................................888
Refused.........................................................999 SHEAR85

BASE: ALL RESPONDENTS
S5b. P When was your last hearing test or exam?

Within the past year .............................................1
More than a year ago.........................................2
Never...................................................................3
Don't know .....................................................888
Refused.........................................................999 SHEAR85B

V. VISION

BASE: ALL RESPONDENTS
V6. P Can you see well enough to recognize a friend or a family member (when wearing glasses/contacts if applicable) (READ EACH ITEM)?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Respondent is Blind</th>
<th>Don't Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Across the street</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>b. Across the room</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>c. Who is at an arm's length away</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
<td>999</td>
</tr>
</tbody>
</table>

VVIS8A
VVIS8B
VVIS8C
BASE: ALL RESPONDENTS
V69.P When was your last vision exam?

Within the past year .......................................................... 1
More than a year ago .......................................................... 2
Never ................................................................................. 3
Don’t know ................................................................. 888
Refused ........................................................................... 999

K. HYPERTENSION

BASE: ALL RESPONDENTS
K1.P Has a doctor ever told you that you have high blood pressure?

Yes ................................................................................. 1
Suspect or possible ........................................................... 2
No ..................................................................................... 3
Don’t know ................................................................. 888
Refused ........................................................................... 999

ASK Q.K4.  

SKIP TO Q.GG1. BLOOD PRESSURE

BASE: HAVE EVER BEEN TOLD BY DOCTOR HAVE HIGH BLOOD PRESSURE (K1/1,2)
K4.P Are you currently taking any medication for high blood pressure?

Yes ................................................................................. 1
If “yes,” what type of medication __________________________

INCLUDE NAME, DOSAGE & FREQUENCY of MEDICINE/S

(Please record medications as they appear on the bottle)
No .................................................................................... 2
Don’t know ................................................................. 888
Refused ........................................................................... 999

KHYPER84

GG. BLOOD PRESSURE

BASE: ALL RESPONDENTS
GG1.P-R Now I would like to take your pulse and three blood pressure readings (two seated and one standing). While I do this, please sit back comfortably and rest both feet flat on the floor; do not cross your legs or ankles. (IF THE RESPONDENT HAS REASON (E.G. BRUISING, OPEN SORE) FOR NOT TAKING BLOOD PRESSURE, CODE NA.)

GG4.P-R First seated blood pressure reading?

GG5.P-R Second seated blood pressure reading?

(RECORD LOWEST SYSTOLIC/DIASTOLIC READING ON NOTE CARD.)
( DO NOT REMOVE CUFF UNLESS NECESSARY.)

(READ TO RESPONDENT): Please stand up and relax during the next series of questions after which I would like to take your blood pressure again while you are standing. If you are not able to stand, that’s fine, let’s continue.
### U. OTHER HEALTH PROBLEMS
**BASE: ALL RESPONDENTS**

**U3P.** Have you ever been told by a doctor or other health care professional that you had any of the following conditions? (READ EACH ITEM)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Kidney disease?</td>
<td>U63A</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>b. Stomach Ulcers?</td>
<td>U63B</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>d. Liver disease?</td>
<td>U63D</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>f. Osteoporosis?</td>
<td>U63F</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>g. Emphysema or chronic bronchitis (COPD)?</td>
<td>U63G</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>h. Parkinson's disease?</td>
<td>U63H</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>j. (IF MALE): Prostate problems?</td>
<td>U63J</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>k. Thyroid or other gland problems?</td>
<td>U63K</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>m. Anemia, low blood count?</td>
<td>U63M</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>n. Eye problems? (such as Cataracts, Glaucoma, or Macular degeneration)</td>
<td>U63N</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>q. Heart failure or heart disease?</td>
<td>U63Q</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>u. Alzheimer's disease or other memory problems?</td>
<td>U63U</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>x. Arthritis or rheumatism?</td>
<td>U63X</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>y. Cancer or malignant tumor?</td>
<td>LCANC</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>z. Pneumonia?</td>
<td>U63Z</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>I1. Had/suspect a heart attack, or coronary, or myocardial infarction, or coronary thrombosis?</td>
<td>ICARD</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>I5. If &quot;Yes&quot;, were you hospitalized overnight for this?</td>
<td>ICARD</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>J1. Had/suspect a stroke, blood clot in the brain, or brain hemorrhage?</td>
<td>JSTROK</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>J5. If &quot;Yes&quot;, were you hospitalized overnight for this?</td>
<td>JSTROK</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>N1. Had broken or fractured your hip?</td>
<td>NFRA</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>N5. If &quot;Yes&quot;, were you hospitalized overnight for this?</td>
<td>NFRA</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>N3. Had broken or fractured any other bone?</td>
<td>NFRA</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>N4. If &quot;Yes&quot;, what bone was it?</td>
<td>NFRA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J9. Had joint replacement?</td>
<td>J9</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>J9a. If &quot;Yes&quot;, what joint was replaced?</td>
<td>J9a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J9b. Was replacement necessary because of: fracture</td>
<td>J9b</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>or: arthritis</td>
<td>J9b</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
</tbody>
</table>
(INTERVIEWER: YOU REMAIN SEATED WITH YOUR EQUIPMENT ON THE TABLE OR COUNTER. IF THERE IS A FAMILY MEMBER AVAILABLE, YOU MAY ASK FOR THEIR ASSISTANCE.)

**BASE: ALL RESPONDENTS**

**GG7P-R.** First standing blood pressure reading?


(INTERVIEWER: TAKE THE BLOOD PRESSURE CUFF OFF AND MOVE EQUIPMENT AWAY FROM RESPONDENT. GIVE THE SUBJECT THE INDEX CARD WITH THEIR LOWEST SEATED READINGS. INDICATE WARNING IF BP IS GREATER THAN (160/110).)

**W. COGNITION – MMSE**

**BASE: ALL RESPONDENTS**

The next questions are about memory. The questions may seem unusual, but they are routine questions we ask of everyone. Some of the questions are very easy and some are difficult, so don’t be surprised if you have trouble with some of them. (IF REFUSE TO ANSWER RECORD AS ERROR)

**W1.P-R** What is the year? (PROBE IF DON’T KNOW: It is OK to guess.)

<table>
<thead>
<tr>
<th>/</th>
<th>/</th>
<th>/</th>
<th>/</th>
<th>/</th>
<th>Year</th>
<th>Correct......... 1</th>
<th>Error............. 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t know</td>
<td>..................................................</td>
<td>888</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refused</td>
<td>..................................................</td>
<td>999</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**W2.P-R** What is the season? (DO NOT READ LIST)

| Spring | .................................................. | 1 |
| Summer | .................................................. | 2 |
| Fall | .................................................. | 3 |
| Winter | .................................................. | 4 |
| Don’t know | .................................................. | 888 |
| Refused | .................................................. | 999 |

**W3.P-R** What is the month?

| January | .................................................. | 1 |
| February | .................................................. | 2 |
| March | .................................................. | 3 |
| April | .................................................. | 4 |
| May | .................................................. | 5 |
| June | .................................................. | 6 |
| July | .................................................. | 7 |
| August | .................................................. | 8 |
| September | .................................................. | 9 |
| October | .................................................. | 10 |
| November | .................................................. | 11 |
| December | .................................................. | 12 |
| Don’t know | .................................................. | 888 |
| Refused | .................................................. | 999 |

**W4.P-R** What is the date?

<table>
<thead>
<tr>
<th>Date</th>
<th>/</th>
<th>/</th>
<th>/</th>
<th>Correct......... 1</th>
<th>Error............. 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t know</td>
<td>..................................................</td>
<td>888</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refused</td>
<td>..................................................</td>
<td>999</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**W5.P-R**  What is the day of the week?

<table>
<thead>
<tr>
<th>Day</th>
<th>Correct</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Tuesday</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Wednesday</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Thursday</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Friday</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Saturday</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Sunday</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Don't know</td>
<td>888</td>
<td>0</td>
</tr>
<tr>
<td>Refused</td>
<td>999</td>
<td>0</td>
</tr>
</tbody>
</table>

**W6.P-R**  Can you tell me where we are right now? For instance, what state are we in?

<table>
<thead>
<tr>
<th>State</th>
<th>Correct</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>California</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Colorado</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>New Mexico</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Texas</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Other (SPECIFY)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don't know</td>
<td>888</td>
<td>0</td>
</tr>
<tr>
<td>Refused</td>
<td>999</td>
<td>0</td>
</tr>
</tbody>
</table>

**W7.P-R**  What county are we in?

<table>
<thead>
<tr>
<th>County</th>
<th>Correct</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Don't know</td>
<td>888</td>
<td></td>
</tr>
<tr>
<td>Refused</td>
<td>999</td>
<td></td>
</tr>
</tbody>
</table>

**W8.P-R**  What (city/town) are we in?

<table>
<thead>
<tr>
<th>City</th>
<th>Correct</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Don't know</td>
<td>888</td>
<td>0</td>
</tr>
<tr>
<td>Refused</td>
<td>999</td>
<td>0</td>
</tr>
</tbody>
</table>

**W9.P-R**  What floor of the building are we on?

<table>
<thead>
<tr>
<th>Floor</th>
<th>Correct</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Ground level</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Don't know</td>
<td>888</td>
<td>0</td>
</tr>
<tr>
<td>Refused</td>
<td>999</td>
<td>0</td>
</tr>
</tbody>
</table>

**W10.P-R**  What is this address?  
(YOU ONLY NEED STREET ADDRESS - IF THEY REFUSE TO ANSWER RECORD AS ERROR.)

<table>
<thead>
<tr>
<th>Address</th>
<th>Correct</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
W11.P-R  I'm going to name three objects. After I have said them, I want you to repeat them. Remember what they are because I am going to ask you to name them again in a few minutes.

"APPLE"   "TABLE"   "PENNY"

(CLEARLY AND SLOWLY, ABOUT ONE SECOND FOR EACH. AFTER YOU HAVE SAID ALL THREE, ASK RESPONDENT TO REPEAT THE WORDS. THE FIRST REPETITION DETERMINES THEIR SCORE, BUT CONTINUE SAYING THEM [UP TO 6 REPETITIONS] UNTIL RESPONDENT CAN REPEAT ALL THREE. IF REFUSES TO ANSWER RECORD AS ERROR.)

<table>
<thead>
<tr>
<th>Record</th>
<th>Correct</th>
<th>Error</th>
<th>Don't Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Apple</td>
<td>1</td>
<td>0</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>b. Table</td>
<td>1</td>
<td>0</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>c. Penny</td>
<td>1</td>
<td>0</td>
<td>888</td>
<td>999</td>
</tr>
</tbody>
</table>

RECORD NUMBER OF TRIALS: / / /

W12.P-R  Now I'd like you to spell a word for me. The word is "world". (IF RESPONDENT IS UNABLE TO SPELL THE WORD "WORLD", SPELL IT FOR HIM/HER) Now please spell the word "world" backwards.

| D | L | R | O | W |

LETTERS IN CORRECT ORDER:

1. .............................................. 1
2. .............................................. 2
3. .............................................. 3
4. .............................................. 4
5. .............................................. 5
Illiterate/Can't Read .................................... 777
None .............................................. 0
Don't know ........................................... 888
Refused ............................................ 999 | WMM5812 |

W13.P-R  Now what were the objects I asked you to remember? (IF REFUSES TO ANSWER RECORD AS ERROR)

<table>
<thead>
<tr>
<th>Record</th>
<th>Correct</th>
<th>Error</th>
<th>Don't Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Apple</td>
<td>1</td>
<td>0</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>b. Table</td>
<td>1</td>
<td>0</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>c. Penny</td>
<td>1</td>
<td>0</td>
<td>888</td>
<td>999</td>
</tr>
</tbody>
</table>
SHOW RESPONDENT A WRIST WATCH AND ASK:
W14 P-R What is this called? (IF RESPONDENT SAYS "WRISTWATCH" OR "WATCH", COUNT AS CORRECT. IF REFUSES TO ANSWER RECORD AS ERROR.) IF "CLOCK" PROBE: Is there another word for it? THEN IF ONLY RESPONSE IS CLOCK, CODE AS ERROR.

Watch
Correct..........................1
Error..........................0 WMMSE814
Don't know ............................................. 888
Refused............................................. 999

SHOW RESPONDENT A PENCIL AND ASK:
W15 P-R What is this called? (IF REFUSES TO ANSWER RECORD AS ERROR)

Pencil
Correct..........................1
Error..........................0 WMMSE815
Don't know ............................................. 888
Refused............................................. 999

W16 P-R I'd like you to repeat a phrase after me. The phrase is (READ THEM). (ALLOW ONLY 1 TRIAL. CODE "CORRECT" REQUIRES AN ACCURATELY ARTICULATED REPETITION. CODE CORRECT IF "S" ARE DROPPED)

No ifs, ands or buts

Correct .......................1
Error..........................0 WMMSE816
Don't know ............................................. 888
Refused............................................. 999

(SHOW RESPONDENT THE CARD THAT HAS PRINTED ON IT "CLOSE YOUR EYES")

W17 P-R USE SHOW CARD #9 Please read the words on this card and then do what it says. (CODE "CORRECT" IF PARTICIPANT CLOSES EYES)

Close your eyes

Correct..........................1
Error..........................0 WMMSE817
Don't know ............................................. 888
Refused............................................. 999

(READ THE FOLLOWING STATEMENT AND THEN HAND THE RESPONDENT A BLANK PIECE OF PAPER WITH BOTH HANDS)

W18 P-R (Thank you, please open your eyes now.) Please listen carefully to the following instructions. I'm going to give you a piece of paper. When I do, take the paper in your right hand, fold it in half with both hands, and put it on the floor. (DO NOT REPEAT INSTRUCTIONS OR COACH)

INTERVIEWER OBSERVATION Correct Error Unable to Do
a. Takes paper in right hand ...................... 1 0 7 WMMSE818A
b. Folds paper in half .............................. 1 0 7 WMMSE818B
c. Puts paper down on the floor .................. 1 0 7 WMMSE818C
(GIVE RESPONDENT A PIECE OF PAPER AND A PEN AND ASK THE FOLLOWING)

W19 P-R  Please write a complete sentence on the piece of paper. (MUST HAVE A VERB AND A SUBJECT AND MAKE SENSE. SPELLING AND GRAMMATICAL ERRORS ARE OK - ATTACH SHEET TO COMPLETED SURVEY)  

<table>
<thead>
<tr>
<th>Correct</th>
<th>Error</th>
<th>Unable to Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>

(WHAND RESPONDENT DRAWING HOLDING IT WITH LEFT PENTAGON POINTING UP)

W20 P-R  USE SHOW CARD # 10  Here is a drawing. Please copy it exactly on this sheet of paper. (MUST HAVE ALL 10 ANGLES AND TWO PENTAGONS MUST INTERSECT. TREMOR AND ROTATION ARE IGNORED). (ATTACH SHEET TO COMPLETED QUESTIONNAIRE)

<table>
<thead>
<tr>
<th>Correct</th>
<th>Error</th>
<th>Unable to Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>

END OF COGNITION SECTION

CPS. CONTROL PREFERENCES SCALE

BASE: ALL RESPONDENTS

ALL P-R  Now I have some questions about your preference for your decision making treatment. Please select one of the following statements that best reflects your preference on how you would decide your treatment decision (INTERVIEWER: Please circle only one response)

1. I prefer to make the final selection about which treatment I will receive ......................

2. I prefer to make the final selection of my treatment after seriously considering my doctor's opinion ............................

3. I prefer that my doctor and I share responsibility for deciding which treatment is best for me..............................

4. I prefer that my doctor make the final decision about which treatment, but seriously considers my opinion ..................

5. I prefer to leave all decisions regarding treatment to my doctor ..................................

6. If you do not make the final decision, then who does?  
   a. ........................................... Family  
   b. ........................................... Neighbors  
   c. ........................................... Friends
### X. FEELINGS/CESD

**BASE: ALL RESPONDENTS**

**X. P-R USE SHOW CARD #11** Now I have some questions about your feelings during the past week. For each of the following statements, please tell me if you felt that way in the past week rarely or none of the time (less than 1 day), some or a little of the time (1 to 2 days), occasionally or a moderate amount of time (3 to 4 days), most or all of the time (5 to 7 days)?

*(IF RESPONDENT GIVES NUMBER OF DAYS RECORD APPROPRIATELY)*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Rarely Or None Of the Time (Less Than 1 Day)</th>
<th>Occasionally Or A Little Of the Time (1-2 Days)</th>
<th>Occasionally Or A Moderate Amount Of Time (3-4 Days)</th>
<th>Most Or All Of the Time (5-7 Days)</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I was bothered by things that usually don't bother me</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>2. I did not feel like eating; my appetite was poor</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>3. I felt that I could not shake off the blues even with help from my family &amp; friends</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>4. I felt that I was just as good as other people</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>5. I had trouble keeping my mind on what I was doing</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>6. I felt depressed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>7. I felt that everything I did was an effort</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>8. I felt hopeful about the future</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>9. I thought my life had been a failure</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>10. I felt fearful</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>11. My sleep was restless</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>12. I was happy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>13. It seemed that I talked less than usual</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>14. I felt lonely</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>15. People were unfriendly</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>16. I enjoyed life</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>17. I had crying spells</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>18. I felt sad</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>19. I felt that people disliked me</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
<tr>
<td>20. I could not get going</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>888</td>
</tr>
</tbody>
</table>
BB. ACTIVITIES OF DAILY LIVING

IADLS

BASE: ALL RESPONDENTS

BB1.P Now I’d like to ask you about some of the activities of daily living, things that we all need to do as part of our daily lives. I would like to know if you can do these activities by yourself, without any help from anyone else. (READ LIST)

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don’t Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Can you use the telephone without any help (including looking up numbers and dialing)?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999 BB1A8</td>
</tr>
<tr>
<td>b. Can you drive your own car or travel alone on buses or taxis?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999 BB1B8</td>
</tr>
<tr>
<td>c. Can you go shopping for groceries or clothes without help (take care of all shopping needs yourself, assuming you had transportation)?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999 BB1C8</td>
</tr>
<tr>
<td>d. Can you prepare your own meals without help (plan and cook full meals yourself)?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999 BB1D8</td>
</tr>
<tr>
<td>e. Can you do light housework without help (dish washing and bed making, etc.)?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999 BB1E8</td>
</tr>
<tr>
<td>f. Can you take your medicine without help (in the right doses at the right time)?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999 BB1F8</td>
</tr>
<tr>
<td>g. Can you handle your money without help (write checks, pay bills, etc.)?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999 BB1G8</td>
</tr>
<tr>
<td>h. Can you do heavy work around the house like washing windows, walls and floors without help?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999 BB1H8</td>
</tr>
<tr>
<td>i. Can you walk up and down stairs to the second floor without help?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999 BB1I8</td>
</tr>
<tr>
<td>j. Can you walk half a mile without help?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999 BB1J8</td>
</tr>
</tbody>
</table>
ADLS

BASE: ALL RESPONDENTS

BB2a. P. Now I'm going to ask you some questions about the kind of help you need to do things. At the present time, do you need help from another person or special equipment or a device for (READ EACH ITEM)? (RECORD ANY HELP AS HELP). REPEAT LEAD QUESTION AND RESPONSE CATEGORIES AS NECESSARY.

<table>
<thead>
<tr>
<th>(DO NOT ROTATE)</th>
<th>Need Help</th>
<th>Don't Need Help</th>
<th>Unable To Do (Vol.)</th>
<th>Don't Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Walking across a small room........................1</td>
<td>2</td>
<td>3</td>
<td>888</td>
<td>999</td>
<td>BB2A8</td>
</tr>
<tr>
<td>b. Bathing (either a sponge bath, tub bath, or shower)..............................1</td>
<td>2</td>
<td>3</td>
<td>888</td>
<td>999</td>
<td>BB2B8</td>
</tr>
<tr>
<td>c. Personal grooming like brushing hair, brushing teeth, or washing face...............1</td>
<td>2</td>
<td>3</td>
<td>888</td>
<td>999</td>
<td>BB2C8</td>
</tr>
<tr>
<td>d. Dressing (like putting on a shirt, buttoning and zipping, or putting on shoes) ..................1</td>
<td>2</td>
<td>3</td>
<td>888</td>
<td>999</td>
<td>BB2D8</td>
</tr>
<tr>
<td>e. Eating (like holding a fork, cutting food, or drinking from a glass) .........................1</td>
<td>2</td>
<td>3</td>
<td>888</td>
<td>999</td>
<td>BB2E8</td>
</tr>
<tr>
<td>f. Getting from a bed to a chair........................1</td>
<td>2</td>
<td>3</td>
<td>888</td>
<td>999</td>
<td>BB2F8</td>
</tr>
<tr>
<td>g. Using the toilet.............................1</td>
<td>2</td>
<td>3</td>
<td>888</td>
<td>999</td>
<td>BB2G8</td>
</tr>
</tbody>
</table>

EE. RELIGION

BASE: ALL RESPONDENTS

EE2. P. USE SHOW CARD #14

How often do you go to church or religious services?

Never or almost never ..................................................... 1
Several times a year ..................................................... 2
Once or twice a month ................................................... 3 EE82
Almost every week ....................................................... 4
More than once a week .................................................. 5
Don't know ................................................................. 888
Refused................................................................. 999
# LIFE-SPACE

## ASK EVERYONE

<table>
<thead>
<tr>
<th>LIFE SPACE LEVEL</th>
<th>FREQUENCY</th>
<th>INDEPENDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASK FOR EVERY LEVEL</strong></td>
<td><strong>ONLY ASK IF YES USE SHOWCARD #12</strong></td>
<td><strong>Did you use aids or equipment?</strong></td>
</tr>
<tr>
<td>During the past four weeks, have you been to...</td>
<td>How often did you get there?</td>
<td>1 = Personal only</td>
</tr>
<tr>
<td>Life-Space Level 1...</td>
<td></td>
<td>1.5 = Equipment only</td>
</tr>
<tr>
<td>Other rooms of your home besides the room where you sleep?</td>
<td>Less than 1/week</td>
<td>Daily</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>1</td>
</tr>
<tr>
<td>Life-Space Level 2...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An area outside your home such as your porch, dock or patio, hallway (of an apartment building) or garage, in your own yard or driveway?</td>
<td>Less than 1/week</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Life-Space Level 3...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Places in your neighborhood, other than your own yard or building?</td>
<td>Less than 1/week</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>3</td>
</tr>
<tr>
<td>Life-Space Level 4...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Places outside your neighborhood, but within your town?</td>
<td>Less than 1/week</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>4</td>
</tr>
<tr>
<td>Life-Space Level 5...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Places outside your town?</td>
<td>Less than 1/week</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>5</td>
</tr>
</tbody>
</table>
QQ. WALKING

BASE: ALL RESPONDENTS
Now we would like to ask you about any walking that you do.

QQ1. In the past 14 days, have you done any walking for exercise?

Yes...................1  [ASK Q.QQ1a.]
No...................2
Don't know.........888
Refused.............999

Na, unable to walk.....0  [SKIP TO Q.CC3]
(...even with wheel chair or cane)

BASE: HAS DONE WALKING FOR EXERCISE (QQ1/1)

QQ1a. On the average, how many times in the past 14 days did you go walking for exercise?

/__/__/ [ENTER NUMBER OF TIMES]  [QQ1A8]

BASE: HAS DONE WALKING FOR EXERCISE (QQ1/1)

QQ1b. About how many minutes did you actually spend on each occasion? Answer must be in the range from 1 up to 300:

/__/__/__/ [ENTER NUMBER OF MINUTES]  [QQ1B8]

Codes:   1 Hour=60 min   1.5 Hour=90 min   2 Hours=120 min
         2.5 Hours=150 min   3 Hours=180

BASE: ALL RESPONDENTS

QQ2. In the past 14 days, have you done any other walking, for example, to go to the store, to visit someone in the neighborhood, or to go to church?

Yes...................1  [ASK Q.QQ2a.]
No...................2
Don't know.........888
Refused.............999

BASE: HAS DONE OTHER WALKING (QQ2/1)

QQ2a. On the average, how many times in the past 14 days did you go walking like that?

/__/__/ [ENTER NUMBER OF TIMES]  [QQ2A8]

BASE: HAS DONE OTHER WALKING (QQ2/1)

QQ2b. About how many minutes did you actually spend on each occasion? Answer must be in the range from 1 up to 300:

/__/__/__/ [ENTER NUMBER OF MINUTES]  [QQ2B8]

Codes:   1 Hour=60 min   1.5 Hour=90 min   2 Hours=120 min
         2.5 Hours=150 min   3 Hours=180
CC. LIFE SATISFACTION/LONELINESS

BASE: ALL RESPONDENTS

CC3. USE SHOW CARD #13

Now please think about your life as a whole. How satisfied are you with it? Are you completely satisfied, very satisfied, somewhat satisfied, or not at all satisfied?

Completely satisfied ........................................... 1
Very satisfied .......................................................... 2
Somewhat satisfied.................................................. 3
Not at all satisfied..................................................... 4
Don't know .............................................................. 888
Refused ..................................................................... 999  CC83

BASE: ALL RESPONDENTS
The next questions are about how you feel about different aspects of your life. For each one, please say how often you feel that way.

CC4a. How often do you feel you lack companionship?

Often .............................................................................. 1
Some of the time......................................................... 2 CC4A8
Hardly ever ..................................................................... 3
Don't know ................................................................. 888
Refused ..................................................................... 999

CC4b. How often do you feel left out?

Often .............................................................................. 1
Some of the time......................................................... 2 CC4B8
Hardly ever ..................................................................... 3
Don't know ................................................................. 888
Refused ..................................................................... 999

CC4c. How often do you feel isolated from others?

Often .............................................................................. 1
Some of the time......................................................... 2 CC4C8
Hardly ever ..................................................................... 3
Don't know ................................................................. 888
Refused ..................................................................... 999

LL. FINANCIAL STRAIN

(INTVIEWER: ASK FOR LAST CALENDAR YEAR)

BASE: ALL RESPONDENTS

LL5a. USE SHOW CARD #15

How much difficulty do you have in meeting monthly payments on your bills - a great deal, some, a little, or none?

A great deal ................................................................. 1
Some ........................................................................... 2
A little .......................................................................... 3
None ........................................................................... 4
Don't know ................................................................. 888
Refused ..................................................................... 999  LL85A
BASE: ALL RESPONDENTS

LL5b. USE SHOW CARD #16

At the end of the month, do you usually end up with some money left over, just enough to make ends meet, or not enough money to make ends meet?

- Some money left over .................................................. 1
- Just enough to make ends meet ..................................... 2
- Not enough money to make ends meet .............................. 3
- Don't know ................................................................. 888
- Refused ................................................................. 999

BASE: ALL RESPONDENTS

LL6. Do you own your own home?

- Yes .............................................................................. 1
- No ............................................................................... 2
- Don't know ................................................................. 888
- Refused ................................................................. 999

CC. LIFE EVENTS

ASK EVERYONE

CC1. Here is a list of things which sometimes happen to people and might have an effect on their health. As I read the list, stop me whenever I mention something that happened to you in the past three months.

(READ LIST)

<table>
<thead>
<tr>
<th>DO NOT ROTATE</th>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. Experience an illness or injury (get sick or hurt) that kept you from your usual activities (work, housework) for a week or more</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>c. Did anyone close to you die</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>o. Have you eaten less than normal</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>o1. If &quot;Yes&quot;, is this because of a lack of appetite?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>o2. If &quot;Yes&quot;, is this because of chewing difficulties?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>o3. If &quot;Yes&quot;, is this because of swallowing difficulties?</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
<tr>
<td>o4. If &quot;Yes&quot;, is this because you have a lot of pain</td>
<td>1</td>
<td>2</td>
<td>888</td>
<td>999</td>
</tr>
</tbody>
</table>
KK. HEALTH CARE SERVICE UTILIZATION

Now I'd like to ask you some questions about your use of health care services.

BASE: ALL RESPONDENTS
KK2.P Not including any overnight stays in a nursing home or hospital, how many times in the past 12 months, that is since (DATE ONE YEAR AGO) have you visited with a medical doctor? (INTERVIEWER: INCLUDE VISITS WITH A PHYSICIAN'S ASSISTANT OR NURSE PRACTITIONER AT AN HMO OR CLINIC).

<table>
<thead>
<tr>
<th># of Times</th>
<th>Don't Know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ / / /</td>
<td>888</td>
<td>999</td>
</tr>
</tbody>
</table>

BASE: ALL RESPONDENTS
CC1a.P Since (DATE ONE YEAR AGO) did you experience an illness or injury (get sick or get hurt) that required staying overnight or longer in a hospital (not a nursing home)?

Yes ................................................................. 1
If "yes," how many different times were you hospitalized? ______
No ......................................................................... 2
Don't know ............................................................ 888
Refused ................................................................. 999

HH. PERFORMANCE ORIENTED MOBILITY ASSESSMENT (POMA)

Now let's move on to a more active part of the interview. As you know, certain movements of your body may become more difficult to do as you grow older. I would now like you to try to do different movements of your body that involve your arms or legs.

I will first describe and show each movement to you. Then I'd like you to try to do it. If you cannot do a particular movement or if you feel it would be unsafe to try to do it, tell me, and we'll move on to the next one. Let me emphasize that I do not want you to try to do any exercise you feel might be unsafe. Do you have any questions before we begin? (PAUSE AND RESPOND TO ANY QUESTION THAT IS RAISED). O.K., let's begin. I'm going to demonstrate first and then I will ask you to try the exercise.

INTERVIEWER: PLEASE OBSERVE THE RESPONDENT AND RECORD YES OR NO:

HHA. Is Respondent bedridden? HHA8

Yes ............ 1
No .......... 2

ASK HHB

HHB. Is Respondent unable to stand with support? HHB8

Yes ............ 1
No .......... 2

ASK HHC

ASK HH10. GAIT/WALK

ASK HHD

ASK HH10. GAIT/WALK IF CAN WALK WITH AID OF WHEEL CHAIR. OTHERWISE SKIP TO HH7A. HAND GRIP

ASK HH1. STANDS

IF NOT TO ALL ABOVE ITEMS, ASK HH1. STANDS

23
STANDS

(INTERVIEWER: MAKE SURE THERE IS A SOLID OBJECT (LIKE A CHAIR OR TABLE) THAT THE RESPONDENT CAN USE TO HOLD ON TO FOR BALANCE OR SUPPORT, IF THEY NEED IT, AT THE START OF EACH EXERCISE. IF RESPONDENT SAYS, "I CAN TRY," PROCEED WITH EXERCISE.)

Side-By-Side Stand (Eyes Open)
HH1.P-R I would like you to try to stand with your feet together, side-by-side, for about ten seconds. (DEMONSTRATE THE SIDE-BY-SIDE POSITION FOR THE RESPONDENT).

You may use your arms, bend your knees or move your body to maintain your balance, but try not to move your feet. Try to hold this position until I say stop. Are the instructions, as I've explained them to you, clear?

- STAND NEXT TO RESPONDENT TO HELP HIM/HER INTO THE SIDE-BY-SIDE POSITION.
- SUPPLY JUST ENOUGH SUPPORT TO THE RESPONDENT’S ARM TO PREVENT LOSS OF BALANCE.
- WHEN THE RESPONDENT HAS HIS/HER FEET TOGETHER, ASK THE PARTICIPANT IF HE/SHE IS READY.
- THEN LET GO AND START TIMING AS YOU SAY START.
- STOP THE STOP-WATCH AND SAY STOP AFTER 10 SECONDS OR WHEN THE RESPONDENT STEPS OUT OF POSITION. RECORD TO NEAREST TENTH OF A SECOND IF STEPS OUT EARLY.

Number of seconds held: / / / / (IF HELD FOR 10 SECONDS, ASK Q.HH2)
( IF LESS THAN 10 SECONDS, SKIP TO Q.HH5a )

Tried but unable .................................................. 111
Not attempted, interviewer felt unsafe ................................... 222
Not attempted, respondent felt unsafe................................. 333
Refused ....................................................................... 999

SKIP TO Q HH5a

NO HH1
ASK Q.HH2 IF RESPONDENT WAS ABLE TO HOLD STAND FOR 10 SECONDS (Q.HH1)

Semi-Tandem Stand (Eyes Open)

HH2 P-R I would like you to try to stand with the side of the heel of one foot touching the big toe of the other foot for about ten seconds. You may use either foot, whichever is more comfortable for you. (DEMONSTRATE THE SEMI-TANDEM POSITION FOR THE RESPONDENT).

You may use your arms, bend your knees or move your body to maintain your balance, but try not to move your feet. Try to hold this position until I say stop. Are the instructions, as I've explained them to you, clear?

- STAND NEXT TO RESPONDENT TO HELP HIM/HER INTO THE SEMI-TANDEM POSITION.
- SUPPLY JUST ENOUGH SUPPORT TO THE RESPONDENT'S ARM TO PREVENT LOSS OF BALANCE.
- WHEN THE RESPONDENT HAS HIS/HER FEET IN THE SEMI-TANDEM POSITION, ASK THE PARTICIPANT IF HE/SHE IS READY.
- THEN LET GO AND START TIMING AS YOU SAY START.
- STOP THE STOP-WATCH AND SAY STOP AFTER 10 SECONDS OR WHEN THE RESPONDENT STEPS OUT OF POSITION. RECORD TO NEAREST TENTH OF A SECOND IF STEPS OUT EARLY.

Number of seconds held: [ ] [ ] [ ] [ ] [ ] (IF HELD FOR 10 SECONDS, ASK Q.HH3)
(If less than 10 seconds, skip to Q.HH5a)

Tried but unable ...................................................... 111
Not attempted, interviewer felt unsafe .......................... 222
Not attempted, respondent felt unsafe ............................ 333
Refused ................................................................. 999

SKIP TO Q HH5a
NDHH82
ASK Q.HH3 IF RESPONDENT WAS ABLE TO HOLD PREVIOUS STAND FOR 10 SECONDS

**Tandem Stand (Eyes Open)**

**HH3.P-R** Now I would like you to try to stand with the heel of one foot in front of and touching the toes of the other foot for about ten seconds. You may use either foot, whichever is more comfortable for you. (DEMONSTRATE THE TANDEM POSITION FOR THE RESPONDENT).

You may use your arms, bend your knees or move your body to maintain your balance, but try not to move your feet. Try to hold this position until I say stop. Are the instructions, as I’ve explained them to you, clear?

- STAND NEXT TO RESPONDENT TO HELP HIM/HER INTO THE TANDEM POSITION.
- SUPPLY JUST ENOUGH SUPPORT TO THE RESPONDENT’S ARM TO PREVENT LOSS OF BALANCE.
- WHEN THE RESPONDENT HAS HIS/HER FEET IN THE TANDEM POSITION, ASK THE PARTICIPANT IF HE/SHE IS READY.
- THEN LET GO AND START TIMING AS YOU SAY START.
- STOP THE STOP-WATCH AND SAY STOP AFTER 10 SECONDS OR WHEN THE RESPONDENT STEPS OUT OF POSITION. RECORD TO NEAREST TENTH OF A SECOND IF STEPS OUT EARLY.

<table>
<thead>
<tr>
<th>HH83</th>
<th>Number of seconds held: __ __ __ __ __</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tried but unable.......................... 111</td>
</tr>
<tr>
<td></td>
<td>Not attempted, interviewer felt unsafe........ 222</td>
</tr>
<tr>
<td></td>
<td>Not attempted, respondent felt unsafe......... 333</td>
</tr>
<tr>
<td></td>
<td>Refused..................................... 999</td>
</tr>
</tbody>
</table>

NOHH83

**REPEATED CHAIR STANDS**

**HH5a.P-R** Now I want to ask you to try to stand and sit in a chair five times. Do you think it would be safe for you to try to stand up from a chair without using your arms five times quickly?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>888</th>
<th>999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes..........................</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No..........................</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Don't know................</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Refused....................</td>
<td></td>
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</tr>
</tbody>
</table>

**HH5a8**

**BASE: UNSAFE TO DO REPEATED CHAIR STANDS (Q.HH5a/2)**

**HH5b.P-R** Why do you think it would be unsafe? (Select as many as apply)

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>888</th>
<th>999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can’t stand on own</td>
<td></td>
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<tr>
<td>Back problems</td>
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<td>Leg problems</td>
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<td></td>
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<tr>
<td>Knee problems</td>
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<tr>
<td>Dizzy spells</td>
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<td>Fear</td>
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<tr>
<td>Arthritis</td>
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<td></td>
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<tr>
<td>OTHER: (RECORD VERBATIM)</td>
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<td></td>
<td></td>
<td>7</td>
<td></td>
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<tr>
<td>Don’t know</td>
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<td>888</td>
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</tr>
<tr>
<td>Refused</td>
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<td></td>
<td>999</td>
<td></td>
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</tr>
</tbody>
</table>

GO TO Q HH5c

UNSFSTN8
UNSFBA8
UNSFLEG8
UNSPNNE8
UNSFDSR8
UNSFED8
UNSFAR8
UNSFARTH8
UNSFOTH8
UNSFDK8
UNSFREF8

UNSFDFF8

79
BASE: SAFE TO DO REPEATED CHAIR STANDS OR UNSURE (Q.HH5a/1.8)

HH5d. P-R
(DEMONSTRATE REPEATED CHAIR STAND TO RESPONDENT.)

Keep your arms folded across your chest. Please stand up straight as quickly as you can five times without stopping in between. After standing up each time, sit down and then stand again. I’ll be timing you with a stop-watch. Please begin when I say “ready, stand.”

- WHEN RESPONDENT IS PROPERLY SEATED, SAY READY, STAND AND BEGIN TIMING.
- COUNT OUT LOUD AS HE/SHE ARISES EACH TIME, UP TO FIVE.
- STOP THE STOP-WATCH WHEN HE/SHE HAS STRAIGHTENED UP COMPLETELY THE FIFTH TIME AND ALL BODY MOVEMENT HAS CEASED.
- IF THE RESPONDENT SITS DOWN AFTER THE FIFTH STAND-UP, STOP TIMING AS HE/SHE BEGINS TO SIT DOWN.

Completed:
Yes .................................................. 1  SKIP TO Q HH5f
No ..................................................... 0  ASK Q HH5c
Refused .............................................. 999

BASE: REPEATED CHAIR STANDS NOT COMPLETED (Q.HH5d/0.9) OR NOT ATTEMPTED (Q.HH5b/1.7)

HH5c. P-R  Reason not completed five chair stands.

Tried but unable ........................................ 1  SKIP TO Q HH10
Not attempted, safety reasons ....................... 2
Not attempted, chair bound .......................... 3
Not attempted, other (SPECIFY) .................... 4
Refused .............................................. 999

BASE: COMPLETED 5 CHAIR STANDS (Q.HH5d/1)

HH5f. P-R  Time to complete all 5 chair stands? (RECORD TO NEAREST TENTH OF A SECOND)

/ / / .  / / /  Seconds HH5f8

HH5g. P-R  Chair height (inches from floor to top of the back of the seat or seat cushion)? (RECORD TO NEAREST QUARTER INCH.)

/ / / .  / / /  Inches HH5g8

GAIT ASSESSMENT

Walking  (Eight Feet)

(IF RESPONDENT IS UNABLE TO WALK, EVEN WITH AN AID SUCH AS A CANE, WALKER, OR LEANING ON A WHEELCHAIR, SKIP TO Q.HH17a)

HH10. P-R  Now we are going to observe how you normally walk. If you use a cane or other walking aid and would feel more comfortable with it, then you may use it.

EXTEND THE RULER OR TAPE TO THE EIGHT FOOT LENGTH AND PLACE IT ON THE FLOOR AT THE SIDE ON AN AREA WHICH OFFERS AT LEAST 10 FEET AND IDEALLY 12 FEET OF WALKING SPACE. IF POSSIBLE THIS SHOULD BE A UNIFORM WALKING SURFACE.

27
This is our walking course. I want you to walk to the other end of the course at your usual speed, just as if you were walking down the street to go to the store. I want you to walk all the way past the other end of the rule before you stop and don’t slow down as you get close to the end. I will walk with you. (DEMONSTRATE THE WALK FOR THE RESPONDENT).

When I want you to start, I will say: Ready, begin.

- HAVE THE RESPONDENT STAND WITH BOTH FEET TOGETHER AT THE END OF THE RULE.
- WHEN THE RESPONDENT IS PROPERLY POSITIONED AT STARTING LINE, SAY "READY, BEGIN".
- START STOP-WATCH AS THE RESPONDENT BEGINS WALKING, AND STOP TIMING WHEN ONE OF THE RESPONDENT'S FEET IS ALL THE WAY ACROSS THE END LINE.
- WALK BESIDE THE RESPONDENT.
- RECORD THE NUMBER OF STEPS REQUIRED TO COMPLETE EIGHT FEET.
- RECORD TO NEAREST TENTH OF A SECOND.

a. Completed?  
   Yes: 1  
   No: 2  
   Refused: 999

ASK Q.HH10b
SKIP TO QHH10d HH10A8

BASE: WALK COMPLETED (Q.HH10a/1)

b. Seconds to complete? / / / . / / HH10B8

c. Number of steps? / / / HH10C8

SKIP TO Q.HH10e

BASE: WALK NOT COMPLETED (Q.HH10a/2,9)
d. Reason walk not completed?
   Tried but unable: 1
   Not attempted, interviewer felt unsafe: 2
   Not attempted, respondent felt unsafe: 3
   Not applicable: 666
   Refused: 999

SKIP TO QHH7a GRIP STRENGTH HH10D8

BASE: WALK COMPLETED (Q.HH10a/1)
e. Aids for first walk?
   No aid: 1
   Wheelchair (as walking aid): 2
   Walker: 3
   Quad cane: 4
   Other cane: 5
   Other walking cane: 6

HH12a.P-R. Any difficulty finding 12 foot space for walking?
   Yes: 1
   No: 2

HH12a8

HH12b.P-R. Type of walking surface?
   Uncarpeted: 1
   Low carpet: 2
   Other (SPECIFY): 3

HH12B8

28
Grip Strength

(SUBJECT SHOULD NOT HAVE HAD ANY HAND OR WRIST SURGERY IN THE PAST 3 MONTHS [12 WEEKS]. EXAMPLES OF SURGERY INCLUDE FUSION, ARTHROPLASTY, TENDON REPAIR, OR SYNOVECTOMY INVOLVING THE UPPER EXTREMITY. DISCONTINUE WITH ANYONE COMPLAINING OF PAIN AND CHECK "UNABLE/DISCONTINUED".)

HH7a. P-R. Now, I am going to use this instrument called a Dynamometer to test the strength in the hand you feel is stronger. However, if you have had any surgery on your arm in the last three months, you should not do this exercise. Have you had any recent surgery?

Yes ................................................................. 1
No................................................................. 2
Don't know ........................................................ 888
Refused .............................................................. 999

SKIP TO Q11a HEIGHT AND WEIGHT

ASK Q.HH7b HH7A8

Base: HAVE NOT HAD SURGERY ON HAND OR ARM (Q.HH7a/2.8.9)

(AJUST GRIP SCALE FOR FEMALE (5 TO 6), MALE (6 TO 7))

HH7b. P-R. I'd like you to place the arm that you think is the stronger on the table with your palm facing up. Grab the handles using an underhand grip. (DEMONSTRATE DYNAMOMETER). Let me know if the grip needs to be adjusted. When I say squeeze, squeeze as hard as you can. The handles will not move, but I will be able to read the force of your grip on the dial. I will ask you to do this two times. If you feel any pain or discomfort, tell me and we will stop (SCORE AS "UNABLE/DISCONTINUED"). Record to nearest half kilogram.

<table>
<thead>
<tr>
<th>Trial 1</th>
<th>Trial 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>kilograms HH7B1</td>
<td>kilograms HH7B2</td>
</tr>
<tr>
<td>Unable/Discontinued 444</td>
<td>Unable/Discontinued 444</td>
</tr>
<tr>
<td>Not performed for safety reasons 555</td>
<td>Not performed for safety reasons 555</td>
</tr>
<tr>
<td>Refused 999</td>
<td>Refused 999</td>
</tr>
<tr>
<td>NCH7DB81</td>
<td>NCH7DB82</td>
</tr>
</tbody>
</table>

HH7c. P-R Hand tested?

Right ................................................................. 1
Left ................................................................. 2
Not applicable ..................................................... 3 HH7C8

Interviewer: RECORD GRIP SCALE FROM THE HANDLE (TO THE CLOSEST WHOLE NUMBER):

<table>
<thead>
<tr>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
</table>
| 1 | 2 | 3 | Gripscl8

II. Height and weight

Base: All respondents

II1a. Now we'd like to get your height and weight. Why don't you slip off your shoes and remove heavy jewelry or clothing. Now stand back against this door with your feet, heels together on the floor and with your heels, hips, back and head directly against the wall. Look straight ahead.

Height (to nearest quarter-inch) | / / / | / / / | Inches II1A8
Unable to stand 888
Refused 999

29
BASE: ALL RESPONDENTS (EVEN IF WE MEASURED RESPONDENTS HEIGHT)
II1a.a. We would like to measure the distance between the middle of your chest and the tips of your finger. This is called the demi-span, a simple way to calculate your height.

<table>
<thead>
<tr>
<th>Demi-span (to the nearest centimeter)</th>
<th>Centimeters</th>
<th>Unable to do</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>888</td>
<td>999</td>
</tr>
</tbody>
</table>

BASE: ALL RESPONDENTS
(PLEASE PLACE SCALES ON A FLAT SURFACE)
II1b.P-R. Now let’s get your weight.

<table>
<thead>
<tr>
<th>Weight (to nearest pound)</th>
<th>Pounds</th>
<th>Unable to stand 888</th>
<th>Refused 999</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

BASE: UNABLE TO STAND OR REFUSED TO GET ON SCALES (II1b/888, 999)
II1d. Can you please tell me how much you weigh? (SUBJECT may reply with something like the last time I went to the doctor, I weighed __________. Or they may say about __________. These are fine. They give us an estimate.)

<table>
<thead>
<tr>
<th>Reported Weight (to nearest pound)</th>
<th>Pounds</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>999</td>
</tr>
</tbody>
</table>

II1c. INTERVIEWER: TYPE OF SURFACE.

<table>
<thead>
<tr>
<th>Uncarpeted</th>
<th>Low carpet</th>
<th>Other (SPECIFY)</th>
<th>Reported Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

J. Minimal Umbilicus Measurement

BASE: ALL RESPONDENTS
(SKIP IF BEDRIDDEN)

JJ1.P-R. Now I would like to measure your waist circumference. (RESPONDENT SHOULD BE STANDING ERECT WEARING ONLY ONE LAYER OF OUTER CLOTHING -- MEASURE IN CENTIMETERS TO NEAREST MILLIMETER.)

* STAND BESIDE RESPONDENT.
* PLACE TAPE MEASURE AROUND THE BODY AT THE NARROWEST POINT BETWEEN RIBS AND THE TOP OF THE HIP BONE. RECORD THE MEASUREMENT IN CENTIMETERS TO THE NEAREST MILLIMETER (EX. 53.7 CENTIMETERS).

(IF NECESSARY, ASK: “Could you show me your navel?” POINT TO YOUR OWN NAVAL.)

<table>
<thead>
<tr>
<th>Measure1</th>
<th>Measure2</th>
</tr>
</thead>
<tbody>
<tr>
<td>JJ1</td>
<td>JJ2</td>
</tr>
<tr>
<td>Centimeters</td>
<td>Centimeters</td>
</tr>
<tr>
<td>Refused measure1</td>
<td>Refused measure2</td>
</tr>
<tr>
<td>999</td>
<td>999</td>
</tr>
</tbody>
</table>
NURSING HOME

BASE: ALL RESPONDENTS
KK5a,P Have you/has respondent (name) ________________ ever been in a nursing home or rest home or an assisted living facility in which you/has he received some help with daily activities like preparing meals, bathing or getting dressed, or going to the bathroom?

Yes  1
No  2
Don't Know  888
Refused  999

ASK KK 6a

SKIP TO QNN1 KK8E

BASE: EVER BEEN IN NURSING HOME (KK6/1)
KK6a,P When did you/she enter the facility?

/ / / / / / / / / / Year of entry KK86A

Don't know  888
Refused  999

BASE: EVER BEEN IN NURSING HOME (KK6/1)
KK6b,P How long were you/has he/she been in this facility?

/ / / / OR / / / / OR / / / / Number of days Number of Years Number of Months

Don't know  888
Refused  999

NOKK86D
NN FOLLOW-UP

No telephone..............................................-1
Don't know .............................................-8
Refused....................................................-9

NN2.P What is your correct street address?
Street: ........................................................
City: .......................................................... State: .............. Zip: ............
Don't know .............................................-8
Refused....................................................-9

NN2a.P Do you have a different mailing address? (IF YES, RECORD BELOW)
Street: ........................................................
City: .......................................................... State: .............. Zip: ............

NN3a.P Do you plan to move in the next few years?
Yes............................................................1
No..............................................................2
Don't know .............................................888
Refused....................................................999

BASE: PLAN TO MOVE IN NEXT FEW YEARS (Q.NN3a/1)
NN3b.P Where do you plan to move?
........................................................................
Don't know .............................................-8
Refused....................................................-9

BASE: ALL RESPONDENTS
NN4.P Can you please give me the names, addresses, and telephone numbers of two people (preferably a child) who do not live with you and who know where you are, in case we need to contact you in the future?

1. Name (Last, First, MI): ..................................................
Street: ..........................................................
City: .......................................................... State: .............. Zip: ............
Telephone: (_____ _____ _____) ..................................................
........................................................................
/ / / / ENTER RELATIONSHIP CODE Don't know ___-8 Refused ___-9

2. Name (Last, First, MI): ..................................................
Street: ..........................................................
City: .......................................................... State: .............. Zip: ............
Telephone: (_____ _____ _____) ..................................................
........................................................................
/ / / / ENTER RELATIONSHIP CODE Don't know ___-8 Refused ___-9
TIME ENDED: ____________________________ A.M./P.M.

OO. INTERVIEWER OBSERVATIONS/COMMENTS

OO12. Type of housing: (INTERVIEWER PLEASE CHECK ONE)

Single ................................................................. 1
Multi-family house .................................................. 2
Apartment ............................................................. 3
Assisted living ....................................................... 4
Congregate housing ................................................ 5
Group quarters ....................................................... 6
Other (SPECIFY): ................................................... 7 OO812

OO2. Was someone else present during the interview?

Yes ............................................................... 1
No ............................................................... 2
Don’t know .................................................... 888
Refused .......................................................... 999 OO82

OO8. Why were some or all of the physical measures not attempted?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Not</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Respondent is bedridden                           -1</td>
<td>-2</td>
<td>666</td>
<td>OO88A</td>
<td></td>
</tr>
<tr>
<td>b. Respondent cannot stand even with support         -1</td>
<td>-2</td>
<td>666</td>
<td>OO88B</td>
<td></td>
</tr>
<tr>
<td>c. Respondent needs support when standing            -1</td>
<td>-2</td>
<td>666</td>
<td>OO88C</td>
<td></td>
</tr>
<tr>
<td>(walker, crutch)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>d. Respondent cannot understand what to do, even when demonstrated -1</td>
<td>-2</td>
<td>666</td>
<td>OO88D</td>
<td></td>
</tr>
<tr>
<td>e. Respondent is blind                               -1</td>
<td>-2</td>
<td>666</td>
<td>OO88E</td>
<td></td>
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<tr>
<td>f. Respondent was dizzy                              -1</td>
<td>-2</td>
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<td>OO88F</td>
<td></td>
</tr>
<tr>
<td>g. Respondent is paralyzed                           -1</td>
<td>-2</td>
<td>666</td>
<td>OO88H</td>
<td></td>
</tr>
<tr>
<td>h. Respondent is paralyzed                           -1</td>
<td>-2</td>
<td>666</td>
<td>OO88I</td>
<td></td>
</tr>
<tr>
<td>i. Respondent is deaf                                -1</td>
<td>-2</td>
<td>666</td>
<td>OO88J</td>
<td></td>
</tr>
<tr>
<td>g. Other reasons                                     -1</td>
<td>-2</td>
<td>666</td>
<td>OO88J</td>
<td></td>
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Specify ____________________________________________________________________________
### ALL ANSWER

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
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</thead>
<tbody>
<tr>
<td>OO9a. Completed</td>
<td></td>
</tr>
<tr>
<td>Completed</td>
<td></td>
</tr>
<tr>
<td>Respondent only</td>
<td>1</td>
</tr>
<tr>
<td>Proxy only</td>
<td>2</td>
</tr>
<tr>
<td>Both (long proxy version)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>OO9b. Completed</td>
<td></td>
</tr>
<tr>
<td>Completed</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>1</td>
</tr>
<tr>
<td>Spanish</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>OO9c. REASON FOR PROXY: (CHECK ALL THAT APPLY)</td>
<td></td>
</tr>
<tr>
<td>Subject physically ill or recovering from hospital</td>
<td>1 PRXRILL8</td>
</tr>
<tr>
<td>Subject was deaf</td>
<td>2 PRXDEAF8</td>
</tr>
<tr>
<td>Subject away indefinitely</td>
<td>3 PRXAWAY8</td>
</tr>
<tr>
<td>Sample subject is mentally incapacitated, or has memory problems such as dementia or Alzheimer’s Disease</td>
<td>4 PRXMENT8</td>
</tr>
<tr>
<td>Denied access to nursing home</td>
<td>5 PRXNONH8</td>
</tr>
<tr>
<td>Other (SPECIFY)</td>
<td>6 PRXOTH8</td>
</tr>
</tbody>
</table>

### INTERVIEWER ANSWER ONLY IF THIS IS A PROXY:

**DO NOT ASK SUBJECT**

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>OO9d. Is the PROXY a caregiver of the respondent?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
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</table>

### OO10. INTERVIEWER COMMENTS:

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

### OO11. ADDITIONAL INTERVIEWER COMMENTS:

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
VITAE

Celeste Alvidrez

Email: CelesteAlvidrez1@gmail.com

Celeste Alvidrez holds a bachelor’s degree in health Promotion with a minor in community health from the University of Texas at El Paso. Graduate studies include biostatistics, epidemiology, chronic and infectious diseases, and data science. She is also a Certified Health Education Specialist as well as a Certified Phlebotomist through the National Health Association. Mrs. Alvidrez also has 2 years of experience using IBM SPSS statistics software to analyze statistical data in educational, private and research settings.

She has worked as a Disease / Health Intervention Specialist (DIS) for the City of El Paso’s Health Department. As a DIS, she provided active surveillance to reduce communicable and infectious diseases. Specifically, she conducted contact tracing, epidemiological reports, and facilitated screening, diagnosis and treatment of these diseases as needed.

Previous to this, Mrs. Alvidrez worked as an intern at the El Paso Health Department as an undergraduate. Specifically, she developed a Zika campaign targeting at risk populations, such as pregnant mothers, as the sole creative social media director, where she prepared and handed out literature, brochures, and other prevention materials related to Zika.

She has most notably worked as a program coordinator for the Diabetes Garage, a program at the University of Texas at El Paso as a graduate research assistant. She was responsible for preparation of materials, recruitment of research participants, and prepared, manipulated, and managed extensive databases. During her time here, she was able to assist the program in providing diabetes education to men, specifically in El Paso, Texas, to help them better maintain their diabetes and symptoms.