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# Identifying Predictors of Functional Limitations Associated with Depression, Anxiety, and Emotional Problems in US Adults

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# Identifying Predictors of Functional Limitations Associated with Depression, Anxiety, and Emotional Problems in US Adults

Capstone Project

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## Abstract

Depressive disorders are characterized as sharing affected mood, and somatic (e.g. sleep pattern, appetite, and unintentional changes in weight) and cognitive alterations from previous normal daily functioning that are clinically significant. Anxiety disorders are characterized by excessive fear, general or specific anxiety, and related behavioral disturbances that are also clinically significant. This project attempts to identify risk factors that may predict what groups are most likely to be affected by depression and/or anxiety.

Sponsored by the CDC, the National Health Interview Survey collects general health information for non-institutionalized individuals living in the US. Variables for use in logistic regression model construction were selected from the all-inclusive pool of data measurements taken during the 2014 NHIS person data module, using the literature as a guide. The sample was limited to adult respondents at least 18 years of age.

Odds ratios were calculated for each level of potential predictor variables comparing the two levels of the dependent variable: those with a self-reported depression, anxiety, or emotional problem (DAE) related functional limitation and those without. These were used as initial inclusion criteria for logistic regression modeling, which resulted in two final models. Each model contained eight variables accounting for age, marital status, education level, financial factors, and other functional limitations. The nine predictor model also included sex as a predictor (c=0.763), while the eight predictor did not (c=0.790). Different effects were observed in each model.

These models were designed for use as a tool for selecting groups for targeted public health intervention, not for use in a clinical setting, and could likely help distinguish groups that would be prime for investigating the prevalence and effects of DAE-related functional limitations. There were several limitations worth addressing in future research into this topic.

# Introduction

Not all illnesses are visible. Many conditions are difficult to discern just by looking at a person, but can be managed with medical treatment. But not every illness is so easily managed. Two such illnesses are often very difficult to distinguish and diagnose, even for those living with them. Though highly comorbid, each can independently have an enormous toll on the lives of those they affect. These illnesses are depression and anxiety.

Depression as the average person understands it is actually an umbrella term for a group of depressive disorders, each characterized by a distinct but related set of symptoms. For the purposes of this study, these disorders will be collectively explored. The Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5) defines depressive disorders as sharing affected mood, as well as somatic and cognitive alterations from previous functioning. These changes all impact daily functioning in a clinically significant manner, which may or may not be worse when observed in conjunction with another chronic condition (Wells et al., 1989). However, depression is a quiet illness. It can go undetected for long periods while still causing difficulties in the daily lives of those affected (APA, 2013a). The symptoms can make basic tasks insurmountable, and can have personal financial repercussions that make this illness a serious issue.

Anxiety disorders, as defined by the DSM-5, are characterized by clinically significant, excessive fear, anxiety, and related behavioral disturbances (APA, 2013a). While these first two feelings are connected, they differ in terms of the time frame. Fear is of the present, and anxiety is of the future.

Regardless of the specific depressive and anxiety diagnosis from a clinician, there are well-known issues related to people seeking treatment. Whether due to the stigma associated with mental illness or the common misconceptions surrounding the nature of depressive disorders, many people do not seek treatment. This project will attempt to identify risk factors that may predict what groups are most likely to be affected by depression and/or anxiety. If certain factors can be identified, it may

ultimately help to reduce the prevalence of untreated depression/anxiety in groups who possess those risk factors by identifying them as high-risk for these illnesses. While this study is entirely retrospective and performed on an existing dataset, the results may help guide future practitioners and public health officials in designing effective interventions targeted at high-risk groups.

## Background

### Depression

#### *Clinical Understanding of Depression*

The DSM-5 uniquely characterizes eight depressive disorders. While sharing observable changes from previous functioning, each disorder has unique diagnostic criteria that allow clinicians to specifically diagnose patients suffering with some quantity of depressive symptoms. Each of these depressive disorders can also be characterized by certain features that act to sub-categorize each disorder. It is important to note that this latest revision of the DSM has included a Bereavement Exclusion, indicating a distinction of depressive symptoms from the normal grieving process. Thus, the shared features of each depressive disorder make a collective analysis of depressive symptomology appropriate for data collected in a self-report survey, where those reporting symptoms may not have been formally diagnosed by a clinician.

However, these common depressive symptoms can be difficult to distinguish in any individual patient before they have reached a severe level. Mood changes may result in feelings of sadness, irritability, or emptiness, which may become very intrusive into daily functioning. Feelings of guilt are also commonly reported with depressive symptoms, and this guilt is generally unwarranted and overwhelming. Persons living with depression (in any form) also often report significant physical symptoms, including constant achiness, hypersomnia or insomnia, weight gain or loss, concentration issues, and lack of pleasure taken in once pleasurable activities (ADAA, 2015).

The DSM-5 has not thoroughly characterized the nature of depression. There are many slippery characteristics of this illness that make it difficult to understand, predict, and treat. Some researchers believe that the current framework through which depression is viewed do not capture all persons living with depression (Fried, 2015). While the purpose of this project is not examine the incompleteness of the current understanding of Major Depression, or of depressive disorders on the whole, one must keep in mind that the disease is still misunderstood and not always correctly identified or entirely captured by clinicians.

For example, though used as a diagnostic symptom in children and adolescents, the Irritable subtype was not included in the DSM-4 as a diagnostic criterion for adults (Fava et al., 2010). Nor was it included as a possible subset of features or even as a diagnostic criterion in the DSM-5. A thorough examination of the importance of considering irritability as it relates to depression found that irritability was associated with early age at onset of depressive symptoms, lifetime persistence, several comorbidities, and disability due to disease. The study by Fava et al. found that inclusion of irritability as a diagnostic symptom in adults would impact the reported prevalence of the disease, though the significance of this change is debatable.

Whatever the ultimate result, Fava et al. certainly indicates that further investigation to determine the validity of irritability as a major part of some depressive diseases might be prudent. Another study, conducted on twins in Sweden, explored irritability and later onset of depressive symptoms. It too found a need for further research into the role of irritable mood in depression, both as a symptom and as an early predictive factor (Savage et al., 2015).

Primary care in particular is regularly guilty of addressing all depressive illnesses with a general list of symptoms and treatments. This is part of the spectrum view of depressive disease (Angst, Sellaro, & Merikangas, 2000). Some literature supports this view, while other results support the distinction between subtypes as an important part of clinical treatment. Some support this use of categorical

diagnosis early in treatment while maintaining the notion that the spectrum approach is more inclusive of depressive disease symptomology (Benazzi, 2006). While this may work in some cases, not enough is understood about the different subtypes and how they are related or not related to make a firm determination of which view is most clinically applicable.

There are also note-worthy differences in the diagnostic criteria in the DSM-IV-TR and the DSM-5. In the former, depressive disorders were included in the category "Mood Disorders" (SAMHSA/CSAT, 2008). This category also included Bipolar Disorder. These two unique illnesses have since been separated into Depressive Disorders and Bipolar and Related Disorders. The restructuring of clinical diagnostic guidelines speaks to the incomplete nature of the clinical understanding of depression, especially considering the addition of several new depressive disorder classifications to the DSM-5 (APA, 2013b).

*Prevalence of Depression in the Population*

From a population based standpoint, Major Depressive Disorder (MDD) is reported by the DSM-5 to have a 12-month prevalence of 7%. This is very similar to a report published in 2014 that indicated that 7.6% percent of persons in the US over age 12 had moderate or severe depressive symptoms in the two-week period prior to data collection (Pratt & Brody, 2014). However, when stratified by age, this figure significantly changes, with a much higher prevalence in young adults and a lower prevalence in older adults. Based on data collected in 2014, an estimated 43.6 million US adults suffered from some form of mental illness, with 9.8 million of these adults qualifying as having serious mental illness (Hedden et al., 2015). This can be further narrowed to an estimate of 15.7 million US adults classified as having at least one major depressive episode in the previous 12 months, which accounts for approximately 6.7% of US adults 18 and older (NIMH, 2014). This data further supports the same age-related trend, where young adults aged 18-25 demonstrate higher 12-month prevalence of at least one depressive episode than adults over 50. Depression, in the form of MDD, is also the leading cause of

disability in the US for persons 15 to 44.3 years old (ADAA, 2014). These statistics indicate that age may be an important factor to examine as a predictor of depression in this study.

Additionally, the NIMH reports that factors like gender and race differentiate depression prevalence between demographic groups. Women are 70% more likely than men to experience depression during their lives (NIMH, 2015a). The DSM-5 reports this disparity in MDD as 1.5 to 3 times higher in women than in men, and notes that this inequality begins in adolescence. The prevalence of other depressive disorders is generally under 5%, and for Substance/Medication-Induced Depressive Disorder, is significantly less than 1% (APA, 2013a).

Race also shows significant differences between groups. SAMHSA estimates from 2014 indicate that persons identifying as White have a 7.1% 12-month prevalence, persons identifying as Black have a 5.4% 12-month prevalence, and Hispanics have a 5.6% 12-month prevalence. Native Hawaiians/Other Pacific Islanders had a 12-month prevalence of 6.7% while American Indians/Alaskan Natives had a 12-month prevalence of 6.0%. However, each of these is dwarfed by the 12-month depressive episode prevalence in those identifying with two or more races, which was estimated to be 12.7% (NIMH, 2014).

**Anxiety**

*Clinical Understanding of Anxiety*

The DSM-5 provides eleven anxiety disorders as free-standing diagnoses. As with depression, there are several common symptoms, though the variety with the symptomology of each unique disorder is greater. What is perhaps most relevant to the examination at hand is Generalized Anxiety Disorder (GAD). Described as having excessive apprehension more than half the time for at least six months, difficulty controlling worrying behaviors/thoughts, and the worry is associated with changes in mood, sleep disturbances, and difficulty concentrating (APA, 2013a). Somatic symptoms are also often reported, though autonomic hyper-arousal is less common in GAD than in some other anxiety disorders. As with any mental illness, a distinguishing characteristic of the symptoms of GAD or any anxiety

disorder is their interruptive nature. They interfere with normal functioning, as it is defined by functioning previous to onset of anxious symptoms.

The onset of this illness can happen at any point in life, though the median age is generally reported to be in the early 30s (APA, 2013a). This estimate varies, however, and has been reported as early as 11 years of age (R. C. Kessler, Berglund, et al., 2005). Additionally, the presentation of GAD symptoms is usually consistent throughout the lifespan of those affected, however the subject of stress may change with age (APA, 2013a).

There were no significant changes in the diagnostic criteria from the DSM-IV-TR to the DSM-5 for GAD, though the anxiety disorder classification no longer includes Obsessive-Compulsive Disorder, and a few changes have been made to certain specific phobias. The category also now includes Selective Mutism (APA, 2013b). This reflects not only the clearer understanding of anxiety symptoms, but also the grander consensus surrounding the nature of the illness when compared to the psychology community's thoughts on depression.

*Prevalence of Anxiety in the Population*

The WHO reports that anxiety disorders are the most common type of mental disorders globally, though the rates are typically higher in Western cultures (Kessler et al., 2009). A study published in 2001 reports that approximately 3.1% percent of the adult US population lives with GAD during any 12-month period (Hirschfeld, 2001). This equates to approximately 6.8 million adults, affecting women at a ratio of 2 to 1 as compared with men (NIMH, 2015b). The DSM-5 reported this prevalence at a slightly lower 2.9%, but adds that the lifetime risk is 9.0% (APA, 2013a). However, it is important to note that the 12-month prevalence of any anxiety disorder has been reported as high as 26.2%, with mood-related anxiety disorder prevalence as high as 18.1% in adults 18 and older (Kessler, Chiu, Demler, Merikangas, & Walters, 2005). The lifetime prevalence of any anxiety disorder is estimated at nearly 29%, though the Centers for Disease Control and Prevention (CDC) estimates this figure closer to 10% for global lifetime

prevalence (CDC, 2013). The CDC also estimates the cost of anxiety disorders to be approximately $42.3 billion annually. This accounts both for cost of care and for cost attributed to disability.

In terms of further differential prevalence between demographic groups, the DSM-5 also notes that GAD is more likely to affect those of European descent and those who are from a developed nation rather than a developing nation (APA, 2013a). White Americans were found to have a DSM-IV diagnosis of GAD prevalence of 8.6%, while African Americans were found to have GAD prevalence of 4.9%, Hispanic Americans a GAD prevalence of 5.8%, and Asian Americans a GAD prevalence of 2.4% (Asnaani, Richey, Dimaite, Hinton, & Hofmann, 2010). Another study by Grant et al. found that being black, Asian, or Hispanic decreased the risk of GAD (Grant et al., 2005).

**Comorbidity of Anxiety and Depression**

While each disorder has a significant prevalence, the presence of comorbid anxiety disorders in those living with depression is extremely high. It has been reported that approximately 15.4% of those living with depression also fit the diagnostic criteria for GAD, and 51.2% fit the diagnostic criteria for any anxiety disorder. Approximately 50% of those visiting a PCP during a depressive episode will also have a comorbid depressive or anxiety disorder (Hirschfeld, 2001). This may be due in part to the shared genetic risk factors for both depression and anxiety, though the strength of this potential connection remains unclear (APA, 2013a).

A study of adults in the Netherlands found that of those with a depressive disorder, 75% fit the diagnostic criteria for an anxiety disorder at some point in life, and for those with an anxiety disorder, 81% fit the diagnostic criteria for a depressive disorder at some point in life (Lamers et al., 2011). Though cultural differences may play a role in the outcomes of this study, it is generally accepted by the medical community that depressive and anxiety disorders are highly comorbid within the affected population. This makes the current study, where data collected did not differentiate between self-reported anxious and depressive symptoms, abler to identify predictors of both illnesses.

# Methods

## Survey Design and Administration

Sponsored by the CDC, the National Health Interview Survey collects general health information for persons not enlisted in the armed forces and not currently residing in a penitentiary, mental health facilities, or long-term care facilities for the elderly. Unlike other major data sources like BRFSS, the NHIS is administered via an in-home, face-to-face interview. The initial visit is always completed in person; though subsequent interview sections may be completed over the phone if circumstances do not permit a return visit by the interviewer. Data is collected to describe the entirety of the household selected for survey. If more than one family is present within the household, survey measures are repeated for each family.

The survey contains two major components: the core section of questions and supplemental questions that are added to the survey as public health concerns shift over time. This study focuses exclusively on the four sections of the core component. A limited scope of demographic data is collected on each family in the Household Core section and a slightly wider scope of demographic information is collected for each individual within a family in the Family Core section. For these data, respondents over the age of 17 are asked to provide survey responses for themselves if they are willing and able. If they are not able to respond due to absence at time of interview or disability, then an adult member of the family is asked to respond for them.

The remaining two components of the Core section are the Sample Adult and the Sample Child. Adults over the age of 65 and who identify as Black, Hispanic, or Asian have a higher chance of being selected as for the Sample Adult Core section than those who do not or are under 65 years of age. This oversampling occurs at a ratio of 2:1. One representative adult per household and if present, one representative child per household are selected to serve as the respondent for these sections. In cases where no child in present in the household, no data is collected for the Sample Child Core section.

In 2014, the household response rate for participation in the survey was 73.8%, with 17.6% refusing or only partially completing the interview, and the remaining 8.6% not interviewed due to the inability of the interview team to reach a suitable respondent (CDC, 2015). There were a total of 112,053 respondents representing Sample Adults and Sample Children. The breakdown of included individuals is shown in Figure 1. These respondents were chosen to provide estimates at the national level, as well as at the individual region level as defined by the census. Some state level estimates are unstable, as the sample size was too small for stable estimates to be produced. Estimates and data are obtained through a multistage stratified sampling plan, initially implemented in 2006 using 2000 census data as a guide (Parsons, Moriarity, Jonas, et al. 2014).

For the NHIS designed for use between 2006 and 2015, the overall sample was divided into subsamples, one for each year, and one for each time interval in which respondents were asked to respond. For the 2014 survey, these intervals were calendar quarters (3 month intervals) and calendar months. The NHIS design team maintains that this design will result in higher quality data (Parsons et al., 2014), as the collection teams will be constantly engaged and thus maintain their survey practices throughout the year.

Of the 112,053 total respondents, 28,114 were under the age of 18 and were thus excluded from analysis. Furthermore, there was only a record related to a DAE limitation for 12,413 respondents, both as having a DAE limitation and not having a DAE related functional limitation. The remaining 71,526 individuals had no recorded response, or had a recorded response of “Refused,” “Not Ascertained,” or “Don’t Know.” Respondents with these recorded responses or missing values were excluded from analysis. The resulting study population contained 12,413 respondents. Of these, 1,795 reported a DAE related functional limitation and 10,618 respondents reported not having a DAE related functional limitation.

**Regression Variable Selection and Creation**

Variables for use in the regression model were selected from the all-inclusive pool of data measurements taken during for the NHIS person data section using the literature as a guide. Only data from adult respondents was used in this analysis, thus excluding respondents where age was indicated to be less than 18.

Firstly, disease/disorder limitation variables were recoded in SAS 9.4 into dichotomous yes/no responses indicating either the confirmed presence or lack of limitation related to the specified set of diseases/disorders. Values that corresponded to the responses "Refused," "Don't Know," and "Not Ascertained" were counted as missing. Highest Level of Education Completed was recoded into four group: Up to High School Diploma or Equivalent; Some College or Associate Degree; Bachelor's, Master's, Professional, or Doctorate Degree; and Refused, Not Ascertained, and Don't Know. With the exception of the final Refused, Not Ascertained, and Don't Know category, these levels represent the most common educational attainment levels in the United States. The first category, Up to High School Diploma or Equivalent, was used as the reference group. Total Earnings Last Year was also recoded into three categories: $25,000 or more; Less than $25,000, and Refused, Not Ascertained, and Don't Know. The first category was used a reference, as the reported median household income for 2014 was $53,657 (DeNavas-Walt & Proctor, 2015).

Odds ratios were calculated for each level of potential predictor variables comparing the two levels of the dependent variable: those with a self-reported DAE limitation and those without. These odds and their corresponding confidence intervals were used as initial inclusion criteria for logistic regression modeling.

**Logistic Regression Analysis**

Variables suggested by the literature as being distinguishing characteristics of those living with depression or anxiety were included in the model in addition to those suggested by the calculated

confidence intervals. SAS 9.4 was used to run a logistic regression model. Backwards elimination was used to streamline the resulting model.

## Results

### Regression Variable Selection

The calculated odds ratios and corresponding 95% confidence intervals are shown in Tables 1.1 to 1.4. Several demographic variables were found to have a significant effect on the odds of having a functional limitation. Table 1.1 shows that those with a functional limitation associated with DAE symptoms were 25% more likely to be female than male (95% CI: 1.13 – 1.39). Identity as a Hispanic also showed a 37% increase in odds (95% CI: 1.19 – 1.58). Respondents who identified as Black were not significantly more or less likely to report a DAE-related functional limitation than those who identified as White (OR: 1.03, 95% CI: 0.90 – 1.16). Those who identified as Asian were also not significantly more or less likely to report this type of functional limitation (OR: 0.76, 95% CI: 0.56 – 1.01). All other race groups showed no significant difference in the likelihood of reporting a DAE-related functional limitation (OR: 1.19, 95% CI: 0.87 – 1.63) When compared to persons who were single or had never married, respondents who were married were 40% less likely to experience a DAE functional limitation (95% CI: 0.54 – 0.67). Respondents reporting DAE-related functional limitation were 70% more likely to be separated (95% CI: 1.34 – 2.15) and 59% more likely to be divorced (95% CI: 1.41 – 1.79). Somewhat unexpectedly, those who were widowed were 54% less likely to report this limitation than those who were single or never married (95% CI: 0.39 – 0.54). Respondents not born in the United States were 21% less likely to report this limitation than those respondents born in the United States (95% CI: 0.67 – 0.93). Those completing some college or obtaining an Associate degree were 27% more likely to report a DAE functional limitation than those who had only completed up to high school (95% CI: 1.13 – 1.41). Those who completed some level of higher education (Bachelor's, Master's, Professional or Doctorate

degree) were 29% less likely to report this limitation than those who only completed high school or obtained their equivalency (95% CI: 0.61 – 0.83).

Using respondents with neither father nor mother present in the household as the reference group, those with only mother present were 87% more likely to report this limitation (95% CI: 1.53 – 2.29), while those with only father present were 68% more likely (95% CI: 1.03 – 2.73). Those with both father and mother present were only 46% more likely to report a functional limitation associated with DAE symptoms (95% CI: 1.14 – 1.87).

Individuals who did not work for pay during the previous year were 22% more likely to report a DAE functional limitation than those who did work for pay (95% CI: 1.08 – 1.39). Respondents whose annual income was less than $25,000 were twice as likely to report a DAE functional limitation than those whose annual income was more than $25,000 (OR: 2.00, 95% CI: 1.65 – 2.42). Respondents who reported having problems paying medical bills were also 87% more likely than those who did not report having these problems (95% CI: 1.68 – 2.08).

Using respondents who reported their personal health status as either excellent or very good as the comparison group, those with a Reported Personal Health Status of good were 24% less likely to report a DAE Limitation (95% CI: 0.68 – 0.85). However, those who reported fair were only 18% more likely to report this limitation (95% CI: 1.06 – 1.31) and those who reported Poor were 69% more likely to report this DAE-related functional limitation (95% CI: 1.50 – 1.90).

A subset of all analyzed functional limitation variables showed significant results. Those with a self-reported vision problem were more than twice as likely to report a functional limitation associated with DAE symptoms (OR: 2.26, 95% CI: 1.95 – 2.62), as were respondents who reported a hearing problem (OR: 2.10, 95% CI: 1.76 – 2.50). Persons were also 43% more likely to report a DAE limitation if they had a functional limitation associated with arthritis or rheumatism (95% CI: 1.28 – 1.59), 49% more likely if they also reported a back or neck problem (95% CI: 1.33 – 1.66), and 45% more likely if they also

reported a functional limitation related to a fracture or bone/joint injury (95% CI: 1.25 – 1.69). Those with a functional limitation associated with hypertension or high blood pressure were two and a half times more likely to report a DAE-related limitation than those without hypertension or high blood pressure (OR: 2.50, 95% CI: 2.41 – 2.83). Those reporting a functional limitation associated with diabetes were 48% more likely to report a DAE-associated limitation than those who did not report a diabetes-related limitation (95% CI: 1.29 – 1.70). Respondents reporting a lung or breathing problem, asthma, or emphysema were 90% more likely to report a DAE-associated functional limitation than those without these issues (95% CI: 1.65 – 2.19). Those with a weight problem, overweight, or obesity-associated functional limitation were more than five times as likely to report a DAE-associated limitation than respondents who did not report a weight-related functional limitation (OR: 5.56, 95% CI: 4.64 – 6.65). A musculoskeletal or connective tissue problem made respondents 46% more likely to report a DAE-related functional limitation (95% CI: 1.28 – 1.67). Those with a nervous system or sensory organ problem were 87% more likely report a DAE-related functional limitation than those without (95% CI: 1.62 – 2.15), and those with a digestive system problem were 148% more likely than those without (OR: 2.48, 95% CI: 1.98 – 3.09).

Conversely, a functional limitation related to senility, dementia, or Alzheimer's Disease made respondents 35% less likely to report a DAE-related functional limitation (95% CI: 0.49 – 0.87). Respondents with a functional limitation related to surgical after-effects or medical treatment were 77% less likely to report a DAE problem than those without these after-effects (95% CI: 0.07 – 0.74). An "old age," elderly, or aging-related problem made respondents 95% less likely to report a DAE-related functional limitation.

**Logistic Regression Modeling – Predicting Functional Limitation**

The variables included in initial model construction due to statistical significance were: sex, Hispanic ethnicity, legal marital status by CDC standards, place born (US or not), highest level of

education completed, parents present in family, worked for pay last year, problems paying medical bills, reported personal health status, and functional limitation variables related to vision and hearing problems, arthritis and rheumatism, back or neck problem, fracture or bone/joint injury, hypertension/high blood pressure, diabetes, lung or breathing and weight-related problems, musculoskeletal or connective tissue problem, and nervous system or sensory organ problems. Racial identity was also included as the literature suggested a potential effect and the calculated confidence intervals were very close to having statistical significance. All other variables with significant confidence intervals were excluded due to low prevalence rates within the study population.

All models were compared using the concordant statistic (c) and Akaike's Information Criterion (AIC). The initial model Backwards elimination resulted in a model containing eight predictors: age, legal marital status by CDC standards, problems paying medical bills, highest level of education attained, worked last year for pay, and functional limitation variables for fracture or bone/join injury, hypertension/high blood pressure, and weight-related problems. The resultant model had fair predictive ability (c=0.790, AIC=1116.032). However, when sex was reentered into the model, this predictive ability dropped slightly (c=0.763, AIC=8705.878). This loss was considered acceptable by investigators based upon extensive reporting of sex as a distinguishing characteristic in depression and anxiety prevalence and thus, the two final models contained eight and nine predictors of a DAE-related functional limitation, respectively.

## Discussion

When considering the results of this study, it is important to maintain a broad view of the factors that are thought to and may have been indicated to affect the likelihood of a functional limitation associated with Depression, Anxiety, or other emotional problems. There are certain types of factors one might expect in addition to demographic descriptors when examining this kind of limitation outcome: social support, life event, and challenging event/situation factors.

**Regression Variable Selection**

None of the variables selected for initial model construction were unexpected, though some variables that were suggested by the literature to be included in the model were found not to have significant effects when their odds ratios were calculated and examined. One of the variables not significantly associated was a reported alcohol, drug, or substance abuse problem. This was an unexpected result, and because the confidence interval was so broad, investigators could not justify adding the variable into the pool of initial model construction variables at the suggestion of the related literature. Other factors that were expected to have a significant effect but were found not to included functional limitation associated with cancer and fatigue, tiredness, or weakness problems. It is possible that in the case of the latter, there was too much variation within the group to produce a significant or even a narrower confidence interval.

At the opposite end of the spectrum, several variables had unexpected yet significant effects on the likelihood of a DAE-related functional limitation. The reporting of a functional limitation associated with a birth defect had an extreme, significant effect on the likelihood of a DAE-related functional limitation (OR: 4.07, 95% CI: 3.06 – 5.40). The broadness of the confidence interval suggests that there may have been a large amount of variation within the respondents reporting a birth defect, or potentially the small response rate for birth defects within the population. This may stem from the range of severity and type of birth defect reported, as all birth defects were reported in the same category. Due to this unexplainable variability, the variable was excluded from further analysis. Similarly, the protective effect associated with senility, dementia, and Alzheimer's disease (OR: 0.65, 95% CI: 0.49 – 0.87) was completely contrary to investigator expectations. A logistic regression with backwards elimination was run using this limitation as a potential predictor to ensure that no predictive effect had been lost from the final model. The resulting model was identical to the final adjusted model, and the variable was ultimately discarded.

**Logistic Regression Model**

The logistic regression models, seeking to predict the likelihood of a functional limitation associated with Depression, Anxiety, or another Emotional Problem, resulted in two predictive tools. Though the eight predictor model was able to correctly differentiate between those reporting a DAE-related functional limitation and those not reporting this 79% of the time, and the nine predictor model was only able to correctly differentiate in 76.3% of cases, the variables ultimately included in both models are not unexpected. Point estimates for each effect in the eight predictor model are listed in Table 2 and Table 3 for the nine predictor model.

The expected demographic variables are all present, which help to predict which groups may be most susceptible to DAE-related functional limitations. In the eight predictor model, age was found to have a protective effect, with each additional year in age associated with a 4.5% reduction in the odds of reporting a DAE-related functional limitation (95% CI: 0.951 – 0.959). This was only slightly different for the nine predictor model (OR: 0.954, 95% CI: 0.950 – 0.958). For the eight predictor model, some college or Associate degree showed a 74.2% increase in the likelihood of reporting the dependent variable when compared to completion of high school or equivalency (95% CI: 1.198 – 2.531). Attainment of a Bachelor's, Master's, Professional, or Doctorate degree also showed an 87.9% increase in likelihood of reporting a DAE-related functional limitation (95% CI: 1.201 – 2.940). In the nine predictor model, only completion of some college or Associate degree showed a significant effect, with a 25.6% increase in the likelihood of reporting a DAE-related functional limitation (95% CI: 1.110 – 1.535).

Social support markers are present in both models with legal marital status by CDC standard and parent(s) present in family. In the eight predictor model, being married showed a significant effect with a 37.5% reduction in the likelihood of reporting a DAE-related functional limitation (95% CI: 0.402 – 0.973). In the nine predictor model, the opposite was true with a 36.1% increase in odds of a DAE-related limitation for those who were separated as compared to single (95% CI: 1.030 – 1.799), and a

52% increase for those who were divorced (95% CI: 1.283 – 1.801). These variables are excellent for inclusion because they act as proxy social support variables to describe the effects of the social withdrawal and isolation often caused by depression, anxiety, and other emotional problems.

Common stressors in life are also represented with problems paying medical bills and the included functional limitation variables. Problems paying medical bills was associated with a 129% increase in the likelihood of reporting a DAE-related functional limitation in the eight predictor model (95% CI: 1.607 – 3.268), and a 38.6% increase in the nine predictor model (95% CI: 1.219 – 1.535). Not working for pay last year was associated with a 160.3% increase in odds over working for pay in the eight predictor model (95% CI: 1.805 – 3.755), and more than twice the odds in the nine predictor model (OR: 2.095, 95% CI: 1.819 – 2.414). Seeing these aspects of life represented in the model lends credibility to the result. However, because the scope of these variables is limited, there are many missing aspects of life events and respondent descriptors that may alter the model should they be included in future studies.

When evaluating each model as a whole, the fair predictive capability in conjunction with the support for included variables lends credence to the notion that in many cases, predicting a limitation associated with depression, anxiety, or another emotional problem may be possible. While neither model can perfectly determine how likely any one person may be to experience a DAE Limitation, they may help public health officials illuminate this complex topic. These models were designed for use as a tool for selecting groups for targeted public health intervention, not for use in a clinical setting, and could likely help distinguish groups that would be prime for investigating the prevalence and effects of depression, anxiety, and other emotional problems that cause a functional limitation.

**Limitations**

Perhaps the most obvious issue with the study at hand is the type of data being analyzed. Self-report data is particularly sensitive to certain biases, including social desirability bias and recall bias.

Because of the stigma associated with mental illness, many consider it taboo to admit to living with mental illness. They do not wish to be judged by their peers – or by the interviewer administering the survey – and will provide a response that does not accurately reflect their current mental health status. This element of response associated social desirability hampers one's ability to draw conclusions from self-report mental health data. Recall bias also complicates the matter when people may be unable to precisely recall when their symptoms initially appeared or became significant. This is not always as true for injury associated limitations or limitations stemming from a distinct diagnosis, since these events tend to be more memorable than a slow progression of symptoms. In the case of anxiety and depression, symptom onset can begin well before a person is aware they are exhibiting symptoms, and thus recall bias is particularly difficult to work around.

On a related note, symptom duration was not always recorded in a way that is clinically meaningful or usable for this study. For example, DAE-relate symptom duration was recorded as 99 years for 14 individuals. Clinically, this duration is not reasonable, since the average life expectancy of a US adult is much lower than 99 years and the average onset age for these symptoms is roughly between 18 and 30. This study did not retrospectively address this issue, which is a concern worth addressing in a future study.

Additionally, this data was entered in a way that resulted in a great number of missing values. Survey responses for functional limitations were "Mentioned," "Not Mentioned," "Refused," "Not Ascertained," and "Don't Know." Due to the sheer volume of missing data and a lack of any responses associated with "Not Ascertained," it may be safe to assume that if the question was not asked, the appropriate "Not Ascertained" value was not entered into the dataset. This may also be true for "Not Mentioned" responses to certain limitation-related questions. Related to this missing-ness, all observations where a functional limitation record existed, both present and not present, existed in the same subsample of 12,413 respondents.

There is another significant limitation of this study stemming from the grouping of conditions that occurred when establishing functional limitation variables. Many of the functional limitations examined in this study were actually a grouping of several conditions. In some cases, these conditions were closely related, for example: senility, dementia, and Alzheimer's Disease. In other cases, however, these conditions were grouped in a very broad way. For example, the grouping of ADD, Bipolar disorder, and Schizophrenia along with all other mental health issues does little to clarify the effect of any one condition on the probability of a DAE-related functional limitation. Understanding that these broad groups muddy the waters may detract from the predictive power of the variables used in model construction.

Additionally, there were several variables that were of great interest included in the original dataset, but which ultimately had to be excluded due to missing-ness. These variables included military service factors, other social support measures, and factors associated with major life events like recent loss of a loved one, job change, and marriage. It is likely that had the data not been missing, there may have been an interesting effect demonstrated in the model.

**Future Directions**

A future study designed specifically to examine the relationships evaluated by this study would benefit from further separating comorbid conditions into narrower, more meaningful categories. By establishing concise comorbidities, future investigators would be able to more clearly distinguish the effects of comorbid conditions on DAE-related functional limitations. Additionally, further dividing the dependent variable may be of significant interest. Though depression and anxiety are highly comorbid, they are unique conditions with unique public health concerns, and should be investigated as such.

This study did not examine the duration of symptoms as a function of age of symptom onset, nor of symptom severity, which may be interesting additions to future studies. Also related to onset age

are generational differences. Because there are different mindsets about anxiety and depression between generations, controlling for these difference may also yield interesting results.

Other variables that would have been interesting to see included would be related to symptoms without functional limitation, and quality of life questions for those who reported any kind of functional limitation. This would have provided another level by which stratification could occur, and would allow for more direct examination of prevalent depression and anxiety, since not all living with these illnesses experience a related functional limitation.

Were a study designed to specifically examine the issues in this study, using clinical diagnoses may change potential outcomes and lead to the discovery of other predictors of DAE-related functional limitations. Self-report data has its drawbacks when working in populations affected by anxiety and depression, so taking a clinical approach may help better predict specific groups to be targeted for public health intervention.

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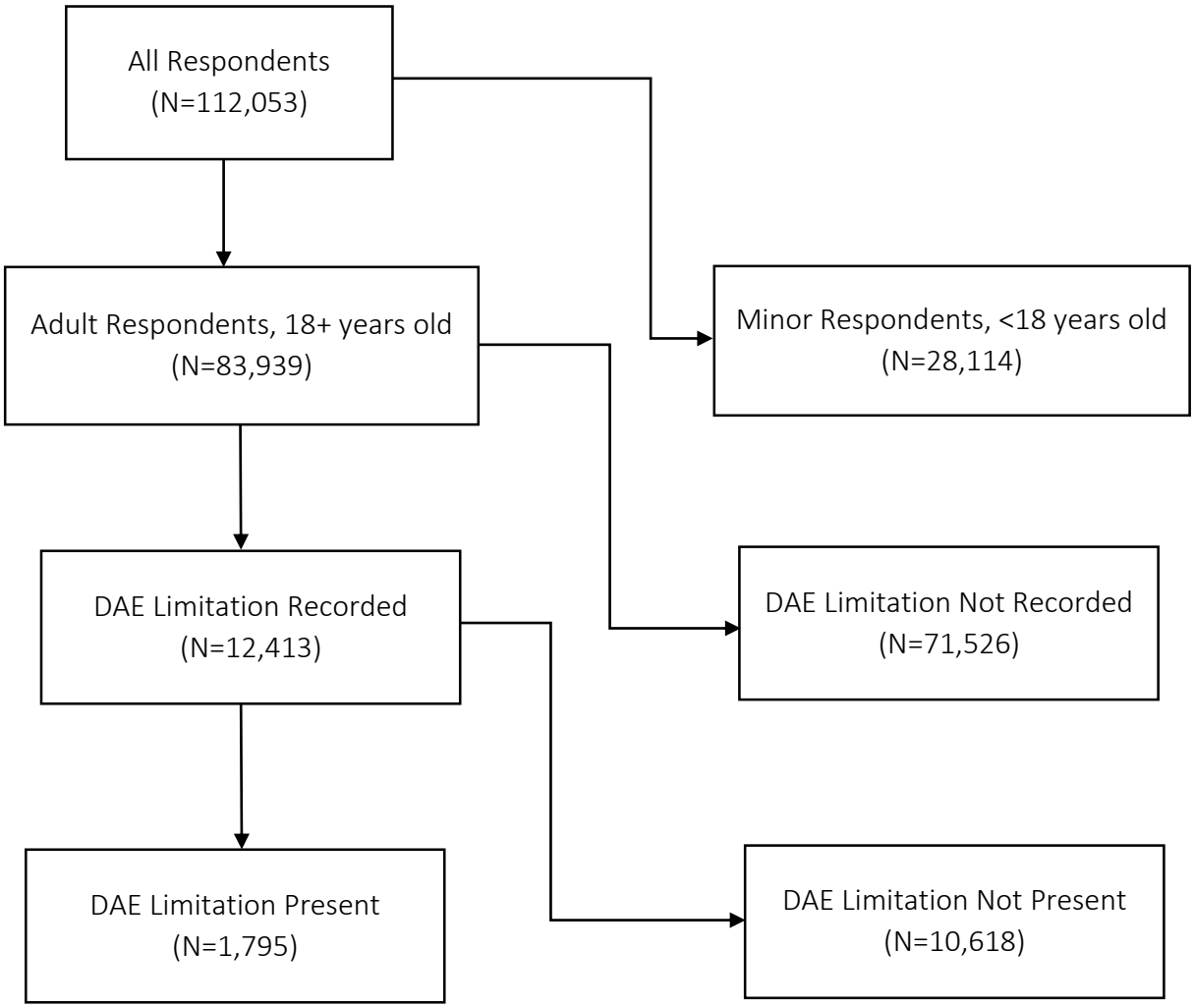
Figure 1. Respondent Breakdown



## Table 1.1 Potential Predictor Frequencies and Odds Ratios – Demographic Factors

| | | DAE Limitation Record Present (N=12,413) | | |
|---|---|---|---|---|
| | Total (N=83,939) | DAE Limitation (N=1795) | No DAE Limitation (N=10,618) | |
| Potential Predictor Variable | N (%) | N (%) | N (%) | OR (95% CI) |
| Demographic Factors | | | | |
| Sex | | | | |
| Male | 39,786 (47.4) | 696 (12.9) | 4,693 (87.1) | Ref |
| Female | 44,153 (52.6) | 1099 (15.6) | 5,925 (84.4) | 1.25 (1.13 - 1.39) |
| Hispanic Ethnicity | | | | |
| No | 67,636 (80.6) | 1,523 (13.7) | 9,630 (86.3) | Ref |
| Yes | 16,303 (19.4) | 272 (17.8) | 1,258 (82.2) | 1.37 (1.19 - 1.58) |
| Simple Race Recode | | | | |
| White | 64,916 (77.3) | 1,361 (14.5) | 8,043 (85.5) | Ref |
| Black | 11,575 (13.8) | 334 (14.7) | 1,932 (85.3) | 1.03 (0.90 - 1.16) |
| Asian | 5,935 (7.1) | 52 (11.4) | 403 (88.6) | 0.76 (0.56 - 1.01) |
| All other race groups | 1,513 (1.8) | 48 (16.7) | 240 (83.3) | 1.19 (0.87 - 1.63) |
| Legal Marital Status, CDC Standard | | | | |
| Single/Never Married | 22,033 (26.2) | 523 (21.9) | 1,870 (78.1) | Ref |
| Married | 45,300 (54.0) | 554 (10.9) | 4,533 (89.1) | 0.60 (0.54 - 0.67) |
| Separated | 1,976 (2.4) | 92 (22.0) | 327 (78.0) | 1.70 (1.34 - 2.15) |
| Divorced | 9,261 (11.0) | 451 (19.6) | 1,852 (80.4) | 1.59 (1.41 - 1.79) |
| Widowed | 5,063 (6.0) | 171 (7.9) | 1,994 (92.1) | 0.46 (0.39 - 0.54) |
| Unknown Marital Status | 306 (0.4) | 4 (8.7) | 42 (91.3) | 0.56 (0.48 - 0.66) |
| Born in the United States | | | | |
| Yes | 66,123 (78.8) | 1,608 (14.8) | 9,246 (85.2) | Ref |
| No | 17,626 (21.0) | 187 (12.1) | 1,361 (87.9) | 0.79 (0.67 - 0.93) |
| Refused, Not Ascertained, Don't Know | 153 (0.2) | 0 (0.0) | 7 (100.0) | |
| Highest Level of School Completed | | | | |
| Up to High School Diploma or Equivalent | 35,394 (42.2) | 1,016 (14.4) | 6,045 (85.6) | Ref |
| Some College or Associate Degree | 24,765 (29.5) | 556 (16.7) | 2,780 (83.3) | 1.27 (1.13 - 1.41) |
| Bachelor's, Master's, Professional or Doctorate Degree | 22,484 (26.8) | 204 (11.2) | 1,625 (88.8) | 0.71 (0.61 - 0.83) |
| Refused, Not Ascertained, Don't Know | 1,296 (1.5) | 19 (10.2) | 168 (89.8) | 0.67 (0.41 - 1.07) |

## Table 1.2 Potential Predictor Frequencies and Odds Ratios – Familial, Financial, and Health-Related Factors

| | | DAE Limitation Record Present (N=12,413) | | |
|---|---|---|---|---|
| | Total (N=83,939) | DAE Limitation (N=1795) | No DAE Limitation (N=10,618) | |
| Potential Predictor Variable | N (%) | N (%) | N (%) | OR (95% CI) |
| Familial Factors | | | | |
| Parent(s) present in Family | | | | |
| Neither Mother nor Father | 72,210 (86.0) | 1,572 (13.8) | 9,787 (86.2) | Ref |
| Mother, no father | 4,630 (5.5) | 132 (23.5) | 430 (76.5) | 1.87 (1.53 - 2.29) |
| Father, no mother | 972 (1.2) | 21 (22.1) | 74 (77.9) | 1.68 (1.03 - 2.73) |
| Mother and Father | 6,127 (7.3) | 80 (19.7) | 327 (80.3) | 1.46 (1.14-1.87) |
| Financial Factors | | | | |
| Worked for Pay Last Year | | | | |
| Yes | 54,840 (65.3) | 353 (12.6) | 2,445 (87.4) | Ref |
| No | 28,154 (33.5) | 1,432 (15.0) | 8,108 (85.0) | 1.22 (1.08 - 1.39) |
| Refused, Not Ascertained, Don't Know | 945 (1.1) | 10 (13.3) | 65 (86.7) | |
| Total Earnings Last Year | | | | |
| $25,000 or more | 26,019 (31.0) | 79 (8.3) | 878 (91.7) | Ref |
| Less than $25,000 | 45,496 (54.2) | 1,672 (15.3) | 9,289 (84.7) | 2.00 (1.65 - 2.42) |
| Refused, Not Ascertained, Don't Know | 12,424 (14.8) | 44 (8.9) | 451 (91.1) | |
| Problems Paying Medical Bills | | | | |
| No | 69,927 (83.3) | 1,105 (12.2) | 7,936 (87.8) | Ref |
| Yes | 13,579 (16.2) | 686 (20.7) | 2,633 (79.3) | 1.87 (1.68 - 2.08) |
| Refused, Not Ascertained, Don't Know | 433 (0.5) | 4 (7.5) | 49 (92.5) | |
| Health-Related Factors | | | | |
| Reported Personal Health Status | | | | |
| Excellent or Very Good | 49,698 (59.2) | 200 (9.8) | 1,837 (90.2) | Ref |
| Good | 23,245 (27.7) | 498 (12.3) | 3,557 (87.7) | 0.76 (0.68 - 0.85) |
| Fair | 8,378 (10.0) | 666 (15.8) | 3,545 (84.2) | 1.18 (1.06 - 1.31) |
| Poor | 2,491 (3.0) | 429 (20.5) | 1,667 (79.5) | 1.69 (1.50 - 1.90) |
| Refused, Not Ascertained, Don't Know | 127 (0.2) | 2 (14.3) | 12 (85.7) | |

## Table 1.3 Potential Predictor Frequencies and Odds Ratios – Functional Limitation Factors, Part I

| | | DAE Limitation Record Present (N=12,413) | | |
|---|---|---|---|---|
| | Total (N=83,939) | DAE Limitation (N=1795) | No DAE Limitation (N=10,618) | |
| Potential Predictor Variable | N (%) | N (%) | N (%) | OR (95% CI) |
| Functional Limitation Associated with: | | | | |
| Vision Problem | | | | |
| No | 11,355 (13.5) | 1,521 (13.4) | 9,834 (86.6) | Ref |
| Yes | 1,058 (1.3) | 274 (25.9) | 784 (74.1) | 2.26 (1.95 - 2.62) |
| Hearing Problem | | | | |
| No | 11,689 (13.9) | 1,613 (13.8) | 10,076 (86.2) | Ref |
| Yes | 724 (0.9) | 182 (25.1) | 542 (74.9) | 2.10 (1.76 - 2.50) |
| Arthritis, Rheumatism | | | | |
| No | 9,448 (11.3) | 1,261 (13.3) | 8,187 (86.7) | Ref |
| Yes | 2,965 (3.5) | 534 (18.0) | 2,431 (82.0) | 1.43 (1.28 - 1.59) |
| Back/Neck Problem | | | | |
| No | 9,402 (11.2) | 1,240 (13.2) | 8,162 (86.8) | Ref |
| Yes | 3,011 (3.6) | 555 (18.4) | 2,456 (81.6) | 1.49 (1.33 - 1.66) |
| Fracture, Bone/Joint Injury | | | | |
| No | 11,169 (13.3) | 1,558 (13.9) | 9,611 (86.1) | Ref |
| Yes | 1,244 (1.5) | 237 (19.1) | 1,007 (80.9) | 1.45 (1.25 - 1.69) |
| Other Injury | | | | |
| No | 11,926 (14.2) | 1,722 (14.4) | 10,204 (85.6) | Ref |
| Yes | 487 (0.6) | 73 (15.0) | 414 (85.0) | 1.04 (0.81 - 1.35) |
| Heart Problem | | | | |
| No | 10,902 (13.0) | 1,573 (14.4) | 9,329 (85.6) | Ref |
| Yes | 1,511 (1.8) | 222 (14.7) | 1,289 (85.3) | 1.02 (0.88 - 1.19) |
| Stroke | | | | |
| No | 11,740 (14.0) | 1,705 (14.5) | 10,035 (85.5) | Ref |
| Yes | 673 (0.8) | 90 (13.4) | 583 (86.6) | 0.91 (0.72 - 1.14) |
| Hypertension/High Blood Pressure | | | | |
| No | 10,754 (12.8) | 1,355 (12.6) | 9,399 (87.4) | Ref |
| Yes | 1,659 (2.0) | 440 (26.5) | 1,219 (73.5) | 2.50 (2.41 - 2.83) |
| Diabetes | | | | |
| No | 10,882 (13.0) | 1,502 (13.8) | 9,380 (86.2) | Ref |
| Yes | 1,531 (1.8) | 293 (19.1) | 1,238 (80.9) | 1.48 (1.29 - 1.70) |
| Lung/Breathing Problems, Asthma, Emphysema | | | | |
| No | 11,154 (13.3) | 1,507 (13.5) | 9,647 (86.5) | Ref |
| Yes | 1,259 (1.5) | 288 (22.9) | 971 (77.1) | 1.90 (1.65 - 2.19) |
| Cancer | | | | |
| No | 11,827 (14.1) | 1,712 (14.5) | 10,115 (85.5) | Ref |
| Yes | 586 (0.7) | 83 (14.2) | 503 (85.8) | 0.97 (0.77 - 1.24) |
| Birth Defect | | | | |
| No | 12,267 (14.6) | 1,770 (14.4) | 10,497 (85.6) | Ref |
| Yes | 146 (0.2) | 83 (40.7) | 121 (59.3) | 4.07 (3.06 - 5.40) |
| Senility, Dementia, Alzheimer's Disease | | | | |
| No | 11,885 (14.2) | 1,742 (14.7) | 10,143 (85.3) | Ref |
| Yes | 528 (0.6) | 53 (10.0) | 475 (90.0) | 0.65 (0.49 - 0.87) |
| Weight Problem, Overweight, Obesity | | | | |
| No | 11,893 (14.2) | 1,558 (13.1) | 10,335 (86.9) | Ref |
| Yes | 520 (0.6) | 237 (45.6) | 283 (54.4) | 5.56 (4.64 - 6.65) |

## Table 1.4 Potential Predictor Frequencies and Odds Ratios – Functional Limitation Factors, Part II

| | | DAE Limitation Record Present (N=12,413) | | |
|---|---|---|---|---|
| | Total (N=83,939) | DAE Limitation (N=1795) | No DAE Limitation (N=10,618) | |
| Potential Predictor Variable | N (%) | N (%) | N (%) | OR (95% CI) |
| Missing or Amputated Limbs, Finger, or Digit | | | | |
| No | 12,291 (14.6) | 1,781 (14.5) | 10,510 (85.5) | Ref |
| Yes | 122 (0.1) | 14 (11.5) | 108 (88.5) | 0.76 (0.44 - 1.34) |
| Musculoskeletal/Connective Tissue Problem | | | | |
| No | 10,626 (12.7) | 1,458 (13.7) | 9,168 (86.3) | Ref |
| Yes | 1,787 (2.1) | 337 (18.9) | 1,450 (81.1) | 1.46 (1.28 - 1.67) |
| Circulation Problems, including Blood Clots | | | | |
| No | 11,968 (14.3) | 1,667 (13.9) | 10,301 (86.1) | Ref |
| Yes | 445 (0.5) | 128 (28.8) | 317 (71.2) | 2.50 (2.02 - 3.08) |
| Endocrine, Nutritional, or Metabolic Problem | | | | |
| No | 12,062 (14.4) | 1,693 (14.0) | 10,369 (86.0) | Ref |
| Yes | 351 (0.4) | 102 (29.1) | 249 (70.9) | 2.51 (1.98 - 3.18) |
| Nervous System or Sensory Organ Problem | | | | |
| No | 11,102 (13.2) | 1,499 (13.5) | 9,603 (86.5) | Ref |
| Yes | 1,311 (1.6) | 296 (22.6) | 1,015 (77.4) | 1.87 (1.62 - 2.15) |
| Digestive System Problem | | | | |
| No | 12,024 (14.3) | 1,692 (14.1) | 10,332 (85.9) | Ref |
| Yes | 389 (0.5) | 116 (28.9) | 286 (71.1) | 2.48 (1.98 - 3.09) |
| Genitourinary System Problem | | | | |
| No | 11,948 (14.2) | 1,679 (14.1) | 10,269 (85.9) | Ref |
| Yes | 465 (0.6) | 116 (31.8) | 249 (68.2) | 2.85 (2.27 - 3.57) |
| Skin or Subcutaneous System Problem | | | | |
| No | 12,393 (14.8) | 1,792 (14.5) | 10,601 (85.5) | Ref |
| Yes | 20 (0.0) | 3 (15.0) | 17 (85.0) | 1.04 (0.31 - 3.57) |
| Blood or Blood-forming Organ Problem | | | | |
| No | 12,382 (14.8) | 1,792 (14.5) | 10,590 (85.5) | Ref |
| Yes | 31 (0.0) | 3 (9.7) | 28 (90.3) | 0.63 (0.19 - 2.08) |
| Benign Tumor or Cyst | | | | |
| No | 12,312 (14.7) | 1,766 (14.3) | 10,546 (85.7) | Ref |
| Yes | 101 (0.01) | 29 (28.7) | 72 (71.3) | 2.41 (1.56 - 3.71) |
| Alcohol, Drug, or Substance Abuse Problem | | | | |
| No | 12,390 (14.8) | 1,792 (14.5) | 10,598 (85.5) | Ref |
| Yes | 23 (0.0) | 3 (13.0) | 20 (87.0) | 0.89 (0.26 - 2.99) |
| ADD, Bipolar Disorder, Schizophrenia, or Other Mental problem | | | | |
| No | 12,193 (14.5) | 1,746 (14.3) | 10,447 (1.71) | Ref |
| Yes | 220 (0.3) | 49 (22.3) | 171 (77.7) | 1.71 (1.24 - 2.36) |
| Surgical After-Effects or Medical Treatment | | | | |
| No | 12,334 (14.7) | 1,792 (14.5) | 10,542 (85.5) | Ref |
| Yes | 79 (0.1) | 3 (3.8) | 76 (96.2) | 0.23 (0.07 - 0.74) |
| "Old Age," Elderly, or Aging-Related Problem | | | | |
| No | 12,167 (14.5) | 1,793 (14.7) | 10,374 (85.3) | Ref |
| Yes | 246 (0.3) | 2 (0.8) | 244 (99.2) | 0.05 (0.01 - 0.19) |
| Fatigue, Tiredness, or Weakness | | | | |
| No | 12,394 (14.8) | 1,792 (14.5) | 10,602 (85.5) | Ref |
| Yes | 19 (0.0) | 3 (15.8) | 16 (84.2) | 1.11 (0.32 - 3.81) |
| Pregnancy-related Problem | | | | |
| No | 12,404 (14.8) | 1,795 (14.5) | 10,609 (85.5) | Ref |
| Yes | 9 (0.0) | 0 (0.0) | 9 (100.0) | N/A |

Table 2. Point Estimates with Confidence Intervals for Eight Predictor Logistic Regression Model

| Effect | Point Estimate | 95% Wald Confidence Limits Lower | Upper |
|---|---|---|---|
| Age | 0.960 | 0.949 | 0.971 |
| Legal Marital Status, CDC Standard | | | |
| Married vs. Single/Never Married† | 0.625 | 0.402 | 0.973 |
| Separated vs. Single/Never Married | 0.606 | 0.171 | 2.145 |
| Divorced vs. Single/Never Married | 1.146 | 0.690 | 1.904 |
| Widowed vs. Single/Never Married | 0.477 | 0.221 | 1.027 |
| Highest Education Level Completed | | | |
| Some College or Associate Degree vs. Up to High School, Diploma or Equivalent† | 1.742 | 1.198 | 2.531 |
| Bachelor's, Master's, Professional, or Doctorate Degree† | 1.879 | 1.201 | 2.940 |
| Problems Paying Medical Bills | | | |
| Yes vs. No† | 2.292 | 1.607 | 3.268 |
| Work Last Year for Pay | | | |
| No vs. Yes† | 2.603 | 1.805 | 3.755 |
| Functional Limitation Associated with | | | |
| Fracture, Bone/Joint Injury† | 0.407 | 0.201 | 0.826 |
| Hypertension/High Blood Pressure† | 3.287 | 1.749 | 6.177 |
| Weight Problem, Overweight, Obesity† | 2.965 | 1.112 | 7.908 |

†Indicates statisically significant effect.

Table 3. Point Estimates with Confidence Intervals for Nine Predictor Logistic Regression Model

| Effect | Point Estimate | 95% Wald Confidence Limits Lower | Upper |
|---|---|---|---|
| Sex | | | |
| Female vs. Male† | 1.239 | 1.107 | 1.387 |
| Age | 0.954 | 0.950 | 0.958 |
| Legal Marital Status, CDC Standard | | | |
| Married vs. Single/Never Married | 0.857 | 0.732 | 1.003 |
| Separated vs. Single/Never Married† | 1.361 | 1.030 | 1.799 |
| Divorced vs. Single/Never Married† | 1.520 | 1.283 | 1.801 |
| Widowed vs. Single/Never Married | 0.978 | 0.770 | 1.242 |
| Highest Education Level Completed | | | |
| Some College or Associate Degree vs. Up to High School, Diploma or Equivalent† | 1.256 | 1.110 | 1.535 |
| Bachelor's, Master's, Professional, or Doctorate Degree | 1.170 | 0.982 | 1.395 |
| Problems Paying Medical Bills | | | |
| Yes vs. No† | 1.368 | 1.219 | 1.535 |
| Work Last Year for Pay | | | |
| No vs. Yes† | 2.095 | 1.819 | 2.414 |
| Functional Limitation Associated with | | | |
| Fracture, Bone/Joint Injury† | 1.297 | 1.096 | 1.536 |
| Hypertension/High Blood Pressure† | 2.713 | 2.346 | 3.138 |
| Weight Problem, Overweight, Obesity† | 3.956 | 2.931 | 4.411 |

†Indicates statisically significant effect.

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