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The Association Between a History of Prior Experience with Meditation and the Prevalence of Chronic Health Conditions: Evidence from the 2012 NHIS.

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ABSTRACT

The Association Between a History of Prior Experience with Meditation and the Prevalence of Chronic Health Conditions: Evidence from the 2012 NHIS.

By

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01/06/2017

The use of Complementary and Alternative Medicine (CAM) has grown in popularity since the 1990's. One possible explanation is the Western medicine's inability to adequately treat pain and chronic diseases. Hypertension, high cholesterol, diabetes and obesity each pose significant public health challenges, and effective treatment requires lifestyle modification. Meditation, by attenuating the body's stress response, may positively impact a wide range of chronic health concerns. However, research on meditation has been mixed and is often criticized for methodological shortcomings. The National Health Interview Survey (NHIS) most recently included questions about CAM in 2012. NHIS-based research describes differences in both CAM utilization and the prevalence of chronic health outcomes by region.

We conducted a secondary analysis of the 2012 NHIS data to test our hypothesis of a negative association between ever having meditated and select chronic health outcomes. Due to software limitations we conducted separate analyses to account for the complex sampling and multilevel data structure with clustering of observations by region. Hypertension and meditation were not associated in the weighted logistic (OR=1.05 (95%CI= (0.91, 1.22)] or the unweighted marginal (OR=1.00 95%CI= (0.85, 1.18)] adjusted models. High cholesterol was

positively associated with ever having meditated in both the weighted logistic (OR=1.27, 95%CI= (1.11, 1.46)] and unweighted marginal (OR=1.23, 95%CI= (1.17, 1.28)] adjusted models. Diabetes was not associated with ever having meditated in the weighted adjusted logistic model (OR=0.81, 95%CI= (0.62, 1.07)]. However, a negative association with meditation was found in the unweighted adjusted marginal (OR=0.81, 95%CI= (0.70, 0.95)] model. The association of meditation with BMI was negative in all models.

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Author's Statement Page

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TABLE OF CONTENTS

List of Tables

INTRODUCTION

Complementary and Alternative Medicine (CAM) is a diverse group of systems and products used in the maintenance of health but not usually included in the conventional Western medical curriculum. CAM therapies are based on a shared belief that the body is a holistic system that can heal itself. They are often grouped into five broad categories: alternative systems of medicine such as Ayurveda, manipulation and body-based therapies such as chiropractic, energy healing such as Reiki, biologically-based therapies such as herbs and supplements, and mind-based therapies such as meditation (Nguyen, Davis, Kaptchuk, & Phillips, 2011). The use of CAM in the U.S. began to grow substantially the 1990's. One explanation put forward for this growth is dissatisfaction and frustration with Western medicine's inability to adequately treat many chronic diseases and pain syndromes. As such, CAM modalities have most often been used to treat issues such as neck and back pain, head or chest colds, joint pain and stiffness, and anxiety or depression (Barnes, Powell-Griner, McFann, & Nahin, 2004).

It has been estimated that between $36 and $47 billion dollars were spent on CAM therapies by the U.S. public in 1997. Of this, between $12.2 and $19.6 billion was out of pocket. In terms of out-of-pocket spending, that is more than was spent on hospitalizations and about half as much as was spent for all physician services combined (Barnes et al., 2004). In 1998, partly in response to the growing popularity and expenditures around CAM, The National Center for Complementary and Integrative Health (NCCIH) was established. It's stated mission was to guide and conduct research into CAM ("About NCCIH," 2011) . In 1999 the National Health and Interview Survey (NHIS), whose goal is to quantify the health status and health service use of the noninstitutionalized US population, for the first time included a question asking about CAM utilization. (Barnes et al., 2004, p. 3) Subsequent NHIS surveys (2002, 2007 and 2012) have included increasingly complex patterns of questions around CAM usage.

An analysis of the 2007 NHIS data found that 4 out of 10 adults had used CAM the prior year. Also found was a significant association between CAM use and both the report of excellent health and of improved health over the prior year (Nguyen et al., 2011). CAM utilization was found to be more prevalent among certain groups including: women, ages 30-69, those living in the west, those with higher levels of education, those who engaged in physical activities for leisure, and among adults who had one or more existing health conditions (Barnes, Bloom, & Nahin, 2008). An analysis of the 2012 NHIS data revealed that total out of pocket expenditures on CAM increased as family income increased. The expenditures by American families on CAM for 2012 were estimated to be $30.2 billion. (Nahin, Barnes, & Stussman, 2016) This amounts to approximately 9.2% of the estimated $328.8 billion total of out of pocket health spending for that year (Centers for Medicare & Medicaid Services, 2014). Chronic diseases and related health conditions, such as heart disease, diabetes, obesity, and stroke, are among the most common, costly and preventable health conditions in the United States. As of 2012, approximately half of U.S. adults were estimated to have one or more chronic health conditions. In 2010, 86% of health care spending was for people with one or more chronic medical conditions. (CDC, 2016) The overlap in spending between CAM modalities and chronic health conditions as well as the high level of CAM utilization among those with multiple medial conditions begs the question of whether or not CAM modalities are able in some way to help address the current chronic health crisis in the U.S.

Different regions in the United States (Northeast, Midwest, South and West) show considerable variation in both demographics and CAM utilization. In terms of educational attainment, as reported from the 2009 American Community Survey (ACS) data, the percentage of the population with at least a GED or high school diploma was highest in the Midwest and lowest in the South. At the level of a bachelor's degree or higher, the largest percentage was found to be in the Northeast and again the smallest was in the South (Ryan & Siebens, 2012). Information from the 2010 census showed the oldest median age to be in the Northeast (39.2), followed by the Midwest (37.7), the South (37.0), and the West (35.6). The West contained the highest percentage of the 18-44 age group while the Northeast contained the highest percentage of the 45-64 age group. The highest male to female sex ratios were found in the Western states, and the lowest sex ratios were found in the Northeast (Howden & Meyer, 2011). Total family income has been found to be highest for whites in the Northeast and West and lowest for non-Hispanic blacks in the Midwest and South (Hoover & Yaya, 2010). In considering CAM utilization as described in the 2012 NHIS data, the greatest percentage of adults used meditation in the Western Region while the lowest percentages were seen in the South. There were no differences in utilization noted between the Northeastern and Midwestern regions which were both higher than in the South and lower than in the West (Peregoy, Clarke, Jones, et al., 2014).

Differences between the regions with respect to health have also been reported. Compared to other regions, the South has a higher mean blood pressure and reported cholesterol consumption (Hajjar & Kotchen, 2003). Accordingly, the south has also been found to have a higher percentage of adults being treated for hypertension (27.3%) compared to the west (19.8%). The Midwest (23.9%) and Northeast (24.8%) were not found to be significantly different from the national average (Davis, 2012). Higher proportions of obesity have been reported in the South, especially as compared to the western region (32% vs 25% respectively). Disparities have in part been attributed to differences in economy, physical activity, food environment, population structure, and level of education (Myers, Slack, Martin, Broyles, & Heymsfield, 2015). An analysis of the Medial Expenditure Panel Survey (MEPS) data from 2007 found that of the 1747 adults with type 2 diabetes surveyed, 39.5% lived in the south while the other regions were equally represented. Diabetics in the South were also the least likely to receive education around managing their diabetes (Brown-Guion, Youngerman, Hernandez-Tejada, Dismuke, & Egede, 2013). In terms of obesity, there appears to be a general agreement between different data sources that the West has the lowest prevalence; however, there is disagreement between self-report and measurement data as to which area has the highest. (Le et al., 2014)

The popularity of mind-based practices as an approach to health in the United States is growing. Almost 80% of the 140 accredited medical schools in the US now incorporate mindfulness based interventions into their treatment, education or research programs (Black & Slavich, 2016). In the NHIS data, mind-based practices have often been referred to collectively as meditation. We will similarly use the term meditation in this analysis to represent a group of varying mind-based practices. Self-reported use of meditation in the United States as reported in NHIS was 7.6% in 2002 to 9.4% in 2007, and 8.0% in 2012 keeping it among the top five most commonly used CAM modalities in each of those years (Clarke, Black, Stussman, Barnes, & Nahin, 2015). Even though the findings in the literature in regards to the effects of mind-based practices on chronic disease are conflicting, the accumulating evidence suggests that such practices may attenuate the experience of chronic illness (Hart, 2007). The analysis presented here will focus specifically on meditation as a mind-based domain of CAM and its relationship with various chronic health outcomes. Following is a further exploration of meditation as a practice and meditation research as it applies to several chronic health outcomes: hypertension, high cholesterol, diabetes, and obesity.

Review of the Literature

2.1 Meditation

The current definition of meditation is both functional and broad to reflect the varied backgrounds of the many techniques being used in both personal practice and research. The NCCIH describes meditation as having four basic elements: a quiet location free of distraction; a specific, comfortable posture; a focus on attention; and an open attitude (Meditation, 2006). Such a broad definition has proven to be challenging as it aggregates many disparate and distinct practices. In considering the 2012 NHIS questionnaire, practices which may or may not be included in meditation depending on the preference of the researcher include: Mantra meditation, Transcendental meditation, Relaxation Response, Clinically Standardized Meditation, Mindfulness meditation, Vipassana Meditation, Zen Buddhist Meditation, Mindfulness-Based Stress Reduction, Mindfulness-based Cognitive Therapy, Spiritual meditation, Centering Prayer, Contemplative Meditation, Guided Imagery, and Progressive Relaxation. Data is also presented for Yoga, Tai Chi, and Qi Gong.

There is no consensus as to exactly which practices should be included when describing meditation. Some practices, such as Yoga and Tai Chi, involve movement components which may separately be considered as exercise. As a result, it is questionable whether results associated with the practices are due to the meditation or movement components (Sun, Buys, & Jayasinghe, 2014). To further complicate matters, certain practices in the NHIS data are represented by a common variable which may or may not be agreed upon by researchers or adherents of those practices. For example, Spiritual meditation, Centering Prayer and Contemplative Meditation are all clustered into a single category. An examination of the 2002 NHIS data found that excluding prayer "specifically for health reasons" reduced estimates of CAM use from 62.1% to 36.0%. At the same time 45% of adults used prayer specifically for health (Barnes et al., 2004). That being said, there is no consensus among researchers as to whether or not "prayer is meditation" and whether or not it should be included in research (Tippens, Marsman, & Zwickey, 2009).

The intended benefits of a meditation practice include improved mental and physical health, deeper tranquility, deeper insight into the nature of existence, and spiritual liberation (Burke & Gonzalez, 2011). Although meditation practices have their roots in religious and spiritual practices, some reaching back thousands of years, mediation research is fairly recent. The first meditation studies were conducted in the 1960's at Harvard University. The studies focused on practitioners of Transcendental Meditation and monitored their heart rates, respiratory rates, and core body temperatures (Hart, 2007). Much of the subsequent research into meditation came from the mental health community and focused on conditions such as anxiety and depression. Kabat-Zinn et al. found the use of an 8-week Mindfulness Based Stress Reduction (MBSR) course to significantly reduce symptoms of anxiety and panic, the results of which were subsequently repeated in a number of studies (Sarris et al., 2012). Research on meditation has since been widely expanded to include a plethora of health outcomes including: fibromyalgia, epilepsy, psoriasis, hypertension, breast and prostate cancer, diabetes, HIV, and substance abuse (Manish J. Parswani, Sharma, & Iyengar, 2013). A 2010 literature review of the use of MBSR for chronic health concerns found improvements in regards to mental health, physical health, quality of life and well-being. Overall, positive changes predominated, but as with most meditation research there were issues around the research methodologies employed (Merkes, 2010).

The methodologies utilized in meditation research are often criticized as being flawed and have been highlighted in a growing number of systematic reviews (Park, 2013). A recent systematic review of meditation for posttraumatic stress disorder reinforced the use of meditation for posttraumatic stress and depression; however, the findings were based on a mostly low to moderate quality of evidence, and none of the studies addressed functional status (Hilton et al., 2016). A systematic review of Meditation Interventions for Chronic Disease Populations published in 2015 demonstrated that meditation improved symptoms of anxiety, depression, and of chronic diseases. However, consistency was lacking across disease and across the types of meditation interventions (Chan & Larson, 2015). A systematic review published in 2013 examined meditation as an intervention for binge eating, emotional eating, and weight loss. The authors' findings were supportive of the accumulating evidence of mindfulness training as an important contributor to making positive changes in disorder eating. However, the included studies were also criticized for short follow-up times, lacking active comparison groups, and having small sample sizes (Katterman, Kleinman, Hood, Nackers, & Corsica, 2014). A recent review of clinical trials, focused on Mindfulness meditation and the immune system, showed beneficial effects on stress-related ailments and symptomology as well as a heavy reliance on self-reported health status which can be prone to recall bias, failure to include a comparison condition to account for the nonspecific effect of the intervention, oversampling of females, and the use of nonrandomized matching methods (Black & Slavich, 2016).

2.2 Hypertension

Hypertension increases the risk of cardiovascular disease (CVD), is the leading cause of kidney failure and stroke, and is a major cause of heart attacks. In 2009 the direct medical spending to treat hypertension in the U.S. totaled $47.5 billion (Davis, 2012). A report of data from the 20011-2012 National Health and Nutrition Examination Survey (NHANES) found that hypertension affects nearly one-third of U.S. adults and that uncontrolled hypertension continues to be a challenge in minority populations. The overall prevalence of hypertension was found to be similar in men and women and to increase with age. The prevalence in adults was highest among non-Hispanic blacks (42.1%), followed by non-Hispanic whites (28.0%), Hispanics (26.0%), and non-Hispanic Asians (24.7%) (Nwankwo, Yoon, Burt, & Gu, 2013). Hypertension continues to be the single greatest contributor to the global burden of disease and mortality, leading to an estimated 9.4 million deaths each year (Poulter, Prabhakaran, & Caulfield, 2015). The causes of CVD are multifaceted, and treatment often requires lifestyle changes which include mind-body interventions (Guarneri, Mercado, & Suhar, 2009).

Stress has been one of the most important modern influences on global health with cardiovascular damage being one of the main consequences. Stress may function as an adaptive response to help ensure survival, but stress-related hormones have been associated with impaired glucose metabolism, hypertension, weight gain, arrhythmia, inflammation, hyperlipidemia, and coronary spasm (Guarneri et al., 2009). Meditation is an easy and efficient way to help manage both physical and psychological stress. Stress reduction has been observed in several types of meditation, and all types of meditation are associated with blood pressure control (Koike & Cardoso, 2014). Meditative practices have been associated with a reduced risk of cardiovascular events, a reduction in Myocardial Infarction (MI) recurrence, and a reduction in overall cardiovascular mortality (Guarneri et al., 2009). However, since no validated sham technique for meditation is available, the likely substantial placebo effect of any meditation technique is hard to quantify (Manikonda et al., 2008).

The literature on meditation and its possible role in controlling hypertension has been mixed. A 2004 systematic review of 39 randomized clinical trials of Transcendental Meditation (TM) concluded that all of the trials had serious methodological weaknesses, and the clinical effects on blood pressure may not be more than marginally relevant (Canter & Ernst, 2004). A separate review of controlled research on the TM program, published that same year, found that as a result of TM's ability to reduce the long-lasting effects of stress the program is useful in the prevention and treatment of CVD (Walton, Schneider, & Nidich, 2004). Subsequent studies seem to support the later conclusion. A 2008 randomized pilot trial found contemplative meditation to effectively lower blood pressure in essential hypertension under both resting conditions and during mental stress. The observed antihypertensive effects were substantial and of similar magnitude to pharmacotherapeutic trials (Manikonda et al., 2008). Similar findings from a randomized clinical trial using TM in subjects with coronary heart disease showed a positive impact on adjusted blood pressure, insulin resistance, and cardiac autonomic tone compared with the control group (Paul-Labrador et al., 2006). A more recent evidence-based review of CAM approaches to blood pressure reduction found that while the evidence supporting CAM is not as robust as that supporting pharmacotherapy, it upheld the use of Qigong, slow breathing techniques, and meditation as methods of blood pressure reduction (Nahas, 2008).

2.3 Diabetes

Diabetes is a metabolic disorder which develops when the body is unable to make enough insulin and/or is unable to use insulin effectively. As a result, blood glucose elevates and over time can damage nerves and blood vessels. Negative health outcomes resulting from chronically elevated blood glucose include: heart disease, kidney disease, stroke, blindness, amputations, and dental disease. Heredity and environment both play an important role in determining who will develop diabetes. People who eventually develop diabetes are more likely to be 45 or older, overweight or obese, an ethnic minority, have a history of high blood pressure, have elevated HDL cholesterol, or have a history of CVD (*Causes of Diabetes*, 2014).

An analysis of the NHIS data from 1980 to 2012 showed a doubling of the prevalence and incidence of diabetes from 1990-2008 followed by a plateauing from 2008-2012. During the 2008-2012 segment, a continued increase in the prevalence of diabetes was seen in certain subgroups including Hispanics, non-Hispanic-blacks, and those with a high school education or less (Geiss et al., 2014). In 2012 approximately 7% of the US population had been diagnosed with diabetes with an estimated cost of care being $245 billion. One study suggests that if current trends continue, as many as one in three U.S. adults could have diabetes by 2050 (Association, 2013). The rise in diabetes has mirrored a similar trend in BMI which has been estimated to account for 90-95% of all diabetes (Geiss et al., 2014).

Greater than 70% of those living with diabetes will suffer a stroke or heart attack; greater than 5% will suffer blindness in one or both eyes; approximately 5% will face end-stage renal disease; and nearly 10% will lose a toe or worse to amputation. Diabetes causes significant life stress requiring physical, emotional, and psychological accommodation. Diabetes is often accompanied by anxiety, depression, strained social relationships, and physical complications (Whitebird, Kreitzer, & O'Connor, 2009). Psychological distress has also been associated with impaired glycemic control (Miller, Kristeller, Headings, Nagaraja, & Miser, 2012). Chronic psychological stress can also promote the development of insulin resistance (Gainey, Himathongkam, Tanaka, & Suksom, 2016). The increased stress levels around diabetes also have a negative impact on HbA1c levels and interfere with self-management making the management of stress paramount in the treatment of Diabetes (Jung, Lee, & Park, 2015).

Strict management of blood glucose levels, glycated hemoglobin (HbA1c), and glycemic variability are of the utmost importance in treating diabetes and preventing complications (Jung et al., 2015). Buddhist Walking Meditation has recently been found to significantly decrease HbA1c (Gainey et al., 2016). Mindfulness Based Stress Reduction (MBSR) has shown success in some studies by helping to reduce stress, manage depression, and reduce levels of HbA1c in participants with Diabetes Mellitus (Miller et al., 2012). Previous studies on MBSR and diabetes had shown a similar positive impact on psychological outcomes, however no significant difference was seen in terms of physical health (Hartmann M et al., 2012). A randomized control trial on subjects with coronary heart disease from 2006 found that both fasting blood glucose and insulin levels were improved in the Transcendental Meditation group compared with the Health Education (HE) group. Also the HE group was significantly more depressed and angry (Paul-Labrador et al., 2006). A study on the comparative effectiveness of a mindful eating intervention showed an improvement in dietary intake, modest weight loss, and improved glycemic control (Miller et al., 2012). Similar to its use in other areas meditation for the management of diabetes shows potential; however, there are conflicting findings, and more work in the area is needed.

2.4 High Cholesterol

High Cholesterol is often included when speaking of chronic disease because it is a major contributor to heart disease. Elevated levels of cholesterol can lead to a plaque-like build-up on the arterial walls which over time can impede blood flow to the heart. While cholesterol is often considered as a single measure, it is usually more informative to speak if it in relation to its component parts: LDL (low-density lipoprotein) cholesterol, HDL (high density lipoprotein) cholesterol, and triglycerides. HDL cholesterol protects against heart disease; LDL cholesterol is the main source of build-up in the arteries, and triglycerides are a separate form of fat in the blood which can also contribute to heart disease at higher levels (National Heart Lung and Blood Institute, 2005).

A variety of both inherited and behavioral factors can affect cholesterol levels. Diets high in saturated fat have been found to increase total blood cholesterol. Being overweight, as is customarily measured by body mass index (BMI) tends to increase cholesterol levels, and losing weight increases HDL levels and lower triglycerides. Physical activity has been found to increase HDL and lower LDL levels. With age, cholesterol levels tend to rise in both men and women. Before menopause, women tend to have lower total cholesterol levels than men of the same age, but after menopause women's LDL levels tend to rise. High levels of cholesterol can have a genetic link and tend to run in families. Finally, cigarette smoking and hypertension are major risk factors that affect LDL levels (National Heart Lung and Blood Institute, 2005).

In 2011 the Centers for Disease Control and Prevention (CDC) estimated that 71 million Americans (33.5%) had high low-density LDL cholesterol. Cholesterol levels vary by race/ethnicity and sex. Having high cholesterol approximately doubles one's risk for heart disease which is the leading cause of death in the United States. High cholesterol often goes undiagnosed due to a lack of overt symptoms. Less than half of adults with high LDL cholesterol get treated, and it is estimated that only one in three adults with high cholesterol have it under control. (CDC, Behavioral Risk Factor Surveillance System, 2015) It has been suggested that a 10% decrease in the treatment of high LDL cholesterol could prevent approximately 8,000 deaths per year (*Vital Signs*, 2011). Cholesterol can be lowered through a combination of lifestyle modifications and medication, should lifestyle modifications alone not be sufficient (CDC, Behavioral Risk Factor Surveillance System). This "TLC" approach (Therapeutic Lifestyle Changes) is recommended for anyone whose LDL levels are above the desired level and includes a cholesterol lowering diet, physical activity, and weight management (National Heart Lung and Blood Institute, 2005). However, accumulating data suggest that there can still be substantial risk for heart disease in those who achieve recommended LDL levels, and that a further focus on raising beneficial HDL levels is also needed.

There are fewer studies assessing the use of meditation as a means of addressing high cholesterol, as compared to its use with hypertension and diabetes. As early as 1979 "chronic sympathetic nerve over activity," AKA stress, was implicated as a factor capable of elevating serum cholesterol. That same year, TM was found to lower serum cholesterol (Cooper & Aygen, 1979). Subsequent research indicated that stress may disproportionately affect serum cholesterol levels in African Americans, and again TM was found to be, an effective treatment for stress, and thereby help in addressing elevated serum cholesterol levels (Calderon et al., 1999). More recent research into Cholesterol with other types of meditation has yielded similar results. A randomized exercise intervention study utilizing Buddhist Walking Meditation found a significant reduction in serum LDL levels beyond that of the traditional walking exercise control group (Prakhinkit, Suppapitiporn, Tanaka, & Suksom, 2014). Another recent study, this time focusing on a short-term lifestyle intervention via yoga, found a significant increase in HDL cholesterol levels after only a 10-day period. Also found were significant reductions in blood pressure, fasting glucose level, and weight as reflected in BMI (Yadav, Magan, Yadav, Sarvottam, & Netam, 2014).

2.5 BMI/Obesity

Body Mass Index (BMI) is a person's weight in kilograms divided by their height as measured in square meters. BMI shows a moderate correlation with more direct forms of body fat measurement (e.g. skin fold thickness) and appears to be strongly correlated with metabolic disease outcomes. As such, BMI can be used as an inexpensive and effective screening tool. While BMI is a continuous measure, it is more often considered in terms of standard weight status categories: below 18.5 is underweight, 18.5-24.9 is normal or healthy weight, 25.0-29.9 is overweight, and 30.0 and above is obese. For the purpose of this study, which is also a Public Health Biostatistics thesis, BMI will be analyzed as a continuous outcome. Participants in the obese category are at increased risk for all causes of death and hypertension, dyslipidemia, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea, chronic inflammation, and some cancers. In addition to its link to numerous negative physical health outcomes, obese individuals are also at increased risk for mental illness such as clinical depression, anxiety, and other mental disorders (Centers for Disease Control and Prevention, 2016). It has been suggested that negative emotions and stress are key factors in overeating, a form of maladaptive coping response that can be associated with obesity (Alert et al., 2013).

The prevalence of obesity in the United States has climbed steadily since the 1960's, reaching epidemic proportions. Results from the 2011-2012 NHANES survey estimated 33.9% of US adults to be overweight, 35.1% to be obese, and 6.4% to be extremely obese based on measured BMI. The national estimated cost of obesity is quite high. In 2008 the cost of direct medical care for obesity was estimate to be $147 billion. An additional estimated $3.38-$6.38 billion-dollar loss in productivity was attributed to obesity-related absenteeism. At a given BMI level, body fat may vary by sex, age, race and Hispanic origin. In general, men are more likely to be overweight than women, but women are more likely to be obese or extremely obese. Prevalence of obesity has traditionally been highest among non-Hispanic blacks, followed by Hispanics, non-Hispanic whites, and lowest in non-Hispanic Asians. However, research suggests that at lower BMI's Asians may have more body fat than non-Hispanic whites. Therefore health risks for non-Hispanic Asians may begin at lower BMI's (Fryar, Carroll, & Ogden, 2014).

Approaches to treating obesity range from lifestyle changes to medication and surgical interventions. Of the more conservative approaches, a multicomponent intervention including mindfulness components has been found to lead to the greatest reduction in weight (Singh et al., 2008). Most of the research around meditation and obesity has been fairly recent and much of it in the form of pilot studies. An early pilot study with ten obese patients which included training in mindfulness meditation, mindful eating and an emphasis on awareness of triggers to overeat found statistically significant decreases in weight, binge eating, depression and perceived stress (Dalen J et al., 2010). A pilot study around mindful restaurant eating found that in women eating out at least 3 times per week, a combination of education and mindful eating meditation led to a significant increase in weight loss, lower caloric intake, lower fat intake, and fewer barriers to weight management when eating out (Timmerman & Brown, 2012). A subsequent pilot study with thirty-one obese patients provided preliminary evidence that a comprehensive mind-body intervention could result in significant changes in both BMI and triglyceride levels (Alert et al., 2013).

Much of the early research around meditation and BMI suffered from design flaws, including using small convenience samples, short follow-up times, and lacking control groups. More recently, research around mindfulness and weight control has expanded to more rigorous study designs. A randomized control trial of mindfulness-based eating found clinically significant improvements in insulin resistance, lipid profiles, and a trend towards improved weight loss in the mindfulness group (Daubenmier et al., 2014). A recent cross-sectional analysis of data from the NutriNet-Sante study on 64,704 individuals from 2009-2014 found that after adjusting for sociodemographic and lifestyle factors, regular practitioners of mind-body techniques were less likely to be overweight [OR=0.68, 95%CI= (0.63,0.74)] or obese [OR=0.55, 95%CI= (0.50,0.61)] than never users (Camilleri, Méjean, Bellisle, Hercberg, & Péneau, 2016).

2.7 Research Questions, Aims and Hypotheses

We conducted a secondary analysis of the 2012 NHIS data, the most recent containing information on CAM utilization, with the overall goal of investigating the relationship between the presence of a meditation practice and the prevalence of obesity, hypertension, high cholesterol, and diabetes

Aim: Assess the association between the presence of a meditation practice and the prevalence of hypertension, high cholesterol, diabetes, and obesity.

H1: There will be a negative association between the presence of a meditation practice and the prevalence of hypertension, high cholesterol, diabetes, and obesity.

METHODS AND PROCEDURES

3.1 Data Source:

Data were obtained from the publicly available Family, Person, Sample Adult, and Adult Alternative components of the 2012 National Health Interview Survey (NHIS). ("NHIS - 2012 Data Release," 2014) NHIS is an ongoing assessment of the health status and healthcare utilization habits of the civilian, noninstitutionalized US population. Data are collected by employees of the US Census bureau on an ongoing basis through personal, in-home interviews. All adults 18 years of age or older (19 in Alabama & Nebraska, 21 in Mississippi) who are present at the time of the survey were invited to participate. Participants were asked questions regarding their health and healthcare utilization from the previous year.

NHIS uses a complex sample design involving stratification, clustering and multi-stage sampling which allows for oversampling of minorities and participants who are 65 years of age or older to produce data on both the household and individual level. The 2012 survey contains data on 42,366 households. Overall 108,131 persons from 43,345 families were sampled. Individual representative adults are selected from each of the surveyed households. In 2012 a supplement assessing CAM utilization was included along with the core components of the survey, and 34,525 representative adults were surveyed on their individual alternative healthcare utilization habits. ("NHIS - About the National Health Interview Survey," 2016)

3.2 Variables

Predictor of Interest: Data for meditation practices were obtained from the Adult Alternative component of the 2012 NHIS data set.

In this analysis the presence of a meditation practice was the exposure of interest. A stem question addressed meditation by asking participants "Have you ever used meditation, guided imagery, or progressive relaxation?" Responses from this stem question were recoded as a dichotomous variable. Responses for "Refused", "Not Ascertained", and "Don't Know" were considered to be missing. A positive response on the recoded meditation variable indicates having performed any of the following at some point in one's life:

- Mantra meditation, including Transcendental Meditation, Relaxation Response, and Clinically Standardized Meditation.
- Mindfulness meditation, including Vipassana, Zen Buddhist meditation, Mindfulness-based Stress Reduction, and Mindfulness-based Cognitive Therapy.
- Spiritual meditation including Centering Prayer and Contemplative Meditation.
- Guided Imagery.
- Progressive Relaxation.

Additional data for each subgrouping of meditation type listed above were available which indicate the presence of a practice in the past year. Only lifetime practice data were considered in the analysis.

Outcomes of Interest: Data for the outcomes of interest were obtained from the Sample Adult component of the 2012 NHIS data set.

Hypertension: Responses from two questions were combined to create a dichotomous outcome variable for hypertension status. A stem question asked participants if they had "ever been told by a doctor or other healthcare professional that you had hypertension, also called high blood pressure?" A follow-up question asked those who gave a positive response if they were "told on two or more different visits that you had hypertension?" Responses of "Refused", "Not Ascertained", and "Don't Know" for either variable were recoded as missing in the recoded hypertension variable. Additional data were available for the past year. They were not considered in this analysis.

High Cholesterol: Responses from one question "Have you ever been told by a doctor or other health care professional that you had High Cholesterol?" were recoded into a dichotomous variable. Responses of "Refused", "Not Ascertained", and "Don't Know" were considered as missing in the recoded high cholesterol variable. Additional data indicative of high cholesterol status for the past year were present. They were not considered in this analysis.

Diabetes: The responses from one question "Have you ever been told by a doctor or other health care professional that you have diabetes or sugar diabetes?" were recoded into a dichotomous variable. Responses of “Refused”, “Not Ascertained”, and “Don’t Know” were considered missing in the recoded variable.

BMI: BMI was calculated with self-reported data. A description of the calculation from the NHIS 2012 documentation is described below.

Traditionally, BMI data are aggregated by sex and categories are created that include: underweight is BMI < 18.5; healthy weight is BMI 18.5 to < 25; overweight is BMI >=25 to <30; and obese is BMI >= 30. However, for this analysis BMI was analyzed as a continuous outcome.

Covariates: Data for the covariates listed below were obtained from the Sample Adult, Person, and Family components of the 2012 NHIS data set.

Age: Data for age were obtained from the Sample Adult component of the 2012 NHIS data set. Age was reported on a scale of 18-84 years. Any respondents aged 85 or older were grouped into a single category and represented by the age 85. The value of the age variable was considered as both a continuous variable in its measured form, and as a dichotomous variable with, 18-84 and 85+ groups.

Income: Data for total family income were obtained from the Family component of the 2012 NHIS data set. The four levels of the income group variable ($0-$34,999; $35,000-$74,999; $75,000-$99,000; and $100,000 and over) were recoded as a new variable (as 1, 2, 3, & 4 respectively). Responses of “undefined” and “unknown” were recoded as missing.

Education: Data for highest level of personal educational attainment were obtained from the Person component of the 2012 NHIS data set. Educational data were recoded as four categories: Less than High School, High School/GED, College, and Advanced degree which were defined as listed below. Responses of “Refused”, “Not Ascertained”, and “Don’t Know” were recoded as missing.

- Less than High School: Never attended /kindergarten only and 1st-12th grade with no diploma.
- High School/GED: High School Graduate and GED or equivalent.
- College: Some college, no degree; Associate degree: occupational, technical, or vocational program; Associate degree: academic program; and Bachelor’s degree (Example: BA, AB, BS, BBA).
- Advanced Degree: Master’s degree (Example: MA, MS, MEng, Med, MBA); Professional School degree (Example: MD, DDS, DVM, JD), and Doctoral degree (Example: PhD, EdD).

Race/Ethnicity: Data for race/ethnicity obtained from the Person component of the 2012 NHIS data set. The variable was kept in its original form: 1-Hispanic, 2-Non-Hispanic White, 3-Non-Hispanic Black, 4-Non-Hispanic Asian, and 5-Non-Hispanic Other race groups. The race/ethnicity variable was recoded from race and ethnicity variables from survey questions. Missing values were imputed with “hot deck” imputation as described in the 2012 survey description (“2012 NHIS Survey Description - srvydesc.pdf,” 2013).

Sex: Data for sex were obtained from the Sample Adult component of the 2012 NHIS data set. The variable for sex was recoded as a new dichotomous variable.

Health Status: Data for health status were obtained from the Person component of the 2012 NHIS data set. The health status variable was recoded as a new ordinal variable with the original levels of the variable retained: 1-Excellent Health, 2-Very Good Health, 3-Good Health, 4-Fair Health, and 5-Poor Health. Values for "Refused", "Not Ascertained", and "Don't Know" were recoded as missing.

Marital Status: Data for marital status were obtained the Sample Adult component of the 2012 NHIS data set. Marital status was recoded as a dichotomous variable as indicated below. Unknown marital status was recoded as missing.

- Married/Partnered: Married-spouse in household, Married-spouse not in household, Married-spouse in household unknown, Separated, Living with Partner.
- Not Currently Married: Widowed, Divorced, Never Married.

Region: Data for region were obtained from the Sample Adult component of the 2012 NHIS data set. No change was made to the variable for region: Northeast, Midwest, South, and West. More specific information on region of residence was withheld to protect participant confidentiality (Parsons, Moriarity, Jonas, & et al.).

3.3 Descriptive Statistics

SAS 9.4 was used for all statistical analyses.

Predictor and Categorical Outcomes: *Meditation, Hypertension, High Cholesterol & Diabetes*

PROC FREQ was used to tabulate conditional unweighted sample frequencies for meditation and each outcome. Unweighted Means and standard deviations (SD) for age were produced utilizing *PROC MEANS*. A *WHERE* statement was used with each unweighted procedure to restrict the sample to respondents aged 18-84.

PROC SURVEYFREQ was used to estimate weighted frequencies for meditation and each categorical outcome. Stratification, clustering, and sampling weight variables were present in the data and utilized in this procedure. NOMCAR was specified as a procedure command so that missing data were treated as "not missing completely at random." The sample was restricted to participants age 18-84 through the use of a domain statement. Frequencies for meditation and outcomes conditional on level of the predictor/covariates were reported. *PROC SURVEYMEANS* was used to produce weighted Means (SDs) for age. Strata, Clusters and weights were specified in the same manner as named previously for PROC SURVEYFREQ. The sample was restricted to participants age 18-84 through the use of a domain statement.

Continuous Outcome: *BMI*

PROC UNIVARIATE with the *plot* and *normal* options was used to generate a histogram, box and whisker, and QQ plots. These were used to visually evaluate the shape of the unweighted distribution. *PROC MEANS* was used to generate Median and Interquartile Range (IQR) values for the sample. A *CLASS* statement was added to produce calculate values at different levels of the predictor and categorical covariates. *WHERE* statements were used to limit the output for each procedure to the 18-84 years age group.

PROC SURVEYMEANS was used to estimate weighted Median and IQR values. A DOMAIN statement was included to display values at different levels of the predictor/covariates and the results limited to the 18-84 years age group. The *STRATA*, *CLUSTER,* and *WEIGHT* options were used to indicate the structure of the survey data. NOMCAR was specified in the procedure command so that missing data were treated as "not missing completely at random." Similarly, *PROC SURVEY REG* was used to produce a weighted beta estimate for age.

3.4 Modeling: Each statistical model was fit to the 18-84 age group. This was achieved with the *WHERE* statement in the unweighted models and with a *DOMAIN* statement in the weighted models.

Categorical Outcomes: *Hypertension, High Cholesterol & Diabetes.* A total of five regression models were fit for each dichotomous outcome.

Unweighted Unadjusted Logistic Regression Models: a series of bivariate logistic regression models were fit utilizing PROC LOGISTIC. Mediate and each covariate were regressed on each outcome. Odds ratio estimates, 95% confidence intervals, p-values and Akaike Information Criterion (AIC) values were reported for each model.

Weighted Unadjusted Logistic Regression Models: a series of bivariate logistic regression models were fit utilizing PROC SURVEYLOGISTIC. The *STRATA*, *CLUSTER,* and *WEIGHT* options were used to indicate the structure of the survey data. Meditation and each covariate were regressed on the categorical outcomes. Odds ratio estimates, 95% confidence intervals, p-values and AIC values were reported for each model.

Weighted Adjusted Logistic Regression Model: a single multivariable logistic regression model was fit utilizing PROC SURVEY LOGISTIC. The *STRATA*, *CLUSTER,* and *WEIGHT* options were used to indicate the structure of the survey data. The predictor of interest and all covariates were all simultaneously regressed on each of the outcomes. Odds ratio estimates, 95% confidence intervals, and p-values were reported for each predictor in the model. A single AIC value was reported for the multivariable model.

Unweighted Unadjusted Marginal Models: a series of bivariate marginal models were fit utilizing PROC GENMOD with a binomial distribution and logit link. A REPEATED statement was included to account for clustering by region. Each covariate and the predictor of interest were regressed on the dichotomous outcomes. Odds ratio estimates, 95% confidence intervals, *p-values* and quasilikelihood under the independence model information criterion (QICu) values were reported for each model.

Unweighted Adjusted Marginal Model: a single multivariable marginal model was fit utilizing PROC GENMOD and specifying a binomial distribution and logit link. A REPEATED statement was included to account for clustering by region. Odds ratio estimates, 95% confidence intervals, and *p-values* were reported for meditation and each covariate and a single QIC value was reported for the model.

Continuous Outcome: *BMI.*

A total of nine regression models were fit for BMI. Based visual assessment of the distribution of BMI a log-transformed BMI variable was created and used in the linear regression models.

LINEAR REGRESSION MODELS:

Unweighted Unadjusted Linear Regression Models: a series of bivariate linear regression models were fit utilizing the PROC REG procedure. Each covariate and the predictor of interest were in turn regressed on the log-transformed BMI outcome variable. Beta estimates with 95% confidence intervals, *p-values* and R^2 values were reported for each model.

Weighted Unadjusted Linear Regression Models: a series of bivariate linear regression models were fit utilizing the PROC SURVEYREG procedure. The *STRATA*, *CLUSTER,* and *WEIGHT* options were used to indicate the structure of the survey data. The predictor of interest and each covariate were regressed on the log-transformed BMI outcome variable. Beta estimates with 95% confidence intervals, *p-values* and R^2 values were reported for each model.

Weighted Adjusted Linear Regression Model: a single multivariable linear regression model was fit utilizing the PROC SURVEYREG procedure. The *STRATA*, *CLUSTER,* and *WEIGHT* options were used to indicate the structure of the survey data. The predictor of interest and each covariate were simultaneously regressed on the log-transformed BMI variable. Beta estimates with 95% confidence intervals and *p-values* were reported for each predictor. A single coefficient of determination ($R^{2)}$) value was reported.

Unweighted Unadjusted Generalized Linear Mixed Model: a series of bivariate generalized linear mixed models were fit utilizing PROC MIXED. A RANDOM INTERCEPT statement was included to account for clustering by region and to allow for global averaging of shared variance. Each covariate and the predictor of interest were in turn regressed on the log-transformed BMI variable. Beta estimates with 95% confidence intervals, *p-values* and AIC values were reported for each model.

Unweighted Adjusted Generalized Linear Mixed Model: Beta estimates and 95% confidence intervals were produced through a single multivariable mixed model utilizing PROC MIXED. A RANDOM INTERCEPT statement was included to account for clustering by region. The predictor of interest and all covariates were included in the single multivariable model. P-values were reported for the predictor/covariates and a single AIC value was reported for the model.

GAMMA REGRESSION MODELS

Unweighted Unadjusted Gamma Regression Models: a series of bivariate gamma regression models were fit utilizing the PROC GENMOD procedure and specifying a gamma distribution and log link. Each covariate and the predictor of interest were in turn regressed on BMI. Beta estimates with 95% confidence intervals, *p-values* and AIC values were reported for each model.

Unweighted Adjusted Gamma Regression Models: a single multivariable gamma regression model was fit utilizing the PROC GENMOD procedure and specifying a gamma distribution and log link. Beta estimates with 95% confidence intervals and *p-values* were reported for each predictor, and a single AIC value was reported for the model.

Unweighted Unadjusted Generalized Linear Mixed Model: a series of bivariate generalized linear mixed models were fit by utilizing the PROC GENMOD procedure and specifying a gamma distribution with a log link. Each covariate and the predictor of interest were in turn regressed on BMI. A REPEATED statement was included to account for clustering by region. Beta estimates with 95% confidence intervals, *p-values* and AIC values were reported for each model.

Unweighted Adjusted Generalized Linear Mixed Model: a multivariable generalized linear mixed model was fit utilizing the PROC GENMOD procedure and specifying a gamma distribution and log link. A REPEATED statement was included to account for clustering by region. Beta estimates with 95% confidence intervals and *p-values* were reported for each predictor, and a single AIC was reported for the model.

RESULTS

Results for this analysis are presented below. Descriptive statistics are followed by model results.

4.1 Meditation

Based on the weighted 2012 sample data as presented in table 1, approximately 7.22% of respondents aged 18-84 reported ever having meditated. The highest proportion of participants who reported ever having meditated were those earning more than $100,000 per year (9.45%) with advanced (15.23%) or college degrees (9.05%); non-Hispanic Whites (8.63%) or non-Hispanic Others (7.52%); females (8.46%); in poor (8.52%) or very good health (8.17%); not currently married (7.97%); and living in the West (10.24%). The mean age for those who reported a meditation practice was 45.45 (SD=20.65) versus 45.83 (SD=24.28) for those who have never meditated. The lowest proportion of participants who reported ever having meditated were those who earned less than $35,000 per year (6.35%); had a high school education (3.37%) or less (2.11%); were Hispanic (3.88%) or Non-Hispanic (NH)-Black (4.17%); males (5.90%); in good health (6.35%); married or partnered (6.78%); and living in the South (5.09).

4.2 Hypertension

As shown by the weighted values presented in Table 2, 24.82% of sample respondents reported ever having been told they were hypertensive on 2+ occasions. Respondents who reported being told they were hypertensive on 2+ occasions were more likely to meditate (24.84%); earn less than $35,000 per year (29.10%); have less than a high school education (30.62%); be non-Hispanic Black (31.49%); male (25.16%); report poor health status (60.81%); be married or partnered (25.58%); and live in the South (27.87%). The mean age of hypertensive respondents was 58.39 (SD=19.16) and the mean age for those never told they were hypertensive was 41.68 (SD=23.40). Respondent who reported having been told they were hypertensive on 2+ occasions were less likely to have meditated (23.02%); earned greater than $100,000 per year (18.82%); have an advanced (21.83%) or college degree (22.45%); be Hispanic (15.68%) or non-Hispanic Asian (18.17%); be female (24.5%); report being in excellent health (9.41%); be currently married (23.55%); or live in the West (21.31%).

LOGISTIC REGRESSION MODELS

In the unweighted unadjusted logistic model for hypertension, as presented in Table 6, each additional year of age was associated on average with a 1.067 times increase in the odds of reporting hypertension [OR=1.067, 95%CI= (1.065, 1.069)]. The predictor of interest and all covariates, save gender [female vs male OR=1.00, 95%CI= (0.95, 1.05)], showed a statistically significant association with hypertension. Each level of income above $35,000 per year compared to those earning less than $35,000 had lesser odds of reporting hypertension, and those earning greater than $100,000 had the lowest estimated odds [OR=0.54, 95%CI= (0.51, 0.63)]. All individuals with higher levels of education compared to those with less than a high school education showed a decreased odds of reporting hypertension, with a college education [OR=0.62, 95%CI= (0.58, 0.66)] and advanced degree [OR=0.57, 95%CI= (0.51, 0.63)] being equivalent. NH-Blacks [OR=1.54, 95%CI= (1.45, 1.64)] showed increased odds compared to NH-Whites of reporting hypertension while Hispanics [OR=0.58, 95%CI= (0.54, 0.62)] and NH-Asians [OR=0.66, 95%CI= (0.59, 0.72)] each showed reduced odds or reporting hypertension compared to NH-Whites. NH-Others were no significantly different compared to NH-Whites. All individuals reporting excellent, very good, good and fair health status had lower odds of reporting hypertension compared to individuals reporting poor health status. Individuals reporting excellent health status [OR=0.07, 95%CI= (0.06, 0.07)] had the lowest odds of reporting hypertension. Compared to those not currently married, married respondents had a lower odds of reporting hypertension [OR=0.88, 95%CI= (0.84, 0.92)]. Participants in all regions showed significantly increased odds of reporting hypertension compared to the West. Participants from the South [OR=1.48, 95%CI= (1.39. 1.58)] reported the highest odds compared to participants from the West. Participants from the Northeast [OR=1.17, 95%CI= (1.09, 1.27)] and Midwest [OR=1.21, 95%CI= (1.13, 1.30)] showed significantly higher estimated odds than the West, and lower than the South, but not different from each other.

In the weighted unadjusted logistic model, each additional year of age on average was associated with a multiplicative difference of 1.067 in the odds of reporting hypertension [OR=1.067, 95%CI= (1.065, 1.069)]. A statistically significant difference was not found between meditators and non-meditators [OR=0.91, 95%CI= (0.80, 1.03)]. Compared to those earning less than $35,000 per year all other groups lower diminished odds of reporting hypertension.

Those earning greater than $100,000 per year [OR=0.57, 95%CI= (0.51, 0.62)] had the lowest odds of reporting hypertension compared to those earning less than $35,000 per year. The two middle-earning categories showed a statistically significant difference from both the high and low earners, but not from each other. Participants at all levels of education showed lower odds of reporting hypertension compared to those with less than a high school education. Participants with either an advanced degree [OR=0.63, 95%CI= (0.55, 0.72)] or a college degree [OR=0.66, 95%CI= (0.60, 0.72)] were equivalent in their odds of reporting hypertension. Both NH-Blacks [OR=1.30, 95%CI= (1.19, 1.41)] and NH-Others [OR= 1.19, 95%CI= (0.89, 1.60)] were estimated to have higher odds of reporting hypertension compared to NH-Whites. Both Hispanics [OR=0.53, 95%CI= (0.48, 0.57)] and NH-Asians [OR=0.63, 95%CI= (0.54, 0.73)] showed equivalently lower odds of reporting hypertension compared to NH-Whites. Compared to males, females showed no difference [OR=0.97, 95%CI= (0.91, 1.03)] in their odds of reporting hypertension. Compared to those not currently married, respondents who were married [OR=1.12, 95%CI= (1.05, 1.19)] had an increased odds of reporting hypertension. Respondents at each level of health status had significantly lower odds of reporting hypertension compared to both respondents who reported poor health status and respondents with a health status immediately below. Respondents reporting excellent health [OR=0.07, 95%CI= (0.06, 0.08)] had the lowest odds of reporting hypertension. Respondents in the South [OR=1.43, 95%CI= (1.32, 1.55)] had highest odds of reporting hypertension compared to respondents in the West. Individuals in the Northeast [OR=1.11, 95%CI= (1.02, 1.21)] and Midwest [OR=1.22, 95%CI= (1.11, 1.34)] showed equivalently increased odds compared to the West. Respondents in the

Midwest did not show a statistically significant difference in the odds of reporting hypertension compared to the South.

In the weighted adjusted logistic model, meditation OR=1.05 (95%CI= 0.91, 1.22)], all levels of family income, all levels of education, marital status, and living in the Northeast [OR=0.99, (95%CI=0.89, 1.10)] and Midwest [OR=1.11, 95%CI= (1.00, 1.25)] failed to reach a statistically significant level of association with hypertension while controlling for all other variables in the model. The estimated increase in odds for each year of age was slightly lower but equivalent to the previous model [OR=1.064, 95%CI= (1.061, 1.066)]. The relative differences associated with race were the same, but the odds of reporting hypertension in NH-Blacks were now 1.57 time those for NH-Whites (OR=1.57, 95%CI= (1.40, 1.76)). Controlling for all other variables, females now show a negative difference of at least 9% compared to that of males in the odds of reporting hypertension, where in the previous two unadjusted models no association with gender was found. While controlling for other variables in the model the relative ordering of the levels of health status was maintained, and Excellent health [OR=0.11, 95%CI= (0.09, 0.14)] was still found to be associated with the greatest decrease in the odds of reporting hypertension compared to poor health status (at least 86% less). However, all odds ratio estimates for levels of health status were reduced compared to the weighted unadjusted logistic model. Compared to the West, only the South [OR=1.22, 95%CI= (1.11, 1.35)] showed a statistically significant difference in the odds of reporting hypertension while controlling for all other variables which is lower than in the weighted unadjusted model.

MARGINAL MODELS

In the unweighted unadjusted marginal model, each additional year of age was associated a 1.067 time increase in the odds of reporting hypertension [OR=1.067, 95%CI= (1.066, 1.068)]. The odds of meditators reporting hypertension were 0.84 times the odds of non-meditators [OR=0.84, 95%CI= (0.73, 0.97)]. No statistically significant difference was seen in respondents with a High School/GED [OR=0.86, 95%CI= (0.73, 1.02)] compared to those with less than a high school education. Respondents with a college [OR=0.62, 95%CI= (0.49, 0.78)] or advanced degree [OR=0.57, 95%CI= (0.44, 0.73)] showed equivalently lower odds of reporting hypertension. No difference was found between males and females [OR=1.00 95%CI= (0.97, 1.03)]. All levels of health status individually showed a significant reduction in the odds of reporting hypertension compared to those reporting poor health. Respondents reporting excellent health [OR=.06, 95%OR= (.05, 0.08)] had the lowest odds of reporting hypertension. The odds of married participants reporting hypertension [OR=0.88, 95%CI= (0.84, 0.92)] were 0.88 time the odds of those who were not currently married.

In the unweighted adjusted marginal model each additional year of age [OR=1.063, 95%CI= (1.062, 1.064)] was associated with a 1.063 times increase in the odds of reporting hypertension, controlling for all other variables in the model. No statistically significant difference was found between meditators and non-meditators [OR=1.00, 95%CI= (0.85, 1.18)], between married and not currently married respondents [OR=0.99, (95%CI= 0.95, 1.03)], or between respondents with different levels of education compared to those with less than a high school education while controlling for other variables in the marginal model. Compared to those earning less than $35,000 per year, only those earning more than $100,000 per year

[OR=0.92, 95%CI= (0.87, 0.97)] showed a statistically significant difference in the odds of reporting hypertension. In this model, the odds of NH-Blacks reporting hypertension [OR=1.72, 95%CI= (1.52, 1.94)] were found to be 1.72 times the odds for NH-Whites. NH-Others [OR=1.35, 95%CI= (1.19, 1.52)] were also found to have higher odds of reporting hypertension than NH-Whites. Hispanics showed decreased odds of reporting hypertension [OR=0.72, 95%CI= (0.65, 0.79)] compared to NH-Whites, and NH-Asians were not significantly different from NH-Whites [OR=0.84, 95%CI= (0.67, 1.05)] in their odds of reporting hypertension. In the adjusted model, the odds of females reporting hypertension were 0.90 times the odds for males [OR=0.90, 95%CI= (0.87, 0.93)]. Respondents at all levels of reported health status were found to have lower odds of reporting hypertension compared to those reporting poor health status. Respondents with excellent health [OR=0.11, 95%CI= (0.10, 0.12)] had the lowest odds of reporting hypertension.

4.3 Cholesterol

As shown by the weighted sample frequencies presented in table 3, 26.08% of the respondents reported ever having been told they had high cholesterol. Respondents reporting high cholesterol were more likely to have meditated at some point (29.01%); earned $35,000-$74,999 (26.43%); had an advanced degree (29.56%); were non-Hispanic White (28.77%); male (27.48%); reported being in poor health (52.08%); were married or partnered (28.97%); and lived in the South (27.23%). The mean age in years for those who reported they were ever told they had high cholesterol was 57.85 (SD=19.06) versus 41.58 (SD=21.87) for those who were never told they had high cholesterol. Respondents reporting high cholesterol were less likely to meditate (25.90%); have family income below $35,000 per year; have a college education (24.43%); be Hispanic (18.94%); be female (24.77%); be currently married (21.17%); or live in the West (24.60%).

LOGISTIC REGRESSION MODELS

In considering the unweighted unadjusted logistic model for high cholesterol, as presented in Table 7 each additional year of age was associated with a 1.062 times increase in the odds of reporting high cholesterol [OR=1.062, 95%CI= (1.060, 1.064)]. The predictor of interest and all covariates, save family income and several levels of education, showed a statistically significant association with high cholesterol. Compared to those with less than a high school education, only respondents with a college degree [OR=0.78, 95%CI= (0.73, 0.84)] showed decreased odds of reporting high cholesterol. Those with both a High School/GED [OR=0.94, 95%CI= (0.87, 1.02)] and advanced degree [OR=0.93, 95%CI= (0.84, 1.02)] failed to show a statistically significant difference from respondents with less than a high school diploma or from each other. Compared to NH-Whites, respondents from all other race/ethnicities showed lower odds of reporting cholesterol. Hispanics [OR=0.59, 95%CI= (0.55, 0.64)] reported the lowest odds compared to NH-Whites. NH-Blacks [OR=0.79, 95%CI= (0.74, 0.85)] and NH-Asians [OR=0.76, 95%CI= (0.69, 0.85)] each showed lower odds of reporting high cholesterol compared to NH-Whites but did not show a statistically significant difference from each other. NH-Others showed the second lowest odds of reporting high cholesterol compared with NH-Whites [OR=0.71, 95%CI= (0.55, 0.90)] but the wide confidence interval did not show a statistically significant difference from any of the other three groups. Respondents at each higher level of health status had lower odds of reporting high cholesterol compared to those reporting poor health status. Respondents reporting excellent health [OR=0.15, 95%CI= (0.13, 0.17)] had the lowest odds of reporting high cholesterol. Compared to those not currently married, married respondents had higher odds of reporting high cholesterol [OR=1.18, 95%CI= (1.13, 1.24)]. Respondents from all regions had significantly higher odds of reporting high cholesterol compared to respondents from the West. Those from South [OR=1.17, 95%CI= (1.10. 1.24)] had the highest odds of reporting high cholesterol. No statistically significant difference was found between respondents from the South, the Northeast [OR=1.12, 95%CI= (1.04, 1.21)], or the Midwest [OR=1.11, 95%CI= (1.03, 1.19)].

In the weighted unadjusted logistic model, each additional year of age was associated with 1.067 times difference in the odds of reporting high cholesterol [OR=1.067, 95%CI= (1.065, 1.069)]. The odds of meditators of reporting high cholesterol were 1.17 times the odds for non-meditators [OR=1.17, 95%CI= (1.04, 1.32)]. No statistically significant difference in the odds of reporting high cholesterol was found between respondents reporting different levels of income. In terms of education, only a college education [OR=0.87, 95%CI= (0.79, 0.95)] was associated with a significant difference in the odds of reporting high cholesterol. Compared to NH-Whites, respondents from all other race/ethnicity groups had a lower odds of reporting high cholesterol. Compared to males the odds of females reporting high cholesterol was lower [OR=0.87, 95%CI= (0.82, 0.92)]. Compared to those not currently married, respondents who were married [OR=1.52, 95%CI= (1.42, 1.63)] had 1.52 times the odds of reporting high cholesterol. Respondents at each level of reported health had lower odds of reporting high cholesterol compared to those who reported having poor. Respondents with excellent health

[OR=0.15, 95%CI= (0.13, 0.17)] had the lowest odds of reporting high cholesterol. Only respondents from the South [OR=1.15, 95%CI= (1.05, 1.26)] differed significantly in their odds of reporting hypertension compared to respondents from the West.

In the weighted adjusted logistic model, the odds of meditators reporting high cholesterol were 1.27 [OR=1.27, 95%CI= (1.11, 1.46)] times the odds for non-mediators controlling for all other variables in the model. Each additional year of age were associated with 1.062 times increase [OR=1.062, 95%CI= (1.059, 1.064)] in the odds of reporting high cholesterol. Respondents at all levels of had higher odds of reporting cholesterol compared to those earning less than $35,000 per year. Respondent at all levels of education had higher odds of reporting high cholesterol compared to those reporting less than a high school education. Compared to NH-Whites the odds of respondents reporting high cholesterol were lower for all other race/ethnicities. Only NH-Blacks [OR=0.78, 95%CI= (0.69, 0.88)] and NH-Others [OR=0.85, 95%CI= (0.60, 0.90)] showed a significantly significant differences compared to NH-Whites. Controlling for all other variables, females [OR=0.78, 95%CI= (0.72, 0.83)] had 0.78 times the odds of reporting high cholesterol compared to makes, similar to what was found in the previous two unadjusted models. Respondents reporting excellent health [OR=0.15, 95%CI= (0.13, 0.17)] had the lowest odds of reporting high cholesterol compared to those reporting poor health status. All odds ratio estimates for respondents at different reported levels of health were lower compared to the weighted unadjusted logistic model. Compared to the West, only respondents from the South [OR=1.11, 95%CI= (1.01, 1.24)] showed a statistically significant increase in the odds of reporting high cholesterol

MARGINAL MODELS

In the unweighted unadjusted marginal model, each additional year of age was associated with a 1.067 times increase in the odds of reporting high cholesterol [OR=1.067, 95%CI= (1.066, 1.068)]. The odds of meditators reporting high cholesterol 0.84 times than those for non-meditators [OR=0.84, 95%CI= (0.73, 0.97)]. No statistically significant difference was shown for those with a High School/GED [OR=0.86, 95%CI= (0.73, 1.02)] compared to those with less than a high school education. Respondents with a college [OR=0.62, 95%CI= (0.49, 0.78)] or advanced degree [OR=0.57, 95%CI= (0.44, 0.73)] showed similar odds of reporting high cholesterol. No difference was found between males and females [OR=1.00 95%CI= (0.97, 1.03)]. Respondents at all levels of health status had lower odds of reporting high cholesterol compared to those reporting poor health. Respondents reporting excellent health [OR=.06, 95%OR= (.05, 0.08)] had the lowest odds of reporting high cholesterol. The odds of married participants [OR=0.88, 95%CI= (0.84, 0.92)] reporting high cholesterol were 0.88 times the odds for those not currently married.

In the unweighted adjusted marginal model, statistically significant associations were found with high cholesterol for meditation and all other variables, save for respondents who were NH-Asian [OR=1.00, 95%CI= (0.91, 1.11)] and NH-Other [OR=0.81, 95%CI= (0.57, 1.16)]. Controlling for all other variables in the model, each additional year of age was associated with a 1.059 times increase in the odds of reporting high cholesterol [OR=1.059, 95%CI= (1.058, 1.060)]. The odds of meditators reporting higher cholesterol were 1.23 times those for non-meditators [OR=1.23, 95%CI= (1.17, 1.28)]. Compared to those earning less than $35,000 per year, respondents with higher incomes were increasingly more likely to report high cholesterol. Respondents with all levels of education showed an increased odds of reporting high cholesterol compared to those with less than a high school education. Respondents with an advanced degree had the highest odds [OR=1.20, 95%CI= (1.15, 1.25)] of reporting high cholesterol. Compared to NH-Whites, respondents who were Hispanic [OR=0.85, 95%CI= (0.77, 0.93)] or NH-Black [OR= 0.82, 95%CI= (0.74, 0.91)] were equally less likely to report high cholesterol. The odds of females reporting high cholesterol were 0.86 times [OR=0.86, 95%CI= (.83, 0.90)] the odds for males. Respondents at all levels of reported health had increasingly lower odds of reporting having high cholesterol compared to those reporting poor health. The odds of married respondents reporting high cholesterol were 1.19 [OR=1.19, 95%CI= (1.10, 1.28)] the odds for those who were not currently married.

Diabetes

As shown by the weighted sample frequencies presented in Table 4, 8.92% of respondents reported ever having been told they had Diabetes or Sugar Diabetes. Respondents who reported having diabetes were more likely to be those who did not meditate (9.11%); had a family income less than $35,000 per year; had less than a high school education (13.63%); were non-Hispanic Other (14.95%) or non-Hispanic Black (12.22%); male (9.04%); reported being in poor health (37.22%); were married or partnered (9.30%); and lived in the South (10.47%). The mean age of those who had ever been told they had diabetes was 59.34 years (SD=17.97) compared to 44.51 (SD=26.06) for those who had never been told they had Diabetes. Respondents who were ever told they had Diabetes or Sugar Diabetes were less likely to be those who had meditated (6.18%); with a total family income greater than $100,000 per year; with an advanced (6.11%) or college degree (7.28%); who were non-Hispanic Asian (7.53%) or non-Hispanic White (8.36%); female (8.80%); reported having excellent health (1.59%); were no currently married (8.29%); and lived in the West (7.33%).

LOGISTIC REGRESSION MODELS

In the unweighted unadjusted logistic model for Diabetes presented in Table 8 a one-year increase in age was associated with a 1.053 times increase in the odds of reporting Diabetes [OR=1.053, 95%CI= (1.051, 1.056)]. The odds of respondents who reported ever having meditated [OR=0.65, 95%CI= (0.55, 0.76)] of reporting diabetes were 0.65 time the odds of respondents who never meditated. The odds of reporting diabetes for respondents with higher levels of income were generally lower compared to those with a family income less than $35,000 per year. The odds of reporting diabetes were lowest for those earning more than $100,000 [OR=0.44, 95%CI= (0.38, 0.50)] compared to those earning less than $35,000 per year. Similarly, respondents with higher levels of education generally lower odds of reporting diabetes compared to those with less than a high school level of education. Respondents with an advanced Degree [0.40, 95%CI= (0.34, 0.47)] had the lowest odds of reporting diabetes compared to those with less than a high school education. Both NH-Blacks [OR=1.60, 95%CI= (1.46, 1.76)] and NH-Others [OR= 1.82, 95%(CI= (1.37, 2.43)] were more likely to report Diabetes than respondents who were NH-Whites. Females were slightly less likely to report Diabetes [OR=0.94, 95%CI= (0.86, 0.99)] than males, and no difference was found between those who were and were not currently married [OR=0.94, 95%CI= (0.87, 1.00)]. The odds of respondents in the South [OR= 1.37, 95%CI= (1.25, 1.51)] reporting diabetes were significantly higher than those living in the West.

In the weighted unadjusted logistic model for diabetes, each additional year of age associated with 1.055 times increase in the odds of reporting Diabetes [OR=1.055, 95%CI= (1.052, 1.058)]. In the weighted model the difference between meditators and non-meditators remained statistically significant [OR=0.66, 95%CI= (0.51, 0.85)]. Respondents at each higher level of had lower odds of reporting diabetes compared to those earning less than $35,000 per year. Similarly, respondents with higher levels of education had lower odds of reporting diabetes compared to those with less than a high school education. The difference in the odds of reporting diabetes between those with a college education [OR=0.50, 95%CI= (0.44, 0.56)] and those with an advanced degree [OR=0.41, 95%CI= (0.34, 0.50)] was not statistically significant. Respondents who were NH-Blacks [OR=1.53, 95%CI= (1.37, 1.71)] and NH-Others [OR= 1.93, 95%CI= (1.37, 2.72)] were both more likely to report diabetes compared to NH-Whites. No difference was found between males and females [OR= 0.97, 95%CI= (0.89, 1.06)], but the odds those who were married [OR=1.14, 95%CI= (1.04, 1.24)] of reporting diabetes were 1.14 time those for respondents who were not currently married. The respondents from the Midwest [OR=1.20, 95%CI= (1.03, 1.40)] and the South [OR= 1.48, 95%CI= (1.31, 1.67)] were both more likely to report diabetes than those in the West, but the difference in the odds of reporting diabetes between the Midwest and the South was not statistically significant.

In the weighted adjusted logistic model for diabetes, each additional year of age on average was associated with 1.04 times increase in the odds of reporting Diabetes [OR=1.04, 95%CI= (1.045, 1.052)]. In the adjusted model the difference between meditators and non-meditators in their odds of reporting diabetes was not statistically significant [OR=0.81, 95%CI= (0.62, 1.07)]. Respondents at each level of income was successively less likely to report diabetes compared to those earning less than $35,000 per year. However, the odds of respondents reporting diabetes who were in the two highest income levels did not show a statistically significant difference from each other. Similarly, respondents at each higher level of education were successively less likely to report diabetes compared to those with less than a high school education. The difference in the odds of reporting diabetes between those with a college education [OR=0.50, 95%CI= (0.44, 0.56)] and those with an advanced degree [OR=0.41, 95%CI= (0.34, 0.50)] was not statistically significant. Respondents who were NH-Blacks [OR=1.53, 95%CI= (1.37, 1.71)] and NH-Others [OR= 1.93, 95%CI= (1.37, 2.72)] were both more likely to report diabetes compared to NH-Whites. No difference was found between males and females [OR= 0.97, 95%CI= (0.89, 1.06)] in their odds of reporting diabetes, but the odds of reporting diabetes for those who were married [OR=1.14, 95%CI= (1.04, 1.24)] were 1.14 times those for respondents who were not married. Respondents from the Midwest [OR=1.20, 95%CI= (1.03, 1.40)] and the South [OR= 1.48, 95%CI= (1.31, 1.67)] were both more likely to report diabetes than those in the West, but the difference in the odds of reporting diabetes between the Midwest and the South was not statistically significant.

MARGINAL MODELS

In the unweighted unadjusted marginal model, the odds of meditators [OR=0.65, 95%CI= (0.57, 0.74)] reporting diabetes was 0.65 times the odds for non-meditators. Each additional in age

[OR= 1.053, 95%CI (1.052, 1.055)] was associated with a 1.053 times increase in the odds of reporting Diabetes. Respondents at each higher level of income has a successively lower odds of reporting diabetes compared to those earning less than $35,000 per year. Those earning more than $100,000 per year showed the lowest odds of reporting diabetes [OR=0.44, 95%CI= (0.39, 0.49)] compared to those earning less than $35,000 per year. Respondents with an advanced degree [OR=0.40, 95%CI= (0.39, 0.49)] had the lowest odds of reporting diabetes compared to those with less than a high school education. However, the difference in odds for those with an advanced degree compared to those with a college degree [OR=0.50, 95%CI= (0.42, 0.60)] was not statistically significant. Compared to NH-Whites, respondents who were NH-Blacks [OR=1.60, 95%CI= (1.44, 1.78)] and NH-Others [OR=1.82, 95%CI= (1.62, 2.05)] each had higher odds of reporting Diabetes. The odds of females reporting diabetes 0.92 times [OR=0.92, 95%CI= (0.87, 0.98)] the odds for males. No statistically significant difference in the odds of reporting diabetes was found between those who were currently married or partnered compared to those who were not currently married [OR=0.94, 95%CI= (0.82, 1.03)]. As reported health status improved, the odds of reporting diabetes generally became lower. The lowest estimated odds of reporting diabetes were found for respondents who reported having excellent health [OR= 0.03, (95%CI= (0.03, 0.04)] compared to those who reported being in poor health.

In the unweighted adjusted model, the odds of meditators reporting diabetes were 0.81 times the odds for non-meditators [OR=0.81, 95%CI= (0.70, 0.95)]. Controlling for all other variables, each additional year of age [OR=1.047, 95%CI= (1.046, 1.049)] was associated with a 1.047 times increase in the odds reporting diabetes. No respondents in the adjusted model showed a statistically significant difference from those earning less than $35,000 per year in their odds of reporting Diabetes. Compared to those with less than a high school education, only those with a high school education/GED showed a statistically significant difference [OR=1.19, 95%CI= (1.14, 1.25)] in their odds of reporting diabetes. Compared to NH-Whites the odds of reporting Diabetes were higher for respondents of all other race/ethnicities and highest for NH-Blacks [OR=1.46, 95%CI= (1.29, 1.64)] and NH-Others [OR= 2.04, 95%CI= (1.62, 2.57)]. The odds of females reporting Diabetes were 0.83 times the odds for males [OR=0.83, 95%CI= (0.76, 0.91)]. The odds of reporting diabetes for those who were currently married were 1.11 times the odds for those who were not currently married [OR=1.11, 95%CI= (1.03, 1.19)].

4.5 BMI

The distribution of reported BMI data was right skewed. This was a violation of the assumptions of the linear regression model, namely that the outcome is normally distributed. This violation was addressed in two separate ways. First, a log-transformed BMI variable which did exhibit a normal distribution was created. Second, a gamma regression model which does not assume a normally distributed outcome was fit.

The weighted median reported BMI, as shown in Table 5, was 26.62 (IQR=7.29). A lower median BMI was found for those who had meditated (25.84, IQR=7.24); had a family income greater than $100,000 per year (25.85, IQR=6.1); had an advanced degree (25.68, IQR=6.00); were non-Hispanic Asian (23.90, IQR=5.07); female (25.84, IQR=8.20); reported having very good health (25.08, IQR=5.64); were not currently married (26.06, IQR=7.61); and lived in the

West (26.38, IQR=6.79). A higher median BMI was found for those who had never meditated (26.63, IQR=7.22); had a total family income less than $35,000 per year (27.08, IQR=8.13); had less than a high school education (27.39, IQR=7.72); were non-Hispanic Others (28.78, IQR=8.19) and non-Hispanic Blacks (28.16, IQR=8.02); males (27.27, IQR=6.34); for those reporting fair (29.27, IQR=9.76) or poor (29.16, IQR=10.2) health; for those who were married or partnered (27.06, IQR=7.05); and for those who lived in the South (27.05, IQR=7.51).

LINEAR REGRESSION MODELS

In the Unweighted Unadjusted Linear Regression model, as presented in Table 9, a 10-year positive difference in age was associated on average with a 1.1% positive difference in the expected geometric mean of BMI. Compared to non-meditators, the BMI of those who meditate was on average 3% lower $[-.029, 95\%CI = (-.038, -.021)]$. Compared to those earning less than $35,000 per year, a statistically significant association with BMI was only found for those making greater than $100,000 per year $[-.037, 95\%CI = (-.044, -.03)]$. Compared to those with less than a high school education, those with a college education $[\hat{\beta} = -.037, 95\%CI = (-.044, -.03)]$ and those with an advanced degree $[-.063, 95\%CI = (-.072, -.053)]$ showed distinctly lower BMI scores on average. No statistically significant difference was seen between respondents with less than a college education. Compared to NH-Whites, Hispanics $[.02, 95\%CI = (.016, .028)]$ and NH-Blacks $[\hat{\beta} = .054, 95\%CI = (.048, .061)]$ each on average showed statistically significant increases in mean BMI. BMI was also found to be higher in NH-Others compared to NH-Whites, but the difference was found to be statistically significant $[.047, 95\%CI = (.025, .068)]$. NH-Asians on average were found to have lower mean values for BMI [$-.12, 95\%CI = (-.132, -.114)$]. Females on average displayed a 2.3% positive difference in mean BMI compared to males [$.023, 95\%CI = (.018, .027)$]. No statistically significant difference was found between those who reported poor and those who reported fair health. However, compared to those who reported poor health, those who reported good health [$-.037, 95\%CI = (-.049, -.024)$], those who reported very good health [$-.088, 95\%CI = (-.101, -.076)$], and those who reported excellent health [$-.14, 95\%CI = (-.157, -.132)$] each had a statistically significant lower average BMI. Those with excellent health had at least a 12% lower BMI on average compared to those reporting poor health. In the unweighted model, those who were currently married reported higher average BMI than those who were not [$.011, 95\%CI = (.0068, .016)$]. No difference in mean BMI was seen between respondents living in the West and those in the Northeast, but those living in in both the South [$.028, 95\%CI = (.023, .034)$] and Midwest [$.026, 95\%CI = (.020, .033)$] showed a similarly higher mean BMI.

The modeling results were similar for the Weighted Unadjusted model compared to the Unweighted Unadjusted model. The mean difference associated with one-year increase in age was found to be slightly higher (.0014 vs .0011), but the difference was not statistically significant. Respondents in all of the same categories of the different covariates showed the same statistically significant associations with Mean BMI as were seen in the Unweighted Model. The greatest negative differences in BMI were found to be for Meditators vs. Non-Meditators [$-.0217, 95\%CI = (-.032, -.011)$]; those earning more than $100,000 vs those earning <$35,000 [$-.037, 95\%CI = (-.047, -.028)$]; respondents with advanced degrees vs. less than high school education [$-.056, 95\%CI = (-.067, -.045)$]; NH-Asians vs. NH-Whites

$[-.116, 95\% CI = (-.127, -.106)]$; and respondents reporting excellent vs. poor health status $[-.144, 95\% CI = (-.164, -.124)]$. The greatest positive differences in mean BMI were found for NH-Blacks vs NH-Whites $[.047, 95\% CI = (.038, .056)]$; females vs. males $[.034, 95\% CI = (.028, .041)]$; those who were currently married vs. not currently married $[.025, 95\% CI = (.018, .031)]$; and for respondents living in both the Midwest $[.025, 95\% CI = (.016, .035)]$ and in the South $[.026, 95\% CI = (.018, .034)]$ vs. those living in the West.

The Weighted Adjusted model showed many similarities to the two previous models, but it also had several notable departures. Age $[.0007, 95\% CI = (.0006, .0009)]$ was still positively associated with BMI, but the mean difference was smaller compared to the two previous models. The difference in Meditators vs non-Meditators was still found to be statistically significant and negative $[-.011, 95\% CI = (-.021, -.00065)]$. A notable departure from the both previous models was seen around total family income. Those earning more than $100,000 were no longer associated on average with a negative difference in mean BMI $[-.0026, 95\% CI = (-.0122, .0070)]$. However, while adjusting for all other variables in the model, those earning $35,000-$74,999 $[.008, 95\% CI = (.00088, .0157)]$ and those earning $75,999-$99,999 $[.0148, 95\% CI = (.0035, .0260)]$ were both associated with an average positive difference in mean BMI. Another notable departure from the two previous models was seen around educational attainment. In this model, there was no statistically significant difference in mean BMI between those with an advanced degree $[-.00098, 95\% CI = (-.013, .011)]$ and those with less than a high school education. Those with a high school/GED level of education $[.0193, 95\% CI = (.0090, .0296)]$ and those with a college education $[.0145, 95\% CI = (.0043, .0249)]$ both had a similar positive mean difference in BMI compared to those with less than a high school education. The relationship between race and BMI remained unchanged compared to the two previous models. Compared to NH-Whites, NH-Blacks [$.0473, 95\%CI = (.0381, .0567)$] had the highest statistically significant average mean difference in BMI, and NH-Asians [$-.102, 95\%CI = (-.113, -.0910)$] had a negative average mean difference in BMI compared to NH-Whites. In the adjusted model, females [$.034, 95\%CI = (.0279, .0.40)$] had a mean BMI 3.5% higher than that of males. The relationship between BMI and reported health status was the same in this model compared to the previous two. Compared to those reporting poor health, those reporting good, very good, and excellent health each were distinctly associated with a statistically significant negative difference in BMI with the greatest difference seen in those reporting excellent health [$-.1336, 95\%CI = (-.1559, -.1113)$]. Similar to the previous models, compared to those not currently married, those currently married on average had a positive difference in mean BMI of 2.5% [$.0248, 95\%CI = (.0183, .0314)$]. One final difference was seen in terms of region of residence. Respondents who lived both the South [$.0107, 95\%CI = (.0028, .0187)$] and in the Midwest [$.0207, 95\%CI = (.0113, .0305)$] displayed a positive mean difference in BMI compared to the West. In this model the average difference in BMI for the Midwest was approximately twice that for the South (2.09% vs. 1.07%). However, the difference in BMI between those living in the South and those living in the Midwest did not reach a level of statistical significance.

GENERAL LINEAR MIXED MODELS

In the Unweighted Unadjusted General Linear Mixed model, each additional year of age on average was associated with an approximate 0.11% positive difference in mean BMI. Compared to those who reported never having meditated, those who had meditated had on average a 2.6% lower reported BMI. Only those earning more than $100,000 per year $[-.0354, 95\%CI = (-.0422, .-.0285)$ showed a statistically significant difference from those earning less than $35,000 per year. Both those with a College level of education $[-.0257, 95\%CI = (-.0323, -.0190)]$ or advanced degree $[-.0616, 95\%CI = (-.0708, -.0523)]$ were significantly different from those with less than a high school education and from each other. The mean BMI reported for respondents of all race/ethnicities were significantly higher than those for NH-Whites, except in the NH-Asian group $[-0.1193, 95\%CI = (-.1287, -0.1098)]$. NH-Blacks showed the greatest average positive difference $[.0533, 95\%CI = (.0468, .0598)]$ from NH-Whites, followed by NH-Others $[.0499, 95\%CI = (.0281, .0716)]$ and Hispanics $[.0249, 95\%CI = (.0187, .0312)]$. Females, on average, had at least a 1.85% higher reported BMI than males $(.0229, 95\%CI = (.0184, .0275)]$. Compared to those reporting poor health status, those reporting good $[-.0351, 95\%CI = (-.0476, -.0226)]$, very good $[-.0862, 95\%CI = (-.0986, -.0738)]$, and excellent $[-.1422, 95\%CI =$ (-.1548, -.1297)] health each had a distinctly lower estimated mean BMI. Those reporting an excellent state of health had an average BMI at least 12.16% lower than those reporting poor health. Compared to those not currently married, the average BMI reported for married respondents was at least 0.75% higher $[.0120, 95\%CI = ($.0074, .0166)].

In the Unweighted Adjusted General Linear Mixed model, each additional year of age $[.0004, 95\%CI = (.0003, .0006)]$ on average was associated with an approximate 0.04% positive difference in mean BMI. Compared to those who reported never having meditated, those who had meditated [$-.0169, 95\%CI =$ (-.0256, -.0081)] had on average a 1.67% lower reported BMI. Respondents with income of $35,999-$74,999 [$.0145, 95\%CI =$ (.0088, .0202)] and $75,999-$99,999 $[.0211, 95\%CI = (.0127, .0296)]$ showed statistically significant similar differences from those earning less than $35,000 per year. Respondents with both a High School/GED $[.0169, 95\%CI = (.0094, .0244)]$ and College level of education [$.0126, 95\%CI =$ (.0054, .0199)] showed a statistically significant and similar difference from those with less than a high school education. The mean BMI reported for respondents of all race/ethnicities were significantly higher than for NH-Whites, except in the NH-Asian respondents $[-.1129, 95\%CI = (-.1226, -0.1032)]$. NH-Blacks showed the greatest average positive difference $[.0464, 95\%CI = (.0396, .0531)]$ followed by NH-Others $[.0392, 95\%CI = (.0170, .0613)]$ and Hispanics $[.0246, 95\%CI = (.0179, .0313)]$. Females, on average, had at least a 1.76% higher reported BMI than males $[.0220, 95\%CI = (.0174, .0266)]$. Compared to those reporting poor health status, those reporting good $[-.0352, 95\%CI = (-.0482, -.0223)]$, very good $[-.0832, 95\%CI = (-.0963, -.0701)]$, and excellent [$-.1375, 95\%CI =$ (-.1508, -.1241)] health each had a distinctly lower estimated mean BMI. Those reporting an excellent state of health had an average BMI at least 11.67% lower than those reporting poor health. Compared to those not currently married, the average BMI reported for married respondents was at least 1.10% higher [$.0159, 95\%CI =$ (.0110, .0208)].

GENERALIZED LINEAR MODEL

In the Unadjusted Gamma Regression Model each additional year of age [$.0010, 95\%CI = (.0008, .0011)$] was associated on average with a positive 0.10% difference in BMI. Compared to those who had never meditated, those who had meditated [$-.0289, 95\%CI = (-.0378, -.0200)$] reported on average a 2.85% lower BMI. Compared to those earning less than $35,000 per year, those earning $75,000-$99,999 [$-.0106, 95\%CI = (-.0189, -.0024)$] and those earning more than $100,000 [$-.0459, 95\%CI =$ (-.0528, -.0389)] per year each reported a statistically significant negative difference in BMI. The highest earners had an average BMI at least 3.82% lower than the lowest earners. Compared to those with less than a high school education, those with a college degree [$-.0257, 95\%CI =$ (-.0324, -.0189)] or advanced degree [$-.0699, 95\%CI = (-.0763, -.0575)$] had a statistically significant negative difference in mean BMI. Those with the highest level of education had a mean BMI at least 5.59% lower than those with the lowest level of education. Compared to NH-Whites, only NH-Asians [$-.0380, 95\%CI = (-.0408, -.0352)$] reported a lower average BMI. Compared to NH-Whites, the highest average BMI was reported for NH-Blacks [$.0163, 95\%CI =$ (.0144, .0183)] which was at least 1.45% higher. Compared to males, females [$.0068, 95\%CI = (.0054, .0082)$] on average reported having BMI higher by at least 0.54%. Compared to those reporting poor health, those reporting good [$-.0110, 95\%CI =$ (-.0148, -.0072)], very good [$-.0264, 95\%CI = (-.0302, -.0227)$], and excellent [$-.0437, 95\%CI = (-.0474, -.0399)$] health each showed a statistically significant and distinct lower mean BMI. Those who reported excellent health had an average BMI at least 3.91% lower than those reporting poor health. Married respondents [$.0034, 95\%CI = (.0021, .0048)$] had a mean BMI at least 0.21% higher than those not currently married. Respondents living in the Midwest [$.0079, 95\%CI =$ (.0059, .0099)] and South [$.0086, 95\%CI =$ (.0069, .0104)] on average showed similar mean BMI scores which were statistically significantly higher than for respondents living in the West.

In the Adjusted Gamma Regression Model each additional year of age [$.0001, 95\%CI = (.0001, .0002)$] was associated on average with a positive 0.010% difference in BMI. Compared to those who had never meditated, those who had meditated [$-.0051, 95\%CI = (-.0077, -.0025)$] reported on average a 0.25% lower BMI. Compared to those earning less than $35,000 per year, those earning $35,000-$74,999 [$.0044, 95\%CI = (.0027, .0061)$] and those earning $75,000-$99,999 [$.0064, 95\%CI = (.0038, .0089)$] per year each similarly reported a statistically significant positive difference in BMI. Compared to those with less than a high school education, both those with a high school/GED [$.0050, 95\%CI = (.0028, .0073)$] level of education and those with a college degree [$.0037, 95\%CI =$ (.0015, .0059)] had a statistically significant positive difference in mean BMI. Compared to NH-Whites, only NH-Asians [$-.0347, 95\%CI = (-.0376, -.0318)$] reported a lower average BMI. Respondents of all other race/ethnicities were higher in terms of mean BMI, and the highest average BMI was reported for NH-Blacks [$.0141, 95\%CI =$ (.0120, .0161)] which was at least 1.21% higher than the average BMI for NH-Whites. Compared to males, females [$.0069, 95\%CI = (.0055, .0083)$] on average reported having BMI higher by at least 0.55%. Compared to those reporting poor health, those reporting good [$-.0105, 95\%CI =$ (-.0143, -.0066)], very good [$-.0249, 95\%CI = (-.0288, -.0210)$], and excellent [$-.0415, 95\%CI = (-.0455, -.0375)$] health each showed a statistically significant lower mean BMI. Those who reported excellent health had an average BMI at least 3.68% lower than those reporting poor health. Married respondents [$.0048, 95\%CI = (.0033, .0063)$] had a mean BMI at least 0.33% higher than those not currently married. Respondents living in the Midwest [$.0061, 95\%CI =$ (.0040, .0082)] and South [$.0028, 95\%CI =$ (.0010, .0046)] on average showed statistically significantly higher mean BMI scores than the West.

GENERALIZED LINEAR MIXED MODEL

In the Unadjusted Generalized Linear Mixed Model, each positive one-year difference in age [$.001, 95\%CI = (.0008, .0011)$] was associated on average with a .1% increase in BMI. Those who reported having had a meditation practice had a mean BMI [$-.0289, 95\%CI = (-.0354, -.0223)$] at least 2.21% lower than those who had never meditated. Compared to those earning less than $35,000 per year, only those earning more than $100,000 per year [$-.0459, 95\%CI = (-.0515, -.0515)$] showed a statistically significant difference in mean BMI. The highest earners had on at least a 3.95% lower average BMI than the lowest earners. Respondents with a college [$-.0257, 95\%CI = (-.0358, -.0155)$] or advanced degree [$-.0669, 95\%CI = (-.0723, -.0615)$] had lower mean BMI's than those with less than a high school education. Compared to NH-Whites, only NH-Asians as a group had a lower average BMI [$-.038, 95\%CI = (-.0399, -.0361)$]. NH-Blacks [$0.0163, 95\%CI = (0.0127, 0.0199)$] had the largest positive difference on average of at least 1.28%. Compared to males, females [$0.0068, 95\%CI = (.0031, .0105)$] on average had a higher BMI by .68%. Respondents reporting good [$-.011, 95\%CI = (-.0178, -.0042)$], very good [$-.0264, 95\%CI = (-.0324, -.205)$], and excellent [$-.0437, 95\%CI = (-.0463, -.041)$] health each distinctly had a lower mean BMI compared to those reporting poor health which reached a level of statistical significance. Average BMI was at least 4.12% lower in those reporting excellent health compared to those reporting poor health. Those who were currently married/partnered [$.0034, 95\%CI = (.0029, .004)$] had a higher average BMI by at least .4% compared to those not currently married.

In the Adjusted Generalized Linear Mixed Model, while controlling for all other variables each positive one-year difference in age [$.0001, 95\%CI = (.0001, .0002)$] was associated on average with a .01% increase in BMI. Those who reported a meditation practice had a mean BMI [$-.0055, 95\%CI = (-.0089, -.0021)$] at least 0.21% lower than those who had never meditated. Compared to those earning less than $35,000 per year, both those earning $35,000-$74,999 [$.0043, 95\%CI = (.0023, .0063)$] and those earning $75,000-$99,999 [$.0062, 95\%CI, = (.0024, .0101)$] showed a similar statistically significant positive difference in mean BMI. Respondents with a high school/GED level of education [$.0051, 95\%CI = (.0038, .0064)$] or who attended college [$.0036, 95\%CI = (.0021, .0052)$] had similar and statistically significant higher mean BMI's than those with less than a high school education. Compared to NH-Whites, only NH-Asians as a group had a lower average BMI [$-.0358, 95\%CI = (-.0388, -.0329)$]. NH-Blacks [$0.0141, 95\%CI = (0.0101, 0.0181)$] had the largest positive difference, on average, of at least 1.02%. Compared to males, females [$0.0068, 95\%CI = (.0033, .0103)$] on average had a higher BMI by .68%. Respondents reporting good [$-.0107, 95\%CI = (-.0157, -.0056)$], very good [$-.0250, 95\%CI = (-.0290, -.211)$], and excellent [$-.0417, 95\%CI = (-.0436, -.0397)$] health each distinctly had a lower and statistically significant mean BMI compared to those reporting poor health. Average BMI was at least 3.89% lower in those reporting excellent health compared to those reporting poor health. Those who were currently married/partnered [$.0049, 95\%CI = (.0010, .0057)$] had a higher average BMI by at least .49% compared to those not currently married.

Discussion

The association of a meditation practice with study outcomes varied. First, a brief comment on the quality of the meditation data is presented, followed by a discussion of results for each outcome. Second, statistical models are compared and discussion ensues on observed trends. Finally, study limitations are detailed.

5.1 Meditation

Respondents who meditated were more likely to be highly educated, NH-White females with advanced degrees who lived in the West. This is consistent with previous descriptions of those who are most likely to meditate (Cramer et al., 2016). Meditators were also more likely to report having poor or very good health. This seeming conundrum may be explained by the varying reasons that one might pursue a meditation practice. Meditation may be used as an approach to wellness, but it may also be used as a component of treatment for chronic illnesses. This analysis did not include information on motivation, which has recently been described for the NHIS data, so that distinction was unable to be made (Cramer et al., 2016).

In the NHIS survey, respondents were asked if they had ever meditated and if they had meditated in the past year. While it was vitally important to know which respondents had practiced meditation, it may have been equally important to know how often they meditated. The possibility that the effects of meditation are dose-dependent must be considered. Unfortunately, it was not possible to draw a distinction between those who meditated regularly and those who had experimented with meditation at some point in the past. Knowing how often they did so may very well prove useful in assessing the association of meditation to chronic illnesses.

A further breakdown by type of meditation was available in the data. This proved useful in that it allowed a clear understanding of what practices were being considered. However, in the more specific categories falling under the more general question on meditation (e.g. mantra meditation and guided imagery), certain categories were clustered together which might have better been considered separately. For example, spiritual meditation and contemplative meditation were included in the same group. While this did not impact this analysis, it may prove troublesome for others wanting to be more specific in which types of meditation they are considering.

5.2 Hypertension

In our weighted sample, respondents who were less likely to report having hypertension were generally similar to those who reported meditating (e.g. female respondents earning >$100,000 per year with advanced degrees and living in the West). This commonality was likely reflected in the statistically significant negative association found between hypertension and meditation in both of our models which only considered meditation and hypertension. However, when we accounted for the complex nature of the survey data, the possible clustering of observations by region, and the other variables in the model that relationship was no longer present.

One possible explanation is that there is no association between meditation and hypertension. While there is accumulating evidence that suggests an association between hypertension and meditation, a number of articles have been published which do not support that conclusion. A good illustration of this is that in 2004, two separate systematic reviews of the literature in regards Transcendental meditation and cardiovascular health were published. One review supported the use of meditation as an approach to cardiovascular health (Walton et al., 2004), while the other did not (Canter & Ernst, 2004).

Two questions from the NHIS survey regarding hypertension were taken together to approximate the clinical definition of hypertension. Further variables were present which indicated how long hypertension had been present, whether it had been reported the prior year, and whether or not more severe related conditions, such as stroke or CHD, were present. However, no variables were present which indicated relative severity of hypertension or what steps were being taken to control it. More nuanced measurements of hypertension on a continuous scale allow respondents to be placed into different risk categories (Poulter et al., 2015). However, our data did not allow for such an approach. It is possible that the difference between meditators who use hypertension as a means of treatment and non-meditators may not be between having or not having hypertension, but in the relative severity of the condition.

5.3 High Cholesterol

Respondents more likely to report having high cholesterol were similar to respondents more likely to meditate in many regards (e.g. NH-White respondents with advanced degrees and those reporting poor health). All model results suggested a positive association between meditation and high cholesterol, which is opposite of what had been hypothesized. This is also inconsistent with what was found in the literature. Buddhist Walking Mediation, for example, has been associated with decreases in LDL cholesterol (Prakhinkit et al., 2014). Also, Yoga has been associated with increased in the good, HDL cholesterol (Yadav et al., 2014). However, neither of these practices were included in the definition of meditation for this study. It is possible that not all mediation practices have the same association with high cholesterol.

The variables describing high cholesterol in the data were not very specific. Respondents were asked if they had ever been told they had high cholesterol. A follow up question asked the same about the previous year. There was no further indication as to what was meant by high cholesterol (HDL vs. LDL vs. Triglycerides), and there was no variable indicative of how long the respondent's cholesterol had been high or whether or not they were receiving care. Had more information on hypertension been present, such as a continuous measure or categorical indicator of severity, a more precise estimate of the relationship between high cholesterol and meditation may have been possible.

Data in the NHIS is self-reported, and high cholesterol quite often goes undiagnosed (CDC, Behavioral Risk Factor Surveillance System, 2015). The prevalence of high cholesterol found in this study is lower than that found in studies such as the National Health and Nutrition Examination Survey (NHANES) which takes physical measurements (26.08% vs 33.5%) (CDC, Behavioral Risk Factor Surveillance System, 2015). Those less likely to meditate are more likely to have lower yearly incomes and lower educational attainment. Often these same groups have less access to health care. It is possible that this under-diagnosis of high cholesterol contributed to the misclassification of some non-meditators as not having high cholesterol who did in fact have high cholesterol.

5.4 Diabetes

Respondents more likely to have reported having diabetes were by and large the same groups less likely to have a meditative practice (e.g. those earning less than $35,000 per year, with less than a high school education, NH-Black/Other, Males, Married and living in the south). All of the model results estimated a negative relationship between meditation and diabetes. However, the relationship was only significant when allowing for clustering of observations but now when accounting for the complex nature of the survey data. This was unique among our models in that whether or not the null hypothesis was rejected depended on which model was chosen, and there is no clear guideline as to which might be the better model. A negative association would be consistent with some previous research which indicates that Buddhist Walking Meditation may be associated with better glycemic control, lower insulin resistance, and better weight control (Gainey et al., 2016). However, research into other practices such as Mindfulness Based Stress Reduction, has not supported such finding (Whitebird et al., 2009).

Compared to some of the other outcomes, there was relatively more information present for those who reported having ever been told they had diabetes. The data set included variables which indicated whether or not the respondent had ever and/or within the last year been told they had diabetes. Similar to hypertension, there was also a variable indicative of how long ago diabetes had first been diagnosed. Unique to Diabetes were variables somewhat indicative of severity (diabetes vs borderline vs. pre-diabetes) and active treatment (fasting glucose tests and taking insulin or medication). It is possible that consideration of this additional information may have resulted in a more nuanced estimate of the association between meditation and diabetes. However, for the sake of consistency with the other outcomes considered, the additional data for Diabetes was not included.

5.5 BMI

Respondents with higher median BMI measurements were similar to respondents who were less likely to meditate (e.g. income < $35,000, <HS education, male, married and living in the South). For all models, our null hypothesis of there being no association between having a meditation practice and reported BMI was rejected. All associations found were negative, as hypothesized. These findings are consistent with preliminary research into such practices as mindful eating which have been described as helping to control binge eating and being associated with weight loss (Dalen J et al., 2010). A recently published secondary analysis of cross-sectional data similarly found that regular practitioners of mind-body techniques were less likely to be overweight [OR=0.68(95%IC=0.63, 0.74)] or obese [OR=0.55, (95%CI=0.50, 0.61)] than never users (Camilleri et al., 2016).

Of the outcome variables considered BMI, with its continuous measurement scale, provided the most detail. The estimated difference in BMI between meditators and non-meditators reached a level of statistical significance in all of the BMI models. The practical significance of this difference, however, should be considered. The greatest estimated effect of Meditation on BMI in the adjusted gamma regression models was found in the adjusted mixed gamma regression model [OR= -.0055, 95%CI= (-.0089, -.0021)]. For someone with a BMI of 30 (lower end of obese), the estimated difference in BMI would at most be a negative .266-point difference in BMI. The estimates from the adjusted Log-BMI regression models were somewhat larger. The larges estimated effect was found in the unweighted adjusted mixed linear model. In this model, the greatest estimated difference in BMI for someone with a BMI of 30 would be a negative .758-point difference in BMI. Such a difference may or may not be large enough to prove clinically significant.

BMI is typically collapsed into clinically meaningful categories (e.g. normal weight, overweight, obese, etc.). The treatment of BMI as a continuous variable complicates comparison with other studies, such as that previously mentioned. However, the possibility that meditation might be used to help address the obesity epidemic is profound. This is especially true in light of the low cost of teaching meditation and the often limited access to medical care for those most likely to be obese. If the difference in BMI for meditators were found to be clinically significant, meditation is something that could easily be taught at a community level through such community partners as churches and athletic centers.

CATEGORICAL MODELS

In order for our model results to be unbiased and accurate the underlying assumptions of the statistical models used needed to be met. For logistic regression models there are arguably five main assumptions. First, the outcomes must be dichotomous. This was true for all three of our categorical outcomes. Second, the independent variables are assumed to have no measurement error. Being that this data is from a survey which was based on recall, the independent variables almost certainly displayed measurement error. However, this is not something that can be formally tested, and the predictors were assumed to be reasonably accurate. Third, there is an assumption of non-collinearity. While several of our predictors were highly correlated (e.g. education, family income, and reported health status). During the data screening process (results not presented) none of the predictors were so highly correlated as to be considered a problem. A formal analysis of variance inflation factors was considered beyond the scope of this project. Fourth, it is assumed that no important variables are omitted and no extraneous variables are included. As many appropriate covariates were included as could reasonably be explained by the current literature. Since we did not do an exhaustive model building process, it is likely that unnecessary variables were included in some of the multivariable models. Also, there was no variable present in the data set which quantifies the number of chronic health conditions present in each respondent. Based on the literature around CAM utilization, this aspect should likely be controlled for. Finally, the observations are assumed to be independent and from a simple random sample. The NHIS survey employs complex sampling methodologies which include clustering, stratification and selective oversampling. In order to account for the complex structure of the data we utilized the SURVEY group of SAS procedures. Based on the literature, there appear to be differences in the distributions of both our outcomes and many of our predictors based on region of residence. For example, Southerners are more likely to have high cholesterol, diabetes, and hypertension compared to Westerners. Southerners, compared to Westerners, are also more likely to report lower earning, lower levels of education, and lower perceived levels of health overall. There are also likely lifestyle and dietary differences between the regions not specifically captured by any of our variables. In order to account for the commonalities within and differences between the regions, we used a multilevel modeling structure with region as a source of random variation. Unfortunately, there is not currently a SURVEY procedure in SAS which allows one to both account for a complex survey methodology and use a multilevel framework. Since we could not allow for both complex sample structure and clustering in the same model, we employed a separate model for each which allowed for a comparison of estimates.

Across the three categorical outcomes, nearly every predictor reached a statistically significant level of association in the unweighted unadjusted models. When considering the very large sample size, this is hardly surprising. The unweighted unadjusted models were quite similar to the weighted unadjusted models. Minor adjustments were seen in the OR estimates, sometimes higher and sometimes lower, but the relative ordering by strength of association within variables was maintained. The one striking difference between the models was in the width of the confidence intervals. The confidence intervals for the odds ratio estimates of the variables in the weighted unadjusted models were universally wider than those seen in the unweighted unadjusted models. Compared to the weighted unadjusted logistic models, the weighted adjusted logistic models again had almost universally wider confidence intervals. Where the weighted adjusted logistic model differed from the previous two models were in the number of variables reaching a level of statistically significant association with the outcome (much fewer) and in the relative ordering by strength of OR estimate for the levels of two key variables (total family income and education). In comparing the Unweighted Adjusted

Marginal model with the Unweighted Unadjusted marginal model there were fewer variables in the adjusted model that reached as statistically significant level of association. No clear pattern was seen when comparing the width of confidence intervals or the unweighted unadjusted and the unweighted adjusted marginal models.

COMPARISON OF CONTINUOUS MODELS

The underlying assumptions supporting a linear regression modeling framework are more stringent than those for logistic. The data needed to satisfy the assumptions of a linear relationship between predictors and outcome, independence of observations, normality of the outcome, equal variance of error terms at each level of the predictors, and that observations were measured without error. The linearity assumption was tested for all predictors and found to be upheld. As mentioned previously, certain commonalities have been reported in the literature in terms of many of the predictors and the outcome by region. This possible violation of the independence assumption was addressed by incorporating multilevel modeling techniques. The distribution of the BMI data is right skewed. This violation of the normality assumption was addressed through the creation of a log-transformed BMI outcome and the use of a generalized linear model as previously described. The assumption of homoscedasticity was evaluated visually by means of the regression diagnostic graphs and was judged to be upheld. Being that our data came from a large survey, it was assumed that a certain amount of measurement error is present, but there was no way to reasonably test for this.

GENERAL LINEAR MODELS

Comparing the unweighted with the weighted unadjusted models, there were only apparent minor difference between the two. The application of the sampling weights resulted in adjustments to the beta estimates and generally wider confidence intervals. This is well illustrated by considering the beta estimates (-.0294 vs. -.0217) and width of confidence intervals (.018 vs .021) for meditation from those models respectively. Similar patterns were seen for all other predictors in the model. The greatest increase in width of confidence interval was seen for health status as a group, with the greatest for those reporting fair health vs poor (0.017). No predictors became statistically significant that had not previously been so, and the signs of the beta estimates for all predictors remained consistent (i.e. negative relationships remained negative and positive relationships remained positive). The greatest relative positive difference in beta estimate was seen for marital status (.0132) and the greatest negative difference was seen for NH-Blacks (-.007) which correspond to a positive 1.01 and a negative 0.99 percent difference respectively.

Similar differences were apparent when comparing the weighted adjusted model with the weighted unadjusted model. Again, all variables which had been statistically significant predictors of BMI remained so as groups. However, there were relative changes between the levels of some variables. For instance, all levels of income in the weighted unadjusted model compared to those earning less than $35,000 showed a statistically significant level of association with BMI, except those earning >$100,000 per year. In the weighted adjusted model, only those earning greater than $100,000 per year showed a statistically significant association with BMI. A similar shift was seen in education for those with an advanced degree becoming statistically significant in the adjusted model, and those with a high school/GED level of education no longer showing a statistically significant association compared to those with less than a high school level of education. Again, confidence intervals were generally wider in the weighted adjusted model compared to the weighted unadjusted model, but the differences in width were much smaller. For example, the differences in width of confidence interval for those reporting excellent health compared to those reporting poor were 0.015 and 0.0045 for the unadjusted and adjusted weighted models respectively. This was true for all variables except meditation (CI difference of -.02), whose CI was narrower in the adjusted model, and for all levels of region.

The unadjusted general linear mixed model with log-transformed BMI, was similar to the both the unweighted unadjusted general linear models and weighted unadjusted general linear models. Across the three models, no difference was seen in terms of which variables had a statically significant association with BMI. Also all statistically significant beta estimates had the same direction of effect. The beta estimates for any given variable were quite similar across all three models, and the estimates from the unweighted unadjusted mixed model tended to fall between the estimates from the unweighted and weighted unadjusted general linear models. For example, the beta estimates for Meditation were -.0294, -.0217, and -.0261 for the unadjusted unweighted general linear model, the unadjusted weighted general linear model, and unadjusted unweighted general linear mixed models respectively. This was true for all variables except total family income and reported health status. For the statistically significant levels of those two variables the unadjusted unweighted general linear mixed model estimated the smallest effect. Compared to the weighted general linear model and unweighted unadjusted models, the unweighted unadjusted mixed model had the narrowest confidence interval for the beta estimate of every level of every variable in the model.

Between the weighted adjusted general linear model and the unweighted adjusted general linear mixed models, there was no difference in terms of which variables were estimated to have a statistically significant association with BMI. Similarly, there was no difference in the relative ordering by strength of effect for any of the variables in the model, except for the NH-other racial group. Of all variables in the model, this group had the smallest sample size thereby giving it the widest confidence intervals. In the mixed model which allowed for clustering by region (the greatest proportion of this group living in the West) the estimate for this group was more conservative (.039 vs. .050) and had a much narrower confidence interval (.044 vs. .057). Similarly, the width of confidence interval was narrower for every level of every other variable in the unweighted adjusted mixed model than in the weighted adjusted general linear model.

GENERALIZED LINEAR MODELS

In the unadjusted generalized linear and the unadjusted generalized linear mixed models all variables were estimated to have statistically significant associations with the untransformed BMI variable. Between the two models, the point estimates were virtually identical. There was no discernable pattern between the two models in terms of width of confidence intervals. Between the adjusted generalized linear model and adjusted generalized linear mixed models, again the beta estimates were quite similar but there were very slight differences. The largest differences in beta estimates were seen for the variables representing meditation and income greater than $100,000 per year (-.0004 each) which amounts to a percent difference in BMI of approximately -.04 percent. No discernable pattern was found around the difference in confidence intervals between the adjusted generalized linear mixed model and adjusted generalized linear model. However, on average confidence intervals in the adjusted generalized linear mixed model were slightly wider (.0005). As a group confidence intervals were wider for of race as well as for meditation. They were more narrow for education, especially for those with an advanced degree (-.0032) and for those earning >$100,000 per year (-.0011).

More notable differences were found when comparing the unadjusted with the adjusted generalized linear models. Of all the variables which had estimated a statistically significant association with BMI in the unadjusted generalized linear model, only those earning $75,000-$99,000 vs <$35,000 in the adjusted generalized linear model failed to have statistically significant association. Overall the estimated difference in beta estimates was small between the two models (.011). However, there were notably higher beta estimates in the adjusted generalized linear model for those who meditated (-.0051 vs. -.0289), those earning >$100,000 per year (.0043 vs. -.0459), and those with an advanced degree (-.0014 vs. -.0669) compared to in the unadjusted model. This amounts to an attenuated relationship between meditation and BMI, a greater association of BMI with high earners (a reversal of this relationship) and those with the highest levels of education. Confidence intervals in the adjusted generalized linear model were notably more narrow (-.0712) than in the unadjusted generalized linear model. This was largely driven by more precise estimates for the association of meditation, all levels of educational attainment, and all levels of income with BMI. In comparing the unadjusted generalized linear model with the adjusted generalized linear mixed model an identical pattern of changes was present as seen between the unadjusted and adjusted generalized linear models. Beta estimates were slightly higher (most notably for meditation, education and income), and confidence intervals were generally narrower (namely for those same groups).

5.6 LIMITATIONS

Many of the limitations of this study were due to the nature of survey data and self-reported measurements, which are subject to recall bias. This raises some doubt as to the accuracy and correct classification of both the mediation and our chronic health outcomes. Also, the NHIS is quite lengthy. No estimate was found in regards to how long it actually takes to fully complete the survey, but survey fatigue could have contributed to missing responses for questions which fall later in the survey. The specific variables that were chosen as our predictor of interest and outcomes were extremely broad and somewhat lacking in detail. Ideally hypertension, cholesterol, and diabetes would be measured in a more precise/continuous manner. In regards to meditation, there was no indication as to how often one practiced meditation or what sort of motivation (prevention vs. treatment of disease) was behind the practice. There were likely unmeasured confounders related to stress, dietary and/or lifestyle habits which partly contributed to the clustering attributed to region. It was beyond the scope of this paper but a sensitivity analysis could have provided further insight as to possible misclassification or unmeasured confounders. Also an assessment of the missing data and a more rigorous model building process would have been desirable. We attempted to compensate for the inability to consider both the complex survey structure and the possible clustering of respondents by region by simultaneously running survey and multilevel procedures. However, due to the restrictions of the procedures available in SAS, we were unable to do both at once.

5.7 CONCLUSION

The ongoing challenge to our health as a nation from hypertension, high cholesterol, diabetes, and obesity requires innovation and creativity. A growing body of literature suggests that meditation practices have a calming effect on the body's sympathetic response to stress, thereby attenuating the damage due to chronic illness. Should this be true, meditation has the potential to be a low cost, widely available, broad-reaching approach to health. Meditation research has not always been of the highest caliber, but improvements in that realm are ongoing. This analysis investigated the association between meditation and select chronic health outcomes in a nationwide sample. Similar to the current body of meditation research, the results were mixed. No association was found between hypertension and meditation. High cholesterol was found to have a positive association with a meditation practice, which was contrary to our hypothesized relationship. For diabetes, the assessment of the relationship depended on the final model chosen. Accounting for the survey structure failed to detect an association, but when accounting for clustering in the data a negative relationship was found as anticipated. Across all of the models for BMI, a negative relationship was found between BMI and meditation as had been shown in one other recent study of meditation with survey data (Camilleri et al., 2016). New data on meditation should be available soon from the NHIS survey, which could help to shed additional light on the ongoing question of what benefits might be gained from a meditation practice.

TABLES

Table 1: Descriptive Statistics for Demographic Characteristics by Meditation Status

Variables	Meditate								
	Yes			No			Total*		
	N	Unweighted (%)	Weighted (%)	N	Unweighted (%)	Weighted (%)	N	Unweighted (%)	Weighted (%)
Total	2417	7.44	7.22	30083	92.56	92.78	32500	100	100
Age in years Mean (SD)	2417	46.49 (15.22)	45.45 (20.65)	30083	47.54 (17.49)	45.83 (24.28)	32500	47.47 (17.33)	45.80 (25.24)
Family Income									
<$35,000	870	6.52	6.35	12470	93.48	93.65	13340	43.29	33.03
$35,000-$74,999	736	7.81	7.16	8693	92.19	92.84	9429	30.60	31.97
$75,000-$99,999	244	7.74	7.10	2910	92.26	92.90	3154	10.23	12.49
>$100,000	496	10.13	9.45	4399	89.87	90.55	4895	15.88	22.51
Education									
<High School	90	1.79	2.11	4929	98.21	97.89	5019	15.50	13.74
High School/GED	296	3.54	3.37	8066	96.46	96.63	8362	25.83	26.07
College	1509	9.55	9.05	14288	90.45	90.95	15797	48.79	50.15
Advanced Degree	518	16.19	15.23	2681	83.81	84.77	3199	9.88	10.04
Race									
Hispanic	209	3.70	3.88	5444	96.30	96.12	5653	17.39	15.21
NH-White	1826	9.37	8.63	17671	90.63	91.37	19497	59.99	66.92
NH-Black	4985	4.39	4.17	4766	95.61	95.83	4985	15.34	11.84
NH-Asian	2008	6.57	5.74	1876	93.43	94.26	2008	6.18	5.23
NH-Other	357	8.68	7.52	326	91.32	92.48	357	1.10	0.80
Sex									
Female	1554	8.63	8.46	16452	91.37	91.54	18006	55.40	51.63
Male	863	5.95	5.90	13631	94.05	94.10	14494	44.60	48.37
Health Status									
Excellent	631	7.43	6.83	7860	92.57	93.17	8491	26.14	28.61
Very Good	871	8.53	8.17	9344	91.47	91.83	10215	31.44	32.41
Good	579	6.44	6.35	8416	93.56	93.65	8995	27.69	26.43
Fair	249	6.82	7.13	3402	93.18	92.87	3651	11.24	9.51
Poor	84	7.41	8.52	1050	92.59	91.48	1134	3.49	3.04
Marital Status									
Married or Partnered	1143	6.58	6.78	16222	93.42	93.22	17365	53.55	63.04
Not Currently Married	1270	8.43	7.97	13791	91.57	92.03	15061	46.45	36.96
Region									
Northeast	444	8.19	6.99	4977	91.81	93.01	5421	16.68	18.15
Midwest	500	7.45	7.79	6208	92.55	92.21	6708	20.64	22.70
South	582	4.92	5.09	11247	95.08	94.91	11829	36.40	36.40
West	891	10.43	10.24	7651	89.57	89.76	8542	26.28	22.75
N=# observations; *1066 missing on Meditate; Missing: Income 1682, Education 123, Health Status 14, Married 74									

Table 2: Descriptive Statistics for Demographic Characteristics by Hypertension Status

Variables	Hypertension								
	Yes			No			Total*		
	N	Unweighted (%)	Weighted (%)	N	Unweighted (%)	Weighted (%)	N	Unweighted (%)	Weighted (%)
	9175	27.38	24.82	24338	72.62	75.18	33513	100	100.00
Age in years Mean (SD)	9175	59.65 (14.15)	58.39 (19.16)	24338	42.88 (16.16)	41.68 (23.40)	33513	47.47 (17.33)	45.82 (25.63)
Meditate									
Yes	587	24.33	23.02	1826	75.67	76.98	2413	7.44	7.22
No	8290	27.6	24.84	21751	72.4	75.16	30041	92.56	92.78
Family Income									
<$35,000	4331	31.48	29.10	9427	68.52	70.90	13758	43.49	33.12
$35,000-$74,999	2553	26.35	24.95	7137	73.65	75.05	9690	30.56	32.02
$75,000-$99,999	757	23.51	22.45	2463	76.49	77.55	3220	10.16	12.39
>$100,000	994	19.73	18.82	4043	80.27	81.18	5037	15.89	22.47
Education									
<High School	1760	34.14	30.62	3395	65.86	69.38	5155	15.45	13.67
High School/GED	2671	22.76	27.43	5960	77.24	72.57	8631	9.9	26.17
College	3958	24.31	22.45	12326	75.69	77.55	16284	48.79	50.12
Advanced Degree	752	30.95	21.83	2552	69.05	78.17	3304	25.86	10.04
Race									
Hispanic	1065	18.4	15.68	4722	81.6	84.32	5787	17.27	15.08
NH-White	5628	28.04	26.15	14446	71.96	73.85	20074	59.9	66.86
NH-Black	1942	37.51	31.49	3235	62.49	68.51	5177	15.45	11.95
NH-Asian	429	20.35	18.17	1679	79.65	81.83	2108	6.29	5.32
NH-Other	111	30.25	29.70	256	69.75	70.30	367	1.1	0.79
Sex									
Female	5081	27.34	24.50	13501	72.66	75.50	18582	55.45	51.64
Male	4094	27.42	25.16	10837	72.58	74.84	14931	44.55	48.36
Health Status									
Excellent	919	10.52	9.41	7820	89.48	90.59	8739	26.09	28.51
Very Good	2251	21.39	20.53	8273	78.61	79.47	10524	31.42	32.41
Good	3229	34.83	33.04	6043	65.17	66.96	9272	27.68	26.47
Fair	2000	53.05	50.82	1770	46.95	49.18	3770	11.26	9.52
Poor	768	64.48	60.81	423	35.52	39.19	1191	3.56	3.09
Marital Status									
Married or Partnered	4675	26.17	25.58	13190	73.83	74.42	17865	53.43	62.97
Not Currently Married	4485	28.81	23.55	11085	71.19	76.45	15570	46.57	37.03
Region									
Northeast	1469	26.3	23.12	4117	73.7	76.88	5586	16.67	18.16
Midwest	1866	26.93	24.78	5064	73.07	75.22	6930	20.68	22.69
South	3789	31.04	27.87	8416	68.96	72.13	12205	36.42	36.46
West	2051	23.33	21.31	6741	76.67	78.69	8792	26.23	22.70

N=number of observations; *53 observations missing for hypertension, U=unweighted, W=Weighted, Missing: Meditate 1059, Income 1808, Education 139, Health Status 17, Marital Status 78

Table 3: Descriptive Statistics for Demographic Characteristics by High Cholesterol Status

Variables	High Cholesterol								
	Yes			No			Total*		
	N	Unweighted (%)	Weighted (%)	N	Unweighted (%)	Weighted (%)	N	Unweighted (%)	Weighted(%)
	9083	27.13	26.08	24401	72.87	73.92	33484	100	100.00
Age in years Mean (SD)	9083	59.08 (13.85)	57.85 (19.06)	24401	43.14 (16.48)	41.58 (21.87)	33484	47.47 (17.33)	45.83 (25.62)
Meditate									
Yes	701	29.05	29.01	1712	70.95	70.99	2413	7.44	7.23
No	8116	27.04	25.90	21895	72.96	74.10	30011	92.56	92.77
Family Income									
<$35,000	3679	26.79	25.35	10055	73.21	74.65	13734	43.36	33.09
$35,000-$74,999	2652	27.38	26.43	7034	72.62	73.57	9686	30.58	32.04
$75,000-$99,999	879	27.32	26.10	2339	72.68	73.90	3218	10.16	12.38
>$100,000	1345	26.71	25.90	3691	73.29	74.10	5036	15.9	22.49
Education									
<High School	1543	29.99	27.22	3602	70.01	72.78	5145	15.43	13.65
High School/GED	2478	28.76	27.30	6137	71.24	72.70	8615	25.84	26.16
College	4088	25.11	24.43	12195	74.89	75.57	16283	48.83	50.16
Advanced Degree	939	28.45	29.56	2362	71.55	70.44	3301	9.9	10.04
Race									
Hispanic	1167	20.19	18.94	4612	79.81	81.06	5779	17.26	15.08
NH-White	6010	29.95	28.77	14054	70.05	71.23	20064	59.92	66.86
NH-Black	1303	25.2	21.60	3867	74.8	78.40	5170	15.44	11.94
NH-Asian	518	24.62	22.91	1586	75.38	77.09	2104	6.28	5.31
NH-Other	85	23.16	23.29	282	76.84	76.71	367	1.1	0.81
Sex									
Female	4893	26.34	24.77	13684	73.66	75.23	18577	55.48	51.67
Male	4190	28.11	27.48	10717	71.89	72.52	14907	44.52	48.33
Health Status									
Excellent	1226	14.03	13.75	7514	85.97	86.25	8740	26.12	28.54
Very Good	2498	23.75	23.75	8021	76.25	76.25	10519	31.43	32.42
Good	3049	32.92	32.60	6213	67.08	67.40	9262	27.68	26.48
Fair	1676	44.57	44.27	2084	55.43	55.73	3760	11.23	9.48
Poor	626	52.78	52.08	560	47.22	47.92	1186	3.54	3.08
Marital Status									
Married or Partnered	5120	28.68	28.97	12733	71.32	71.03	17853	53.44	62.97
Not Currently Married	3947	25.38	21.17	11606	74.62	78.83	15553	46.56	37.03
Region									
Northeast	1530	27.41	25.60	4052	72.59	74.40	5582	16.67	18.15
Midwest	1888	27.26	26.10	5039	72.74	73.90	6927	20.69	22.69
South	3447	28.26	27.23	8749	71.74	72.78	12196	36.42	36.46
West	2218	25.26	24.60	6561	74.74	75.40	8779	26.22	22.69
N=number of observation; *82 observations missing for cholesterol; Missing: Meditate 1060, Family Income 1810, Education 140, Health Status 17, Marital Status 78; U=Unweighted, W=weighted									

Table 4: Descriptive Statistics for Demographic Characteristics by Diabetes Status

Variables	Diabetes								
	Yes			No			Total*		
	N	Unweighted (%)	Weighted (%)	N	Unweighted (%)	Weighted (%)	N	Unweighted %	Weighted (%)
Total	3362	10.02	8.92	30179	89.98	91.08	33541	100	100.00
Age in years Mean (SD)	3362	60.54 (13.21)	59.34 (17.97)	30179	46.02 (17.12)	44.51 (26.06)	33541	47.48 (17.33)	45.83 (25.64)
Meditate									
Yes	166	6.87	6.18	2250	93.13	93.82	2416	7.44	7.22
No	3080	10.24	9.11	26984	89.76	90.89	30064	92.56	92.78
Family Income									
<$35,000	1756	12.76	11.97	12011	87.24	88.03	13767	43.39	33.12
$35,000-$74,999	887	9.15	8.89	8811	90.85	91.11	9698	30.57	32.02
$75,000-$99,999	231	7.17	6.69	2991	92.83	93.31	3222	10.16	12.39
>$100,000	302	5.99	5.29	4738	94.01	94.71	5040	15.89	22.48
Education									
<High School	772	14.97	13.63	4386	85.03	86.37	5158	15.44	13.65
High School/GED	1037	12	10.66	7603	88	89.34	8640	25.87	26.19
College	1319	8.09	7.28	14978	91.91	92.72	16297	48.79	50.12
Advanced Degree	216	6.53	6.11	3091	93.47	93.89	3307	9.9	10.03
Race									
Hispanic	572	9.87	8.95	5221	90.13	91.05	5793	17.27	15.08
NH-White	1841	9.16	8.36	18255	90.84	91.64	20096	59.91	66.86
NH-Black	720	13.91	12.22	4455	86.09	87.78	5175	15.43	11.93
NH-Asian	172	8.15	7.53	1938	91.85	92.47	2110	6.29	5.32
NH-Other	57	15.53	14.95	310	84.47	85.05	367	1.09	0.81
Sex									
Female	1802	9.69	8.80	16793	90.31	91.20	18595	55.44	51.63
Male	1560	10.44	9.04	13386	89.56	90.96	14946	44.56	48.37
Health Status									
Excellent	155	1.77	1.59	8592	98.23	98.41	8747	26.09	28.52
Very Good	564	5.36	4.86	9965	94.64	95.14	10529	31.41	32.39
Good	1228	13.23	12.49	8054	86.77	87.51	9282	27.69	26.49
Fair	970	25.72	25.48	2801	74.28	74.52	3771	11.25	9.51
Poor	443	37.07	37.22	752	62.93	62.78	1195	3.56	3.10
Marital Status									
Married or Partnered	1743	9.75	9.30	16136	90.25	90.70	17879	53.43	62.96
Not Currently Married	1614	10.36	8.29	13970	89.64	91.71	15584	46.57	37.04
Region									
Northeast	516	9.23	8.08	5077	90.77	91.92	5593	16.68	18.16
Midwest	658	9.48	8.69	6280	90.52	91.31	6938	20.69	22.67
South	1419	11.62	10.47	10790	88.38	89.53	12209	36.4	36.45
West	769	8.74	7.33	8032	91.26	92.67	8801	26.24	22.72

N=number of observations; *25 observations missing for diabetes outcome, Missing: Meditate 1061, Fam Income 1814, School Per 139, Health Stat 17, Married 78

Table 5: Descriptive Statistics for Demographic Characteristics by BMI

Variables	BMI				
	N	Unweighted Median	Unweighted IQR	Weighted Median	Weighted IQR
Total *	32261	26.63	7.29	26.62	7.29
Meditate					
Yes	2357	25.82	7.08	25.84	7.24
No	29178	26.76	7.38	26.63	7.22
Family Income					
<$35,000	13248	27.06	8.09	27.08	8.13
$35,000-$74,999	9378	26.99	7.31	27.06	7.3
$75,000-$99,999	3136	26.7	7.04	26.63	7.1
>$100,000	4900	25.86	6.08	25.85	6.1
Education					
<High School	4917	27.45	7.6	27.39	7.72
High School/GED	8296	27.36	7.63	27.35	7.71
College	15735	26.55	7.35	26.54	7.11
Advanced Degree	3197	25.64	5.95	25.68	6
Race					
Hispanic	5551	27.42	6.91	27.39	6.94
NH-White	19348	26.59	7.23	26.59	7.22
NH-Black	4957	28.27	8.29	28.16	8.02
NH-Asian	2054	23.7	5.11	23.90	5.07
NH-Other	351	28.34	8.14	28.78	8.19
Sex					
Female	17586	26.32	8.35	25.84	8.20
Male	14675	27.23	6.3	27.27	6.34
Health Status					
Excellent	8479	25.08	5.66	25.39	11.35
Very Good	10143	26.55	6.77	25.08	5.64
Good	8892	27.99	7.98	27.97	7.96
Fair	3595	29.06	9.16	29.27	9.76
Poor	1139	29.27	10.58	29.16	10.2
Marital Status					
Married or Partnered	17204	27.05	7.08	27.06	7.05
Not Currently Married	14997	26.55	7.71	26.06	7.61
Region					
Northeast	5343	26.55	7.13	26.49	26.93
Midwest	6682	27.07	7.73	26.93	7.63
South	11762	27.11	7.57	27.05	7.51
West	8474	26.46	6.96	26.38	6.79

N=number of observations; *1305 missing for BMI;
Missing: Meditate 726; Income: 1599; Education: 116; Health Status: 13; Married: 60

Table 6: Statistical Modeling Results for Hypertension Status

Variables	Hypertension (ref=non-hypertensive)																								
	Unweighted Unadjusted Logistic					Weighted Unadjusted Logistic					Weighted Adjusted Logistic					Unweighted Unadjusted Marginal					Unweighted Adjusted Marginal				
	OR	95% CI		p-value	AIC	OR	95% CI		p-value	AIC	OR	95% CI		p-value	AIC	OR	95% CI		p-value	QICu	OR	95% CI		p-value	QICu
Age, Years	1.07	1.07	1.07	<.0001	31,620	1.07	1.07	1.07	<0.0001	214,563,498	1.06	1.06	1.07	<.0001	178,511,928	1.07	1.07	1.07	<.0001	32,701	1.06	1.06	1.06	<.0001	27,419
Meditate (ref=0)	0.84	0.77	0.93	0.0005	38,075	0.91	0.80	1.03	0.1237	248,594,814	1.05	0.91	1.22	0.5266		0.84	0.73	0.97	0.0178	38,075	1.00	0.85	1.18	0.9663	
Family Income (ref=<$35,000)				<.0001	36,839				<0.0001	239,815,850				0.1048						36,839					
$35,000-$74,999	0.78	0.74	0.83	<.0001		0.81	0.75	0.88	<0.0001		0.91	0.82	1.00	0.0611		0.78	0.69	0.88	<.0001		0.95	0.85	1.07	0.4134	
$75,000-$99,999	0.67	0.61	0.73	<.0001		0.71	0.63	0.79	<0.0001		1.04	0.91	1.19	0.5939		0.67	0.60	0.74	<.0001		1.05	0.93	1.19	0.4412	
>$100,000	0.54	0.50	0.58	<.0001		0.57	0.51	0.62	<0.0001		0.92	0.81	1.05	0.2239		0.54	0.46	0.62	<.0001		0.92	0.87	0.97	0.0024	
Education (ref=<High School)				<.0001	38,912				<.0001	255,155,682				0.1862						38,912					
High School/GED	0.86	0.80	0.93	<.0001		0.86	0.78	0.94	0.0016		0.98	0.86	1.11	0.7243		0.86	0.73	1.02	0.09		1.08	0.99	1.17	0.0836	
College	0.62	0.58	0.66	<.0001		0.66	0.60	0.72	<.0001		1.04	0.92	1.18	0.5424		0.62	0.49	0.78	<.0001		1.09	1.00	1.19	0.0628	
Advanced Degree	0.57	0.51	0.63	<.0001		0.63	0.55	0.72	<.0001		0.90	0.74	1.08	0.2463		0.57	0.44	0.73	<.0001		0.97	0.86	1.09	0.5809	
Race (ref=NH-White)				<.0001	38,786				<.0001	254,702,900				<.0001						38,786					
Hispanic	0.58	0.54	0.62	<.0001		0.53	0.48	0.57	<.0001		0.68	0.60	0.76	<.0001		0.58	0.53	0.63	<.0001		0.72	0.65	0.79	<.0001	
NH-Black	1.54	1.45	1.64	<.0001		1.30	1.19	1.41	<.0001		1.57	1.40	1.76	<.0001		1.54	1.39	1.71	<.0001		1.72	1.52	1.94	<.0001	
NH-Asian	0.66	0.59	0.73	<.0001		0.63	0.54	0.73	<.0001		0.83	0.70	1.00	0.045		0.66	0.42	1.02	0.0623		0.84	0.67	1.05	0.1183	
NH-Other	1.11	0.89	1.39	0.3509		1.19	0.89	1.60	0.2376		1.52	1.06	2.19	0.0249		1.11	0.91	1.36	0.3		1.35	1.19	1.52	<.0001	
Sex (ref=Male)	1.00	0.95	1.05	0.8771	39,347	0.97	0.91	1.03	0.2822	257,502,545	0.83	0.77	0.91	<.0001		1.00	0.97	1.03	0.7979	39,347	0.90	0.87	0.93	<.0001	
Health Status (ref=Poor)				<.0001	35,561				<.0001	233,378,393				<.0001						35,561					
Excellent	0.07	0.06	0.07	<.0001		0.07	0.06	0.08	<.0001		0.11	0.09	0.14	<.0001		0.06	0.05	0.08	<.0001		0.11	0.10	0.12	<.0001	
Very Good	0.15	0.13	0.17	<.0001		0.17	0.14	0.20	<.0001		0.23	0.19	0.28	<.0001		0.15	0.13	0.18	<.0001		0.21	0.18	0.24	<.0001	
Good	0.29	0.26	0.33	<.0001		0.32	0.27	0.37	<.0001		0.40	0.33	0.49	<.0001		0.29	0.26	0.34	<.0001		0.38	0.34	0.41	<.0001	
Fair	0.62	0.54	0.71	<.0001		0.67	0.56	0.80	<.0001		0.73	0.59	0.90	0.0035		0.62	0.54	0.72	<.0001		0.69	0.62	0.78	<.0001	
Marital Status (ref=not currently married)	0.88	0.84	0.92	<.0001	39,238	1.12	1.05	1.19	0.0005	257,084,554	1.01	0.93	1.10	0.7744		0.88	0.84	0.92	<.0001	39,238	0.99	0.95	1.03	0.5833	
Region (ref= West)				<.0001	39,191				<.0001	256,688,752				0.0001											
Northeast	1.17	1.09	1.27	<.0001		1.11	1.02	1.21	0.0218		0.99	0.89	1.10	0.8284											
Midwest	1.21	1.13	1.30	<.0001		1.22	1.11	1.34	<.0001		1.11	1.00	1.25	0.0605											
South	1.48	1.39	1.58	<.0001		1.43	1.32	1.55	<.0001		1.22	1.11	1.35	0.0001											

Table 7: Statistical Modeling Results for High Cholesterol Status

Variables	High Cholesterol (ref=No High Cholesterol)																								
	Unweighted Unadjusted Logistic					Weighted Unadjusted logistic					Weighted Adjusted Logistic					Unweighted Unadjusted Marginal					Unweighted Adjusted Marginal				
	OR	95% CI		p-value	AIC	OR	95% CI		p-value	AIC	OR	95% CI		p-value	AIC	OR	95% CI		p-value	QIC	OR	95% CI		p-value	QIC
Age in years	1.06	1.06	1.06	<.0001	33,232	1.07	1.06	1.07	<.0001	221,639,740	1.06	1.06	1.06	<.0001	193,718,421	1.06	1.06	1.06	<.0001	33,232	1.06	1.06	1.06	<.0001	29,293
Meditate (ref=0)	1.11	1.01	1.21	0.033	37,946	1.17	1.04	1.32	0.0093	255,104,680	1.27	1.11	1.46	0.0008		1.10	1.03	1.19	0.0058	37,946	1.23	1.17	1.28	<.0001	
Family Income (ref=<$35,000)				0.7043	36,961				0.5762	247,328,419										36,961					
$35,000-$74,999	1.03	0.97	1.09	0.3141		1.06	0.98	1.15	0.1636		1.10	1.00	1.20	0.0439		1.03	0.97	1.10	0.3656		1.14	1.09	1.19	<.0001	
$75,000-$99,999	1.03	0.94	1.12	0.5431		1.04	0.93	1.16	0.4977		1.28	1.11	1.47	0.0005		1.03	0.94	1.13	0.5693		1.33	1.30	1.37	<.0001	
>$100,000	1.00	0.93	1.07	0.9134		1.03	0.93	1.14	0.5793		1.30	1.15	1.46	<.0001		1.00	0.91	1.09	0.9311		1.31	1.23	1.38	<.0001	
Education (ref=<High School)				<.0001	38,924				<.0001	262,085,833										38,924					
High School/GED	0.94	0.87	1.02	0.1259		1.00	0.91	1.10	0.9346		1.16	1.03	1.31	0.0181		0.94	0.89	1.00	0.0416		1.12	1.03	1.23	0.0078	
College	0.78	0.73	0.84	<.0001		0.87	0.79	0.95	0.0021		1.21	1.08	1.37	0.0015		0.78	0.67	0.92	0.003		1.17	1.10	1.24	<.0001	
Advanced Degree	0.93	0.84	1.02	0.1285		1.12	1.00	1.26	0.0568		1.25	1.06	1.47	0.0094		0.93	0.78	1.10	0.3822		1.20	1.15	1.25	<.0001	
Race (ref=NH-White)				<.0001	38,905				<.0001	261,685,138										38,905					
Hispanic	0.59	0.55	0.64	<.0001		0.58	0.53	0.63	<.0001		0.90	0.80	1.02	0.0848		0.59	0.55	0.64	<.0001		0.85	0.77	0.93	0.0006	
NH-Black	0.79	0.74	0.85	<.0001		0.68	0.62	0.75	<.0001		0.78	0.69	0.88	<.0001		0.79	0.75	0.83	<.0001		0.82	0.74	0.91	0.0003	
NH-Asian	0.76	0.69	0.85	<.0001		0.74	0.65	0.84	<.0001		0.98	0.85	1.14	0.8081		0.76	0.56	1.03	0.0802		1.00	0.91	1.11	0.962	
NH-Other	0.71	0.55	0.90	0.005		0.75	0.55	1.03	0.0739		0.85	0.60	0.90	0.3753		0.70	0.47	1.05	0.0834		0.81	0.57	1.16	0.245	
Sex (ref=Male)	0.92	0.87	0.96	0.0003	39,135	0.87	0.82	0.92	<.0001	263,382,312	0.78	0.72	0.83	<.0001		0.91	0.88	0.95	<.0001	39,135	0.86	0.83	0.90	<.0001	
Health Status (ref=Poor)				<.0001	37,175				<.0001	250,453,334										37,175					
Excellent	0.15	0.13	0.17	<.0001		0.15	0.13	0.17	<.0001		0.21	0.17	0.26	<.0001		0.15	0.11	0.19	<.0001		0.21	0.16	0.28	<.0001	
Very Good	0.28	0.25	0.32	<.0001		0.29	0.25	0.34	<.0001		0.34	0.28	0.41	<.0001		0.28	0.22	0.35	<.0001		0.35	0.27	0.45	<.0001	
Good	0.44	0.39	0.50	<.0001		0.45	0.38	0.52	<.0001		0.51	0.42	0.61	<.0001		0.44	0.35	0.55	<.0001		0.52	0.39	0.69	<.0001	
Fair	0.72	0.63	0.82	<.0001		0.73	0.61	0.87	0.0005		0.76	0.61	0.94	0.0114		0.72	0.61	0.85	0.0001		0.79	0.62	0.99	0.0438	
Marital Status (ref=not currently married)	1.18	1.13	1.24	<.0001	39,021	1.52	1.42	1.63	<.0001	261,508,262	1.25	1.15	1.37	<.0001		1.18	1.11	1.26	<.0001	39,021	1.19	1.10	1.28	<.0001	
Region (ref= West)				<.0001	39,128				0.0309	263,479,732															
Northeast	1.12	1.04	1.21	0.0043		1.06	0.94	1.18	0.36		0.99	0.87	1.12	0.8885											
Midwest	1.11	1.03	1.19	0.0048		1.08	0.98	1.20	0.13		1.05	0.93	1.17	0.4509											
South	1.17	1.10	1.24	<.0001		1.15	1.05	1.26	0.00		1.11	1.01	1.24	0.0402											

Table 8: Statistical Modeling Results for Diabetes Status

Variables	Diabetes (ref=no Diabetes)																								
	Unweighted Unadjusted Logistic					Weighted Unadjusted Logistic					Weighted Adjusted Logistic					Unweighted Unadjusted Marginal					Unweighted Adjusted Marginal				
	OR	95% CI		p-value	AIC	OR	95% CI		p-value	AIC	OR	95% CI		p-value	AIC	OR	95% CI		p-value	QIC	OR	95% CI		p-value	QIC
Age in Years	1.05	1.05	1.06	<.0001	19,669	1.055	1.052	1.058	<.0001	124,152,193	1.048	1.045	1.052	<.0001	99,423,639	1.053	1.052	1.055	<.0001	19,669	1.047	1.046	1.049	<.0001	16,130
Meditate (ref=0)	0.65	0.55	0.76	<.0001	21,081	0.66	0.51	0.85	0.0015	133,390,679	0.81	0.62	1.07	0.1382		0.65	0.57	0.74	<.0001	21,081	0.81	0.70	0.95	0.0074	
Family Income (ref=<$35,000)				<.0001	20,399				<.0001	127,433,492										20,399					
$35,000-$74,999	0.69	0.63	0.75	<.0001		0.72	0.65	0.80	<.0001		0.94	0.83	1.07	0.3611		0.69	0.59	0.80	<.0001		0.95	0.80	1.13	0.5904	
$75,000-$99,999	0.53	0.46	0.61	<.0001		0.53	0.44	0.63	<.0001		0.96	0.79	1.17	0.6838		0.53	0.46	0.61	<.0001		0.97	0.75	1.26	0.8398	
>$100,000	0.44	0.38	0.50	<.0001		0.41	0.35	0.48	<.0001		0.95	0.78	1.16	0.6232		0.44	0.39	0.49	<.0001		1.00	0.89	1.13	0.9897	
Education (ref=<High School)				<.0001	21,461				<.0001	136,106,079										21,461					
High School/GED	0.78	0.70	0.86	<.0001		0.76	0.67	0.86	<.0001		1.11	0.95	1.29	0.1783		0.77	0.72	0.84	<.0001		1.19	1.14	1.25	<.0001	
College	0.50	0.46	0.55	<.0001		0.50	0.44	0.56	<.0001		1.11	0.95	1.30	0.1813		0.50	0.42	0.60	<.0001		1.14	0.96	1.34	0.137	
Advanced Degree	0.40	0.34	0.47	<.0001		0.41	0.34	0.50	<.0001		0.97	0.77	1.22	0.7706		0.40	0.36	0.44	<.0001		1.00	0.87	1.15	0.983	
Race (ref=NH-White)				<.0001	21,737				<.0001	137,810,367										21,737					
Hispanic	1.09	0.98	1.20	0.1001		1.08	0.93	1.25	0.3062		1.49	1.25	1.77	<.0001		1.09	0.94	1.26	0.2613		1.38	1.22	1.55	<.0001	
NH-Black	1.60	1.46	1.76	<.0001		1.53	1.37	1.71	<.0001		1.48	1.30	1.70	<.0001		1.60	1.44	1.78	<.0001		1.46	1.29	1.64	<.0001	
NH-Asian	0.88	0.75	1.04	0.1247		0.89	0.73	1.10	0.2859		1.28	0.99	1.64	0.0589		0.88	0.67	1.15	0.348		1.10	1.03	1.18	0.0035	
NH-Other	1.82	1.37	2.43	<.0001		1.93	1.37	2.72	0.0002		2.29	1.48	3.54	0.0002		1.82	1.62	2.05	<.0001		2.04	1.62	2.57	<.0001	
Sex (ref=Male)	0.92	0.86	0.99	0.0236	21,841	0.97	0.89	1.06	0.4852	138,302,017	0.84	0.76	0.92	0.0005		0.92	0.87	0.98	0.0089	21,841	0.83	0.76	0.91	<.0001	
Health Status (ref=Poor)				<.0001	19,096				<.0001	119,728,815										19,096					
Excellent	0.03	0.03	0.04	<.0001		0.03	0.02	0.04	<.0001		0.04	0.03	0.06	<.0001		0.03	0.03	0.04	<.0001		0.05	0.04	0.06	<.0001	
Very Good	0.10	0.08	0.11	<.0001		0.09	0.07	0.10	<.0001		0.12	0.09	0.15	<.0001		0.10	0.08	0.11	<.0001		0.14	0.12	0.16	<.0001	
Good	0.26	0.23	0.30	<.0001		0.24	0.20	0.29	<.0001		0.29	0.23	0.35	<.0001		0.26	0.23	0.29	<.0001		0.31	0.29	0.34	<.0001	
Fair	0.59	0.51	0.68	<.0001		0.58	0.48	0.69	<.0001		0.57	0.46	0.70	<.0001		0.59	0.51	0.68	<.0001		0.60	0.55	0.66	<.0001	
Marital Status (ref=not currently married)	0.94	0.87	1.00	0.0649	21,804	1.14	1.04	1.24	0.0073	138,100,151	1.17	1.05	1.32	0.0064		0.94	0.85	1.03	0.1723	21,804	1.11	1.03	1.19	0.0034	
Region (ref= West)				<.0001	21,794				<.0001	137,857,016															
Northeast	1.06	0.94	1.19	0.317		1.11	0.95	1.30	0.1921		1.14	0.95	1.37	0.1716											
Midwest	1.09	0.98	1.22	0.1056		1.20	1.03	1.40	0.0183		1.28	1.08	1.52	0.0047											
South	1.37	1.25	1.51	<.0001		1.48	1.31	1.67	<.0001		1.32	1.14	1.51	0.0001											

Table 9a: Statistical Models for BMI

Variables	BMI																								
	Unweighted Unadjusted Linear Regression*					Weighted Unadjusted Linear Regression*					Weighted Adjusted Linear Regression*					Unweighted Unadjusted Mixed Linear Regression*					Unweighted Adjusted Mixed Linear Regression*				
	b-hat	95% CI		p-value	R^2	b-hat	95% CI		p-value	R^2	b-hat	95% CI		p-value	R^2	b-hat	95% CI		p-value	AIC	b-hat	95% CI		p-value	AIC
Age in years Mean (SD)	0.0011	0.0009	0.0012	<.0001	0.0077	0.0014	0.0012	0.0015	<.0001	0.0128	0.0007	0.0006	0.0009	<.0001	0.0985	0.0011	0.0009	0.0012	<.0001	-9,742	0.0004	0.0003	0.0006	<.0001	-11,341
Meditate (ref=0)	-0.0294	-0.0381	-0.0206	<.0001	0.0014	-0.0217	-0.0320	-0.0114	<.0001	0.0007	-0.0109	-0.0211	-0.0007	0.0371		-0.0261	-0.0348	-0.0173	<.0001	-9,258	-0.0169	-0.0256	-0.0081	0.0001	
Family Income (ref=<$35,000)					0.0042					0.0056										-9,007					
$35,000-$74,999	-0.0001	-0.0056	0.0055	0.982		0.0005	-0.0068	0.0079	0.8868		0.0083	0.0009	0.0157	0.0285		0.0006	-0.0049	0.0062	0.8194		0.0145	0.0088	0.0202	<.0001	
$75,000-$99,999	-0.0059	-0.0140	0.0023	0.1575		-0.0057	-0.0167	0.0054	0.3135		0.0148	0.0035	0.0260	0.0101		-0.0046	-0.0127	0.0035	0.2681		0.0211	0.0127	0.0296	<.0001	
>$100,000	-0.0373	-0.0442	-0.0305	<.0001		-0.0374	-0.0465	-0.0283	<.0001		-0.0026	-0.0122	0.0070	0.5991		-0.0354	-0.0422	-0.0285	<.0001		0.0042	-0.0036	0.0120	0.2886	
Education (ref=<High School)					0.0084					0.0076										-9,713					
High School/GED	0.0001	-0.0072	0.0075	0.9703		0.0025	-0.0077	0.0127	0.6262		0.0193	0.0090	0.0296	0.0003		-0.0003	-0.0076	0.0071	0.9383		0.0169	0.0094	0.0244	<.0001	
College	-0.0263	-0.0329	-0.0196	<.0001		-0.0251	-0.0347	-0.0154	<.0001		0.0145	0.0043	0.0246	0.0054		-0.0257	-0.0323	-0.0190	<.0001		0.0126	0.0054	0.0199	0.0007	
Advanced Degree	-0.0628	-0.0720	-0.0535	<.0001		-0.0559	-0.0669	-0.0450	<.0001		-0.0010	-0.0132	0.0113	0.8757		-0.0616	-0.0708	-0.0523	<.0001		-0.0039	-0.0142	0.0063	0.4518	
Race (ref=NH-White)					0.0344					0.0253										-10,532					
Hispanic	0.0220	0.0158	0.0281	<.0001		0.0226	0.0158	0.0294	<.0001		0.0296	0.0217	0.0375	<.0001		0.0249	0.0187	0.0312	<.0001		0.0246	0.0179	0.0313	<.0001	
NH-Black	0.0543	0.0479	0.0608	<.0001		0.0474	0.0383	0.0565	<.0001		0.0474	0.0381	0.0567	<.0001		0.0533	0.0468	0.0598	<.0001		0.0464	0.0396	0.0531	<.0001	
NH-Asian	-0.1231	-0.1325	-0.1138	<.0001		-0.1164	-0.1266	-0.1062	<.0001		-0.1021	-0.1132	-0.0910	<.0001		-0.1193	-0.1287	-0.1098	<.0001		-0.1129	-0.1226	-0.1032	<.0001	
NH-Other	0.0468	0.0251	0.0684	<.0001		0.0556	0.0263	0.0849	0.0002		0.0501	0.0218	0.0783	0.0006		0.0499	0.0281	0.0716	<.0001		0.0392	0.0170	0.0613	0.0005	
Sex (ref=Male)	0.0225	0.0179	0.0271	<.0001	0.0029	0.0339	0.0276	0.0401	<.0001	0.0067	0.0341	0.0279	0.0403	<.0001		0.0229	0.0184	0.0275	<.0001	-9,598	0.0220	0.0174	0.0266	<.0001	
Health Status (ref=Poor)					0.058					0.0600										-11,381					
Excellent	-0.1444	-0.1570	-0.1319	<.0001		-0.1442	-0.1643	-0.1242	<.0001		-0.1336	-0.1559	-0.1113	<.0001		-0.1422	-0.1548	-0.1297	<.0001		-0.1375	-0.1508	-0.1241	<.0001	
Very Good	-0.0882	-0.1006	-0.0758	<.0001		-0.0866	-0.1068	-0.0665	<.0001		-0.0814	-0.1034	-0.0593	<.0001		-0.0862	-0.0986	-0.0738	<.0001		-0.0832	-0.0963	-0.0701	<.0001	
Good	-0.0370	-0.0495	-0.0245	<.0001		-0.0380	-0.0573	-0.0186	0.0001		-0.0359	-0.0571	-0.0148	0.0009		-0.0351	-0.0476	-0.0226	<.0001		-0.0352	-0.0482	-0.0223	<.0001	
Fair	-0.0007	-0.0142	0.0128	0.919		0.0068	-0.0151	0.0287	0.543		0.0013	-0.0224	0.0250	0.9122		0.0007	-0.0129	0.0142	0.9245		-0.0036	-0.0174	0.0103	0.6155	
Marital Status (ref=not currently married)	0.0114	0.0068	0.0160	<.0001	0.0007	0.0245	0.0183	0.0308	<.0001	0.0033	0.0248	0.0183	0.0314	<.0001		0.0120	0.0074	0.0166	<.0001	-9,502	0.0159	0.0110	0.0208	<.0001	
Region (ref= West)					0.0039					0.0035															
Northeast	0.0036	-0.0036	0.0108	0.3234		0.0018	-0.0076	0.0112	0.7102		-0.0004	-0.0095	0.0087	0.9343											
Midwest	0.0262	0.0195	0.0329	<.0001		0.0254	0.0157	0.0352	<.0001		0.0207	0.0113	0.0300	<.0001											
South	0.0285	0.0226	0.0343	<.0001		0.0261	0.0179	0.0343	<.0001		0.0107	0.0028	0.0187	0.0085											

*=log transformed BMI

Table 9b: Statistical Models for BMI

Variables	BMI																			
	Unadjusted Gamma Regression					Adjusted Gamma Regression					Unadjusted Mixed Gamma Regression					Adjusted Mixed Gamma Regression				
	coefficient	95% CI		p-value	AIC	coefficient	95% CI		p-value	AIC	coefficient	95% CI		p-value	QICu	coefficient	95% CI		p-value	QICu
Age, Years	0.0010	0.0008	0.0011	<.0001	204,955	0.0001	0.0001	0.0002	<.0001	-12,089	0.001	0.0008	0.0011	<.0001	5,624,303	0.0001	0.0001	0.0002	<.0001	36,209,339
Meditate (ref=0)	-0.0289	-0.0378	-0.0200	<.0001	200,593	-0.0051	-0.0077	-0.0025	0.0001		-0.0289	-0.0354	-0.0223	<.0001	5,482,776	-0.0055	-0.0089	-0.0021	0.0014	
Family Income (ref=<$35,000)					195,014															
$35,000-$74,999	-0.0033	-0.0089	0.0023	0.2474		0.0044	0.0027	0.0061	<.0001		-0.0033	-0.0081	0.0015	0.1739	5,362,909	0.0043	0.0023	0.0063	<.0001	
$75,000-$99,999	-0.0106	-0.0189	-0.0024	0.0116		0.0064	0.0038	0.0089	<.0001		-0.0106	-0.0235	0.0023	0.1065		0.0062	0.0024	0.0101	0.0014	
>$100,000	-0.0459	-0.0528	-0.0389	<.0001		0.0013	-0.0011	0.0036	0.2877		-0.0459	-0.0515	-0.0403	<.0001		0.0009	-0.0009	0.0027	0.319	
Education (ref=<High School)					204,124															
High School/GED	0.0014	-0.0061	0.0088	0.7177		0.0050	0.0028	0.0073	<.0001		0.0014	-0.0033	0.0061	0.567	5,647,880	0.0051	0.0038	0.0064	<.0001	
College	-0.0257	-0.0324	-0.0189	<.0001		0.0037	0.0015	0.0059	0.0009		-0.0257	-0.0358	-0.0155	<.0001		0.0036	0.0021	0.0052	<.0001	
Advanced Degree	-0.0669	-0.0763	-0.0575	<.0001		-0.0014	-0.0044	0.0017	0.3847		-0.0669	-0.0723	-0.0615	<.0001		-0.0015	-0.0029	0.0000	0.0482	
Race (ref=NH-White)					-11,124															
Hispanic	0.0066	0.0048	0.0085	<.0001		0.0076	0.0056	0.0096	<.0001		0.0066	0.0037	0.0096	<.0001	36,674,864	0.0065	0.0034	0.0096	<.0001	
NH-Black	0.0163	0.0144	0.0183	<.0001		0.0141	0.0120	0.0161	<.0001		0.0163	0.0127	0.0199	<.0001		0.0141	0.0101	0.0181	<.0001	
NH-Asian	-0.0380	-0.0408	-0.0352	<.0001		-0.0347	-0.0376	-0.0318	<.0001		-0.038	-0.0399	-0.0361	<.0001		-0.0358	-0.0388	-0.0329	<.0001	
NH-Other	0.0141	0.0076	0.0206	<.0001		0.0119	0.0053	0.0185	0.0004		0.0141	0.0053	0.0228	0.0017		0.0108	0.0025	0.0191	0.0108	
Sex (ref=Male)	0.0068	0.0054	0.0082	<.0001	-10,060	0.0069	0.0055	0.0083	<.0001		0.0068	0.0031	0.0105	0.0003	35,414,010	0.0068	0.0033	0.0103	0.0001	
Health Status (ref=Poor)					-11,920										37,765,745					
Excellent	-0.0437	-0.0474	-0.0399	<.0001		-0.0415	-0.0455	-0.0375	<.0001		-0.0437	-0.0463	-0.041	<.0001		-0.0417	-0.0436	-0.0397	<.0001	
Very Good	-0.0264	-0.0302	-0.0227	<.0001		-0.0249	-0.0288	-0.0210	<.0001		-0.0264	-0.0324	-0.0205	<.0001		-0.0250	-0.0290	-0.0211	<.0001	
Good	-0.0110	-0.0148	-0.0072	<.0001		-0.0105	-0.0143	-0.0066	<.0001		-0.011	-0.0178	-0.0042	0.0015		-0.0107	-0.0157	-0.0056	<.0001	
Fair	-0.0002	-0.0043	0.0039	0.9202		-0.0010	-0.0052	0.0031	0.6231		-0.0002	-0.0052	0.0048	0.9346		-0.0012	-0.0055	0.0030	0.5704	
Marital Status (ref=not currently married)	0.0034	0.0021	0.0048	<.0001	-9,964	0.0048	0.0033	0.0063	<.0001		0.0034	0.0029	0.004	<.0001	35,306,857	0.0049	0.0041	0.0057	<.0001	
Region (ref= West)					-10,090															
Northeast	0.0011	-0.0011	0.0032	0.3176		-0.0003	-0.0025	0.0018	0.7587											
Midwest	0.0079	0.0059	0.0099	<.0001		0.0061	0.0040	0.0082	<.0001											
South	0.0086	0.0069	0.0104	<.0001		0.0028	0.0010	0.0046	0.0023											

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