



Munich Personal RePEc Archive

# **Mental Health: Depression, Anxiety, and Anger in the USA**

Borooah, Vani

Ulster University

2021

Online at <https://mpra.ub.uni-muenchen.de/112987/>

MPRA Paper No. 112987, posted 10 May 2022 13:47 UTC

## Chapter 3

### Mental Health: Depression, Anxiety, and Anger in the USA

#### Abstract

Using data from the Collaborative Psychiatric Epidemiology Surveys (CPES) for the United States for the period 2001 to 2003, this chapter addresses the question of inter-gender differences in depression, anxiety, and anger rates: how much of the observed difference in rates between men and women may be explained by differences between them in their *exposure*, and how much may be explained by differences between them in their *response*, to depression-inducing factors? The chapter makes two contributions: first, it uses an “interaction model” which allows men and women to respond differently to each of several condition-inducing factors, which is key in determining whether there is a significant difference between male and female responses. The overall conclusion is that, with a handful of exceptions, there are significant inter-gender differences in responses to all the variable categories. The second contribution of this chapter is to aggregate the different responses for the different variable categories into an overall response. This was achieved by applying the Oaxaca-Blinder decomposition methodology to quantifying the contribution of differences in *exposure*, and differences in *response*, to inter-gender differences in depression, anxiety, and anger rates. The overall conclusion from this exercise is that the most important reason for women and men experiencing different rates of depression, anxiety, and anger is not levels of exposure, but rather that women respond differently from men to factors which induce these conditions.

### 3.1. Introduction

Mental illness is one of many factors that can, by producing low levels of life satisfaction, erode happiness. Yet, as Clark *et al.* (2018) observe, many studies of life satisfaction ignore mental illness by implicitly assuming, quite wrongly, that unhappiness and mental illness are synonymous. Indeed, Clark *et al.* ask how much misery would be reduced if mental illness were to be eliminated? Their answer — based on the twin observations that persons with diagnosed mental illness were 0.1 points more likely to be in misery (than persons without such illness) and that, of the total population in the United States, 22% had diagnosed mental illness — was that misery would be reduced by 2.2 points, approximately a third of the total likelihood of being in misery. In another example from a different country, Borooah (2006) reported that in Northern Ireland, only 4% of those with severe mental health problems described themselves as happy and 60% described themselves as unhappy; equally tellingly, only 32% of those whose mental health problems were *not severe* described themselves as happy — the same proportion as those with *severe* heart problems who regarded themselves as happy.

Given the importance of mental illness, this study examines three specific aspects of mental ill-health: depression, anxiety, and anger. The US National Network of Depression Centers estimated that: US\$210 billion were lost in the USA due to serious mental illness; depression was the single biggest cause of disability in the USA among those aged 15–44; and depression, along with family issues and stress, ranked among the top three workplace issues.<sup>1</sup> The serious consequences of depression and anxiety are compounded by the numbers affected: about 16 million persons in the USA (or 6.9% of adults) had at least one major depressive episode in 2013.<sup>2</sup> Moreover, there is a significant gender bias to depression, anxiety, and anger, with women being much more likely than men to have experienced depression and anxiety but much less likely to have experienced anger (Nolen-Hoeksema, 2001; Sharkin, 1993). A greater incidence of depression among women is also reflected in prescriptions for antidepressant medicines. For example, Albert (2015) reported that in Canada between 2007 and 2011 antidepressant medications were prescribed twice as often for women as for men.

In explaining why rates of depression are higher for women than for men, Nolen-Hoeksema (2001, 2003) distinguished between two effects, the quantification of which constitutes the fundamental purpose of this chapter. First, she argued that, compared to men, women might be more likely to be exposed to depression-inducing factors. Second, even when men and women were exposed to the same depression-inducing factors, women might be more likely than men to develop depression.

Given these two effects — generated, respectively, by gender differences in *exposure* and in *response* to depression-inducing factors — what is needed to explain differences in depression rates between women and men is an *integrative* model, encompassing both exposure and response effects. In addition, it would be useful to quantify how much of the observed difference in depression rates between men and women could be explained by differences between them in their exposure, and how much could be explained by differences between them in their response, to depression-inducing factors. The central purpose of this chapter is to build such a model and offer such quantification.

### **3.2. The Data**

The data used in this chapter are from the Collaborative Psychiatric Epidemiology Surveys (CPES) for the United States for the period 2001–03. These data, which are described in some detail in Alegria *et al.* (2007), present *inter alia* information on the prevalence of mental disorders and on the personal and social circumstances of the respondents, *all of whom were 18 years or older*. The respondents to the CPES are referred to in this chapter as persons or, synonymously, as adults.<sup>3</sup>

The CPES joins together three nationally representative surveys: the National Comorbidity Survey Replication (NCS-R); the National Survey of American Life (NSAL), and the National Latino and Asian American Study (NLAAS). A total of 9,282 adult interviews were completed for the NCS-R: 7,963 with the main respondent and 1,589 interviews with the second adult in the household; in addition, 554 interviews were conducted with a sample of non-respondents using a shortened version

of the instrument. The final response rate was 70.9% for primary respondents and 80.4% for secondary respondents. For the NSAL, the overall response rate was 71.5% while, for the NLAAS, the response rate was 75.7%.<sup>4</sup> By joining these three sets of data, the CPES permits the combined dataset to be treated as a single, nationally representative study.

The CPES dataset is organised in different files, each relating to a particular aspect of respondents' lives, and from these files this chapter focused on two: the "Screening" and the "Demographic" files. The "Screening" and "Demographic" instruments were administered to all the respondents in the survey; the instruments pertaining to the other files were only applied to those affected by one or more mental disorder(s). A general problem with self-reported information is that of recall. If it is a natural instinct to suppress memories of unpleasant events, and if the young are more likely to be susceptible to depression and anxiety, then older persons in a sample are likely to "forget" that they were depressed or anxious when they were young, while for the younger persons in the sample such memories are likely to be vivid. Consequently, in a cross-section of people, older, compared to younger, respondents might report lower rates of depression, anxiety, or anger for reasons due to differences in recall.

With this caveat, using information from the Screening file, a person was defined as having experienced *depression* if he/she answered "yes" to *any* of the following questions:

- (i) Have you ever in your life had a period, lasting several days or longer, when most of the day you felt *sad, empty, or depressed*?
- (ii) Have you ever in your life had a period, lasting several days or longer, when most of the day you were very *discouraged* about how things were going in your life?
- (iii) Have you ever in your life had a period, lasting several days or longer, when you *lost interest* in most things you usually enjoy like work, hobbies, and personal relationships?

Persons were regarded as having experienced: *severe* depression if they answered *all* of the above questions was in the affirmative; *moderate* depression if two of the answers to the above questions were in the affirmative; and *mild* depression if *only* one of the answers to the above questions was in the affirmative. Lastly, persons were defined as not having experienced depression if their answers to *all* of the above questions were in the negative.

Persons were regarded as having experienced *anxiety* if they answered the following question in the affirmative: have you ever in your life had an attack of fear or panic when all of a sudden you felt very frightened, anxious, or uneasy? Persons who answered this question in the negative were regarded as not having experienced anxiety.

Persons were regarded as having experienced *anger* if they answered any of the following questions in the affirmative:

- (i) Have you ever had attacks of anger when all of a sudden you lost control and broke or smashed something worth more than a few dollars?
- (ii) Have you ever had an attack of anger when all of a sudden you lost control and hit or tried to hit someone?
- (iii) Have you ever had an attack of anger when all of a sudden you lost control and *threatened* to hit or hurt someone?

Persons who answered all three questions in the negative were regarded as not having experienced anger.

<Table 3.1 here>

Table 3.1 shows that 60% of the 11,334 women and 53.3% of the 8,471 men in the CPES sample had experienced depression. Of these, 49.1% of women and 38.7% of men had felt “sad, empty, or depressed”; 48.8% of women, compared to 42.3% of men, had felt “very discouraged”; while 36% of women, and 31.8% of men, had “lost interest in most things”. Table 3.1 also shows that 28.7% of women and 22.5% of men had known severe depression and 16.5% of women and 14.6% of men had

known moderate depression. So, in aggregate and for every facet of depression, except mild depression, women were more likely than men to have experienced that condition. A similar story emerges with respect to anxiety: 44.1% of the women, compared to 37.2% of men, in the CPES had experienced “an attack of fear or panic” with a concomitant feeling of being “very frightened, anxious, or uneasy”.

<Table 3.2 here>

Gender differences with respect to anger, however, painted a different picture. As Table 3.2 shows, 27.9% of men (but only 18.5% of women) had smashed an item of value; 23.1% of men (but only 20.1% of women) had hit or attempted to hit another person; and 18.6% of men (but only 14.1% of women) had threatened another person with harm. Considering anger in its entirety, 46.1%, compared to 37.3% of women, had expressed anger by breaking an item of value or hitting, or threatening, another person.<sup>5</sup> Since the data refer to self-reported depression or anxiety, the possibility is that gender differences in depression rates may be the result of men responding to stress through alternative modes such as antisocial behaviour and alcohol abuse (Kessler *et al.*, 1994; Meltzer *et al.*, 1995).

<Table 3.3 here>

Table 3.3 shows the distribution of depression by race: White, Black, Hispanic, and Asian.<sup>6</sup> The highest rates of depression were for White persons (64%), followed by Hispanics (56.1%) and Blacks (54%) and the lowest rates were for Asians (43.2%). A similar story emerges with respect to anxiety. The highest rates of anxiety — having experienced “an attack of fear or panic” with a concomitant feeling of “very frightened, anxious, or uneasy” — were for White persons (47.9%), followed by Hispanics (40.1%) and Blacks (36.6%) with the lowest rates being recorded for Asians (31.6%).

Of the persons who had known depression, the largest number had “felt very discouraged about how things were going in their lives”, followed by those who felt “sad, empty, or depressed”: 53.2% of Whites, 43.1% of Blacks, 44.2% of Hispanics, and 32.4% of Asians felt very discouraged while

50.3% of Whites, 41.1% of Blacks, 46.5% of Hispanics, and 31.9% of Asians felt sad and empty. In terms of the degree of depression, 29.8% of Whites had experienced severe depression, followed by 26.7% of Hispanics, 24.4% of Blacks, and 16.7% of Asians.

<Table 3.4 here>

Table 3.4 shows that, in terms of anger, 45.1% of Whites and 43.4% of Blacks, compared to only 35.2% of Hispanics, and 29.9% of Asians, had expressed anger by breaking something of value or hitting, or threatening harm to, another person. The most common expression of anger was through breaking things of value or through hitting, or attempting to hit, another person: between one-fifth and one-fourth of White and Black respondents were culpable in these two respects. The expression of anger was lowest among Asians: only 12.7% of Asians had hit, or attempted to hit, another person, and 17.9% of Asians had broken things of value in anger.

### **3.3. Outlining an Econometric Model of Depression, Anxiety, and Anger**

This section outlines the issues involved, and the variables used, in an econometric analysis of depression, anxiety, and anger. This analysis was based on estimating a logit model for a dependent variable  $y_i$  such that  $y_i=1$ , if the person ( $i=1...N$ ) had had a particular condition (depression, anxiety, anger),  $y_i=0$ , if he/she had not experienced that condition. The model was estimated on a vector of variables (discussed below), which could, plausibly, affect the chances of that condition existing. A natural purpose of the logistic model was, firstly, to establish the probabilities of depression, anxiety, and anger, and then to examine how the probability of having a condition changed in response to a change in the value of one of the condition-affecting factors. It should be emphasised that in estimating the logit model, it was not possible, for reasons of multicollinearity, to include all the categories with respect to the variables: the category that was omitted for a variable is referred to as the reference category (for that variable). In the results, presented below, these reference categories are marked by [R].



If  $Pr[y_i=1]$  and  $Pr[y_i=0]$  represent, respectively, the probabilities of a person having and not having a condition, the logit formulation expresses the log of the odds ratio as a linear function of  $K$  variables (indexed  $k=1\dots K$ ) which take values,  $X_{i1}, X_{i2}, \dots, X_{iK}$  with respect to person  $i$ ,  $i=1\dots N$ :

$$\log\left(\frac{\Pr[y_i = 1]}{1 - \Pr[y_i = 1]}\right) = \sum_{k=1}^K \beta_k X_{ik} + u_i = Z_i \quad (3.1)$$

where:  $\beta_k$  is the coefficient associated with variable  $k$ ,  $k=1\dots K$ .

From equation (3.1) it follows that:

$$\Pr[y_i = 1] = \frac{e^{z_i}}{1 + e^{z_i}} = \frac{e^{X_i \hat{\beta}}}{1 + e^{X_i \hat{\beta}}} \quad (3.2)$$

where the term ‘ $e$ ’ in the above equation represents the exponential term.

### 3.3.1. The Method of Recycled Predictions

The results in this chapter are presented in terms of the probabilities computed from equation (3.2), using the method “recycled predictions” described in Long and Freese (2014, chapter 4) and in a STATA manual.<sup>7</sup> Since this method underpins the results presented in this chapter it is useful, at the very outset, to describe it in some detail. The variable  $y_i$  in equation (3.1) is defined over persons distinguished by different characteristics — by gender, race, region etc. Suppose that one of these characteristics is gender and persons are identified *inter alia* by whether they are male or female. The object is to identify the probabilities of having a particular condition which can be *entirely* ascribed to gender and, further, to test whether these differ significantly between men and women. The method of “recycled predictions” enables one to do this.

Suppose that the first variable relates to a person’s gender so that  $X_{i1}=1$  if person  $i$  is a man,  $X_{i1}=2$  if she is a woman. For ease of exposition assume that the persons are ordered so that  $X_{i1}=1$  for  $i=1\dots M$  and  $X_{i1}=2$  for  $i=M+1\dots N$ . Now, using the logit estimates from equation (3.1), equation (3.2) *predicts*

for each person his/her probability of having had the condition. This probability is denoted  $\hat{p}_i (i = 1 \dots N)$ . The mean of the  $\hat{p}_i$  defined over all the  $N$  persons in the estimation sample will be the same as the (estimation) sample proportion of persons that have had the condition (that is, persons for whom  $y_i = 1$ ). Similarly, the mean of the  $\hat{p}_i$  defined over the  $M$  men and  $N - M$  women will be the same as the (estimation) sample proportion of men and women that have had that condition. In other words, the estimated logit equation passes through the sample means.<sup>8</sup>

However, the difference between the two sample means — men ( $\hat{p}^M$ ) and women ( $\hat{p}^W$ ) — does not reflect the differences, due solely to gender, between men and women in their probabilities of having had that condition. This is because men and women differ not just in terms of gender but also with respect to variables like race, region, income, education etc. Computing the mean probabilities over each subgroup will not neutralise these differences and, hence, differences between  $\hat{p}^M$  and  $\hat{p}^W$  cannot be attributed *solely* — though, of course, some part may be attributable — to differences in gender.

The method of “recycled predictions” isolates the *gender effect* on the predicted probability of men and women having had a condition. First, “pretend” that *all*  $N$  persons in the estimation sample are men. Holding the values of the other variables constant (either to their observed sample values, as in this chapter, or to their mean values), compute the average probability of having had a condition under this assumption and denote it  $\tilde{p}^M$ . Next, “pretend” that *all*  $N$  persons in the estimation sample are women and, again holding the values of the other variables constant, compute the average probability of having had a condition under this assumption and denote it  $\tilde{p}^W$ .

Since the values of the non-gender variables are unchanged between these two hypothetical scenarios, the only difference between them is that, in the first scenario, the male coefficient is “switched on” (with the female coefficient “switched off”), while in the other scenario the female coefficient is “switched on” (with the male coefficient “switched off”), for *all* the  $N$  persons in the estimation

sample.<sup>9</sup> Consequently, the difference between  $\tilde{p}^M$  and  $\tilde{p}^W$  is *entirely* due to differences in gender. In essence, therefore, in evaluating the effect of two characteristics  $A$  and  $B$  on the likelihood of a particular outcome, the method of “recycled predictions” compares two probabilities: first, under an “all have the characteristic  $A$ ” scenario, and then under an “all have the characteristic  $B$ ” scenario, with the values of the other variables remaining unchanged between the scenarios. The difference in the two probabilities is then entirely due to the attributes represented by  $A$  and  $B$  (in this case, gender differences). These probabilities, respectively  $\tilde{p}^A$  and  $\tilde{p}^B$ , are referred to in this chapter as the *predicted probabilities* (PP) of an event under  $A$  and  $B$ . So, for example, in the earlier exposition,  $\tilde{p}^M$  and  $\tilde{p}^W$  refer to the predicted probabilities (PP) of men and women having a particular condition.

### 3.3.2. *The Determining Variables*

Table 3.5 shows the variables used in the estimation of the logit model along with the strength of their presence in the estimation sample and the percentage of persons in each variable category that had experienced depression, anxiety, and anger as defined above. People below the age of 30 had markedly higher rates of depression and anger than the over 60s (respectively, 61.3% and 48.2% for depression and 49.3% and 23.3% for anger) though there did not appear to be a great deal of difference in anxiety rates between the very young and the very old.

<Table 3.5 here>

Persons who were married or cohabiting had markedly lower rates of depression and anxiety than those who were separated/divorced/widowed or had never married (for depression, respectively, 52.4%, 63.7%, and 61.5%) while the never married were markedly more likely to experience anger compared to persons in the other marital statuses (46.9% compared to 39.6% for married/cohabiting and 38.4% for divorced/separated/widowed persons).

The raw data for education suggested that rates of depression were highest for those with high moderate (16 or more years of schooling) or medium (13–15 years of schooling) education — of whom 57% and 59.6% had experienced depression — and lowest for those with low (less than 12 years of schooling) or moderate (up to 12 years of schooling) of whom, respectively, 54.7% and 56.6% had experienced depression. The data did not suggest marked differences between the different categories of work status — employed, unemployed, inactive (that is, not in the labour market) — in terms of an experience of depression: about 57% of persons in all three categories had experienced depression and about 40% had experienced anxiety. Better-off persons (those whose household income was greater than three times the poverty line ratio) had slightly lower rates of depression, anxiety, and anger (respectively, 54.1%, 39.9%, and 39.3%) than persons whose household income was at or below the poverty line (respectively, 62.1%, 43.1%, and 42.3%).

In terms of regions, persons living the North-east and the Midwest were markedly more likely to experience depression (respectively, 58.8% and 62.9%) than persons living in the South or the West (55.1% and 54.8%). This finding carried over to anxiety and anger with persons living the North-east and the Midwest markedly more likely to experience anxiety (respectively, 43.9% and 46%) and anger (respectively, 42.9% and 47%) than persons living in the South or the West (respectively, 37.6% and 41% for anxiety and 38.6% and 39.2% for anger).

Persons who had experienced childhood trauma were more likely to have experienced depression, anxiety, and anger (respectively, 71.1%, 51.7%, and 58.3%) than those that had not (respectively, 37.5%, 26.7%, and 20.4%).<sup>10</sup> Persons who were church members were less likely to have experienced depression, anxiety, and anger (respectively, 50.9%, 35.7%, and 37.8%) than those that were not (respectively, 58.3%, 42.2%, and 41.7%).

A person's cognitive disability was measured in the CPES by his/her World Health Organisation Disability Assessment Score (WHO-DAS): the higher the score, the greater the disability. Cognitive disability was defined as absent for those whose WHO-DAS score was zero and as present for those

whose score was positive. A greater proportion of persons with cognitive disability experienced depression and anxiety (respectively, 58.4% and 43%) than did persons without this disability (respectively, 56.6% and 40.4%); however, there was hardly any difference between the two groups of persons in their experience of anger (40.4% for those with the disability and 41.3% for those without).

The preceding discussion raises an important issue: what was the contribution of each of the factors listed in Table 3.5 to the likelihood of a person experiencing depression and anxiety, *after controlling for the other factors*? Table 3.5, and the discussion based on it, refer to the contributions in the absence of any imposed controls. This question was answered in the context of a logit model, the results from which — based upon a calculation of predicted probabilities, along the lines discussed earlier, for each category of variable — are discussed in the next section.

### **3.4. The Predicted Probabilities of Depression, Anxiety, and Anger**

Tables 3.6, 3.7, and 3.8 show the predicted probabilities (PP) from estimating the logit equations for depression, anxiety, and anger using the determining variables shown in Table 3.5. All subsequent references involving terms like ‘more likely’/ ‘less likely’/ ‘likelihood’ will be based on the computed predicted probabilities. The second column of Tables 3.6 to 3.8, labelled predicted probabilities, shows the PP associated with each variable category, including the reference category. The third column, labelled marginal probabilities, shows the difference between the PP of the category in question and that of the reference category. As argued earlier, this difference represents, by construction, the effect of a change in the variable category from the reference category to the category shown in the tables. The fourth column shows the standard error associated with the marginal probability, and dividing the marginal probability by the standard error yields the z-value of the fifth column. This z-value informs as to whether the marginal probability was significantly different to zero.

<Tables 3.6, 3.7, and 3.8 here>

For example, Table 3.6 shows the PP of men and women having experienced depression as, respectively, 55.4% and 62.5% — where these PP were obtained by treating the entire estimation sample of 15,050 persons firstly as all men and then as all women — yielding a marginal probability of 7.2 percentage points (hereafter, simply points). As argued earlier this difference represented a pure gender effect since nothing, except gender, had been changed between the all-men and all-women scenarios. Dividing this by its standard error (0.8) results in a z-value of 9.2. The interpretation of this z-value is that women had a *significantly* higher PP of having experienced depression (7.2 points higher) than men.<sup>11</sup> Similarly, Tables 3.7 and 3.8 show, respectively, that women were *significantly* more likely to have experienced anxiety (46.8% versus 38.2%) but that they were *significantly* less likely to have experienced anger (42.3% versus 48.6%).

Earlier in this chapter it was pointed out that Nolen-Hoeksema *et al.* (1999) and Nolen-Hoeksema (2001) emphasised gender differences in both exposure and response to depression inducing factors. So, for example: women were more likely than men to be the victims of childhood sexual assault; they were more likely to be trapped in the role of perpetual carers, with their lives sandwiched between caring for their young children and their aged parents; they were more likely to be unequal partners in heterosexual relationships with major, life-changing decisions being made by their male partners; and they were more likely to do atypical and non-standard type work exemplified by temporary or part-time jobs. However, owing to gender differences in response to depression inducing factors, women might be more likely than men to develop depression even in circumstances where both genders were exposed to the same depression-inducing factors. This might be due to gender differences in the response to such factors caused *inter alia* by: biological factors;<sup>12</sup> differences in levels of self-esteem between men and women;<sup>13</sup> differences between men and women in their respective propensities to introspection and rumination.<sup>14</sup>

The essence of the (late) Nolen-Hoeksema's (2003) argument is that "when bad things happen, women brood — they're cerebral, which can feed into the depression whereas men are more inclined to act, to do something, plan, beat someone up, play basketball".<sup>15</sup> Kendler and Gardner (2014) have also argued that women display more sensitivity towards interpersonal relationships while men are more sensitive to external career and goal-oriented factors. In addition, Albert (2015, p.220) has pointed out that women experience specific forms of depression including "premenstrual dysphoric disorder, postpartum depression, and postmenopausal depression and anxiety that are associated with changes in ovarian hormones and could contribute to the increased prevalence among women".

It is also possible that gender differences in depression rates may be the result of men responding to stress through alternative modes such as antisocial behaviour and alcohol abuse (Kessler *et al.*, 1994; Meltzer *et al.*, 1995). This view has also been expressed by Nazroo (2001) who argues that, in response to stress, men may be more likely to have been socialised to express anger or other forms of acting out. Consistent with this view is this chapter's finding that the likelihood of experiencing anger was significantly higher for men than it was for women.

Tables 3.6 to 3.8 show that Whites were significantly more likely to have experienced depression (66%) than Hispanics (61%), Blacks (56.3%), and Asians (52.2%); significantly more likely to have experienced anxiety (49.2%) than Hispanics (45.5%), Blacks (38.9), and Asians (35.8%); significantly more likely to have experienced anger (49.4%) than Hispanics (38.3%), and Asians (36%). However, in respect of experiencing anger, there was no significant difference in the PP of Whites (49.4%) and Blacks (48.8%).<sup>16</sup> These results are broadly consistent with those of Dunlop *et al.* (2003) who showed that after sociodemographic controls had been imposed depression was found significantly less frequently among African Americans than among Whites and with similar frequency among Hispanics and Whites.

Borrowing from Beauboeuf-Lafontant's (2007) thesis about strong Black women, it is possible that depression among minority populations is underreported because it is seen as a sign of moral

weakness. In particular, according to Beauboeuf-Lafontant's (2007), being depressed is contrary to the self-image of the strong Black woman who regards herself as being able to cope with the demands of single parenthood, juggling home and work, and who, therefore, does not seek help for the depression that such demands might engender. By extension, this attitude may apply to all minority communities whose members are more willing to regard depressive symptoms as part of life's normal fabric than are their White peers.

Another reason for racial differences in rates of depression, as Laino (2004) reports, might be that minority groups disproportionately suffer from "mild long-term depression", which they neither report nor seek help for, believing it's something they have to live with, while White persons disproportionately suffer from "severe short-lived depression" for which they do seek help. Hence, the reporting of depression might be disproportionately skewed towards the majority group and away from minority groups.

Tables 3.6 to 3.8 show that the likelihood of having experienced depression and anxiety was highest in the 46–60 age group (respectively, 62.4% and 48.5%) and lowest for the over-60s (respectively, 51.4% and 37.5%) while the likelihood of experiencing anger was highest for the 18–30 age group (49.5%) and lowest for the over-60s (30.5%). In terms of marital status, the likelihood of having experienced depression, anxiety, or anger was lowest for married/cohabiting persons (respectively, 55.8%, 41.8%, and 44.7%) and highest for those that were divorced/separated/widowed (respectively, 66.3%, 44.8%, 47.6%) and in all three instances these differences between the two groups were significantly different from zero. Bebbington (1987) showed, using English national admission statistics, that widowed and divorced persons showed much higher rates of depressive disorders than the single and married persons. Andrew *et al.* (2017), however, argued on the basis of data for Canada that the effect of marital status on depression should be moderated by age: the odds ratios for depression declined with age for those widowed, separated and divorced compared to married people.



Tables 3.6 and 3.7 show that the likelihood of having known depression and anxiety was significantly higher for better educated persons (62.7% and 45% for high, and 60.2% and 45% for medium, levels) than it was for the less educated (56.9% and 38.6% for low, and 58.1% and 41.9% for moderate, levels).<sup>17</sup> Bjelland *et al.* (2008) point out that the relationship of education to the experience of anxiety and depression throughout adult life is unclear, with limited and inconclusive knowledge of this relationship. An OECD (2018) study suggests that, contrary to the results reported in this chapter, higher education levels and reported rates of depression are negatively correlated. One way of rationalising the positive association between education and depression, reported in Tables 3.6 and 3.7, is in terms of Nolen-Hoeksema's (2003) hypothesis that depression was brought on by "overthinking" and that persons with higher levels of education were more likely to "overthink" than those with lower levels.

There is clear evidence in Tables 3.6 to 3.8 that work status affected the likelihood of experiencing depression and anxiety. Employed persons were significantly less likely to have known depression than the unemployed and the inactive (in the labour force) — respectively, 57.9%, 60.8%, and 63% for depression, and employed persons were significantly less likely to have known anxiety than inactive (respectively, 41.9% and 46.7%).<sup>18</sup> This is consistent with much of the literature on the connection between unemployment and depression (Clark, 2001; Clark and Oswald, 1994). Research by Gallup for the USA suggests that "The longer that Americans are unemployed, the more likely they are to report signs of poor psychological well-being".<sup>19</sup> However, the direction of causation is open to question: does unemployment cause depression or are depressed persons more likely to be made unemployed?

In a population-based longitudinal study for the USA, Sareen *et al.* (2011) found that there was a significant link between household income and mental disorders such that poorer households were at greater risk of mood disorders than better-off households. The results reported in Tables 3.6 to 3.8 reflect this finding. The likelihood of having been depressed, anxious, and angry was significantly higher for poor households (that is, households with income at or below the poverty line) — 63.1%

for depression, 45.9% for anxiety, and 47.3% for anger — than it was for households with income more than three times the poverty line — 56.4 % for depression, 40.3% for anxiety, and 43.3% for anger.

The American Psychological Association reported, on the basis of a *Stress in America* survey, that in 2011, adults living in the East tended to be slightly more stressed and less able to manage than those in the rest of the United States while adults in the Midwest reported increasing stress. By contrast, adults in the South and the West were doing a good job in managing stress.<sup>20</sup> The results reported in Tables 3.6 to 3.8 mirror this finding. The likelihood of depression was highest in the North-east and the Midwest (respectively, 60.2% and 61.5%) and these were significantly higher the likelihoods of depression in the West (57.9%). The likelihood of anxiety was lowest in the South (40.8%) and this was significantly lower than that in the North-east (45%), the Midwest (44.3%), and the West (43.9%). In terms of anger, the likelihood was highest in the Midwest (48.2%) and this was significantly higher than the likelihood of anger in the North-east (45.8%), the South (43%), and the West (46%).

Existing research suggests that engagement in religious activity, or religiosity, both protects against depression and helps people to recover from depression. Ellison (1991), on the basis of US data, suggests a direct and substantial link between religious certainty and well-being: individuals with strong religious faith reported higher levels of life satisfaction and greater personal happiness than persons whose faith was shaky. Similarly, Borooah (2006) showed that for Northern Ireland, the probability of persons who attended a place of worship regularly reporting themselves as “happy” was 10.2 points higher than for persons who did not attend regularly. More recently, Ronnenberg *et al.* (2016) show that, from a study of older adults in the USA, frequent attendance at religious services helped prevent depression. The results presented in Tables 3.6 to 3.8 are consistent with these results. The likelihoods of experiencing depression, anxiety, or anger were all significantly lower for persons who were members of a church compared to those who were not: 56.1% versus 60.4% for depression, 41.5% versus 43.4% for anxiety, and 42.4% versus 45.8% for anger.

The results reported in Tables 3.6 to 3.8 suggest that childhood trauma played a major role in determining the state of mental health in adulthood. Persons who had suffered childhood trauma (defined earlier), compared to those that had not, were much more likely to have experienced depression (69.4% versus 41.1%), anxiety (50.2% versus 29.1%), and anger (55.6% versus 23.8%). There is a large consensus that childhood trauma plays a significant role in the development of depression (Kessler, 1997; Moskvina *et al.*, 2007; Negele *et al.*, 2015). Indeed, Negele *et al.* (2015) show that of a sample of 349 chronically depressed adults in Germany who had completed the Childhood Trauma Questionnaire, 75.6% reported significant histories of childhood trauma with experience of emotional and sexual abuse playing a particularly important role in determining the severity of depression.

Depression is one of the most frequent psychiatric disorders in adults with cognitive disability (Hartley and MacLean, 2009; Richards *et al.*, 2001). The 2007 National Survey of Mental Health and Wellbeing for Australia showed that while 20% of the general population experienced some form of mental disorder in the past six months, this figure was at least 2.5 points higher for adults with cognitive disabilities (Trollor, 2016). As Hartley and MacLean (2009) point out, cognitive dysfunction increases a person's susceptibility to experiencing frequent and severe stressful social interactions and such stressful events trigger cognitive processes which result in depression. The results reported in Tables 3.6 and 3.7 corroborate this: the likelihood of having been depressed or anxious was significantly higher for persons with a cognitive disability than for those without — respectively, 65.3% and 58.1% for depression and 49.5% and 41.3% for anxiety. There was, however, no significant difference between persons with and without cognitive disability in their likelihood of being angry.

### **3.5. The Interaction of Gender with Other Determinants of Mental Illness**

The assumption underlying the analysis in the previous section was that the effect of gender on the likelihood of depression, anxiety, and anger operated entirely through a “gender displacement” effect which shifted the intercept for each of the three equations up or down depending upon whether the person concerned was male or female. The obverse of this assumption was that it was taken that there was no gender effect with respect to the other variables — for example, the effect of childhood trauma on the likelihood of having known depression as an adult was not affected by whether the person was a man or a woman. This section considers a more subtle gender effect whereby gender interacts with the other determining variables to produce, with respect to each variable, a “male” and a “female” effect on the likelihood of having experienced a particular condition. Furthermore, given the way that the equations are set up, it is possible to test whether the variable-specific gender effects were significantly different from zero — in the context of childhood trauma, for example, was there a significant difference in the likelihood of having had a condition between men and women who had known such trauma?

In order to test this hypothesis, the variable  $G$ , was assumed to take the values 1 and 0 for, respectively, female and male respondents. This variable  $G$  was then allowed to *interact* with all the other variables. This means that the coefficient associated with variable  $k$  in the context of a female respondent (that is,  $G_i=1$ ) was  $(\beta_k + \alpha_k)$  while the coefficient associated with the *same* variable for a male respondent (that is,  $G_i=0$ ) was  $\beta_k$ ;  $\alpha_k$ , thus, represents the gender effect associated with variable  $k$ . The estimated logit equation was now:

$$\log\left(\frac{\Pr[y_i = 1]}{1 - \Pr[y_i = 1]}\right) = \sum_{k=1}^K \beta_k X_{ik} + \sum_{k=1}^K \alpha_k \times G_i + u_i \quad (3.3)$$

and a test of the null hypothesis  $\alpha_k=0$  indicated whether gender differences with respect to the  $k$ th variable were significantly different from zero. The results from the logit model embodying these interaction terms are presented in Table 3.9, 3.10, and 3.11 in the form of the *predicted probabilities*, described earlier in the chapter, obtained from the estimated logit coefficients of the equation using STATA’s *margin* command.<sup>21</sup>

In order to pass judgement on the existence of a gender effect with respect to the likelihood of having experienced depression, anxiety or anger, the predicted probability of having had the condition was computed separately, with respect to every determining variable noted under Table 3.5 above, for men and women; the difference between these probabilities was then tested to see if it was statistically significant. If the probabilities with respect to a variable was *ceteris paribus* significantly higher for one gender than another then that would be evidence of the presence of a gender effect with respect to that variable; conversely, the absence of a significant difference would be evidence that a gender effect did not exist with respect to that variable. These inter-gender predicted probabilities are shown in Table 3.9, 3.10, and 3.11, for respectively, depression, anxiety, and anger.

<Tables 3.9, 3.10, 3.11 here>

Tables 3.9 and 3.10 show that for almost every variable category, the likelihood of women having experienced depression and anxiety was significantly higher than that of men.<sup>22</sup> Table 3.11 tells a converse story for anger: for almost every variable category, the likelihood of women having experienced anger was significantly lower than that of men.<sup>23</sup> So, for example, Table 3.9 shows that the likelihood of White men and women having known depression was, respectively, 63.1% and 68.9% and the difference of 5.8 points, with an associated z-value of 3.7, was significantly different from zero. Table 3.10 shows, for example, that the likelihood of employed men and women having known anxiety was, respectively, 36.5% and 46.2% and the difference of 9.8 points, with an associated z-value of 9.8, was significantly different from zero. Again, by way of example, Table 3.11 shows that the likelihood of separated/divorced/widowed men and women having been “angry” was, respectively, 50.2% and 45% and the difference of 5.2 points, with an associated z-value of 2.8, was significantly different from zero.

### 3.5.1. Gender Discrimination in Depression and Anxiety

Most people are familiar with the concept of gender discrimination in, say, the labour market. Women are paid less than men — and under-represented in senior management positions — even after controlling for differences in qualifications and experience. The task of the labour market analyst is then to compute how much of the observed difference in wages between men and women is due to an inter-gender difference in wage-friendly attributes between the sexes and how much remains even after accounting for differences in such attributes. The latter is usually referred to as gender discrimination in wages.<sup>24</sup>

In a similar vein one can think of gender discrimination in the likelihood of having had say, depression. The difference between men and women in their *observed* proportions experiencing depression may be partitioned into a difference which is due entirely to a difference in *exposure* (education, income, etc.) and a difference which is due to coefficients, that is, to differing *responses* of men and women to the same depression-inducing factors.

The Oaxaca (1973) and Blinder (1973) method (hereafter, O-B) of decomposing differences between groups, in their respective mean values, into a “discrimination” and a “characteristics” component is, arguably, the most widely used decomposition technique in economics. This method has been extended from its original setting within regression analysis, to explaining group differences in probabilities derived from models of discrete choice with a binary dependent variable and estimated using logit/probit methods (Nielsen, 1998).

The O-B decomposition — applied originally to the difference in average wages between men and women — is formulated for situations in which the sample is subdivided into two mutually exclusive (and collectively exhaustive) groups, such as, for example, men and women. In its extension to models of discrete choice, one may decompose the difference between men and women in their average proportions of having had depression into two parts: one due to inter-gender differences in the coefficient vectors (“differential response”) and the other a result of gender differences in the variable

values (“differential exposure”). The exposure contribution is computed by asking what the average male–female difference in probabilities *would have been* if the difference in exposure between men and women had been evaluated using a common coefficient vector. The critical question though is: what should this common coefficient vector be? Typically, two separate computations of the exposure contribution are provided using, respectively, the female and the male coefficient vectors as the common vector.

<Table 3.12 here>

Column 1 of Table 3.12 shows the observed difference between men and women in the average proportions with a particular condition (depression, anxiety, and anger). On average, compared to men, a greater proportion of women had experienced depression and anxiety (by, respectively, 6.4 and 7.4 points) but a smaller proportion had experienced anger (by 8.1 points). Column 2 of Table 3.12 shows the amount of the overall gap that was due to the *exposure effect* when female and male exposure were both evaluated using *female* coefficients; similarly, column 4 of Table 3.12 shows the amount of the overall gap that is due to the *exposure effect* when female and male exposure were both evaluated using *male* coefficients.

The size of the exposure effect differs according to whether female or male coefficients are used in the evaluation. For example, for depression, the exposure effect based on female coefficients explained 19%, while the exposure effect based on male coefficients explained only 1.5%, of the observed difference in inter-gender proportions. For anxiety, the exposure effect based on female coefficients also explained 19%, while the exposure effect based on male coefficients explained 16%, of the observed difference in inter-gender proportions. For anger, the exposure effect based on female coefficients also explained 19%, while the exposure effect based on male coefficients explained 31%, of the observed difference in inter-gender proportions.

For depression and anxiety, the exposure effect predicted that if male exposure were evaluated at female coefficients, then, compared to women, a higher proportion of men would have had that

condition. For example, 63.4% of men would have experienced depression compared to 62.2% of women while 47.6% of men would have experienced anxiety compared to 46.2% of women. In general, however, the contribution of the exposure effect towards explaining the overall difference in inter-gender proportions in experiencing depression, anxiety, and anger was relatively small compared to the response effect. The most important reason for women and men experiencing different rates of depression, anxiety, and anger is that women respond differently from men to factors which induce these conditions.

### **3.6. Conclusions**

The contribution of this chapter to the extensive literature on depression, anxiety, and anger, was to apply techniques of econometrics to explain gender differences in the experience of adults of these conditions. One contribution was to use the “interaction model” of the previous section which allowed men and women to respond differently to each of the condition-inducing factors (detailed in Table 3.5). This allowed one to test whether there was a significant difference between male and female responses. The overall conclusion was that, with a handful of exceptions, there were significant inter-gender differences in responses to all the variable categories.

The second contribution of this chapter was to aggregate the different responses for the different variable categories into an overall response. This was achieved by applying the Oaxaca-Blinder decomposition methodology to quantifying the contribution of differences in *exposure*, and differences in *response*, to inter-gender differences in depression, anxiety, and anger rates. The division of the sample could, of course, have been by factors other than gender and it might be also useful to examine inter-racial differences in the propensity towards these conditions.

As the data in Table 3.5 show, reported rates of depression, anxiety, and anger are considerably lower for Asians than for Whites. Is this due to the fact that Asians are, perhaps, relatively sheltered from



depression/anxiety-inducing factors? Or is it because Asian responses to such factors (responses perhaps engendered by a Confucian stoicism which makes it culturally less acceptable to admit to emotional frailty than might be the case for those with liberal, Western roots) are relatively more muted than the responses of people of other races? Similar observations might be made about regional divisions: does living in sunny California offer greater protection from factors associated with depression, anxiety, and anger compared to living in the rust belts of the Midwest? Or are people living in California better able to cope with such factors?

This chapter offered a methodology — with a long and distinguished pedigree in economics — which is capable of providing answers to questions in which responsibility needs to be apportioned between exposure and response. However, it might be pertinent to conclude this chapter by pointing to a limitation of this methodology. It should be emphasised that the response effect was defined as a residual: it was what could not be explained by differences between men and women in their exposure to the various “depression-influencing” factors. Consequently, the empirical results are only as good as the variables used in the logit regression; with a different set of variables the exposure/response split might have been different.

The relevance of this observation to the present analysis is that several of the variables used could be better nuanced. For example, marital breakdown was a “depression-inducing” factor but the data were silent on the circumstances surrounding the breakdown; similarly, differences between men and women in the nature of their employment, or in the nature of their work–home balance, or in the nature of their childhood traumas, were not elaborated. These examples provide a compelling argument for marrying mental health information with a richer set of data on individual circumstances.



## References

- Adams, S. (2014), “How Unemployment and Depression Fit Together”, *Forbes*, 9 June, <https://www.forbes.com/sites/susanadams/2014/06/09/how-unemployment-and-depression-fit-together/#5d096f947b70> (accessed 17 September 2019).
- Albert, P.R. (2015), “Why is Depression More Prevalent in Women”, *Journal of Psychiatry and Neuroscience*, **40**: 219–221.
- Alegria, M., Jackson, J.S., Kessler, R.C. and Takeuchi, D. (2007), “Collaborative Psychiatric Epidemiology Surveys (CPES), 2001-2003 [United States] [Computer file]. ICPSR20240-v5”, Ann Arbor, MI: Institute for Social Research, Survey Research Center [producer], 2007. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2008-06-19.
- Andrew G.M., Bulloch, J., Williams V.A., Lavorato D.H. and Patten, S.B. (2017), “The Depression and Marital Status Relationship is Modified by both Age and Gender”, *Journal of Affective Disorders*, **223**: 65–68.
- Beauboeuf-Lafontant, T. (2007), “You Have to Show Strength: An Exploration of Gender, Race, and Depression”, *Gender & Society*, **21**: 28–51.
- Bebbington, P. (1987), “Marital Status and Depression: A Study of English National Admission Statistics”, *Acta Psychiatrica Scandinavica*, **75**: 640–665.
- Bjelland, I., Krokstad, S., Mykletun, A., Dahl, A.A., Tell, G.S. and Tambs, K. (2008), “Does a Higher Educational Level Protect against Anxiety and Depression? The HUNT Study”, *Social Science and Medicine*, **66**: 1334–1345.
- Blinder, A.S. (1973), “Wage Discrimination: Reduced Form and Structural Estimates”, *Journal of Human Resources*, **8**: 436–455.
- Borooah, V.K. (2006), “What Makes People Happy? Some Evidence from Northern Ireland”, *Journal of Happiness Studies* **7**: 427–465.
- Borooah, V.K. (2010), “Gender Differences in the Incidence of Depression and Anxiety: Econometric Evidence From the USA”, *Journal of Happiness Studies* **11**: 663-682.

- Clark, A.E. (2001), “What Really Matters in a Job? Hedonic Measurement Using Quit Data”, *Labour Economics*, **8**: 223–242.
- Clark, A.E. and Oswald, A. (1994), “Unhappiness and Unemployment”, *Economic Journal*, **104**: 648–659.
- Clark, A.E., Flèche, S., Layard, R., Powdthavee, N. and Ward, G. (2018), *The Origins of Happiness*, Princeton, NJ: Princeton University Press.
- Dunlop, D.D., Song, J., Lyons, J.S., Manheim, L.M. and Chang, R.W. (2003), “Racial/Ethnic Differences in Rates of Depression Among Preretirement Adults”, *American Journal of Public Health*, **93**: 1945–1952.
- Ellison, C.G. (1991), “Religious Involvement and Subjective Well-Being”, *Journal of Health and Social Behaviour*, **32**: 80-99.
- Hartley, S.L. and Maclean, W.E. (2009), “Depression in Adults with Mild Intellectual Disability: Role of Stress, Attributions, and Coping”, *American Journal of Intellectual Development and Disability*, **114**: 147–160.
- Kendler, K.S. and Gardner, C.O. (2014) “Sex Differences in the Pathways to Major Depression: A Study of Opposite-sex Twin Pairs”, *American Journal of Psychiatry*, **171**: 426–435.
- Kessler R.C. (1997), “The Effects of Stressful Life Events on Depression”, *Annual Review of Psychology*, **48**: 191–214.
- Kessler, R.C, McGonagle, K.A, Zhao, S. et al. (1994), “Lifetime and 12-month Prevalence of DSM-III-R Psychiatric Disorders in the United States. Results from the National Comorbidity Survey”, *Archives of General Psychiatry* **51**: 8–19.
- Laino, S. (2004), “Depression: Is There a Racial Gap?”, <https://www.webmd.com/depression/news/20040503/depression-racial-gap#2> (accessed 16 September 2019).
- Lerner, B. (2019), *Topeka School*, London: Granta Publications.
- Long, J.S. and Freese, J. (2014), *Regression Models for Categorical Dependent Variables using Stata*, College Station, TX: Stata Press.

- Meltzer, H., Gill, B., Petticrew, M. and Hinds, K. (1995), *OCPS Surveys of Psychiatric Morbidity in Great Britain, Report 1: The Prevalence of Psychiatric Morbidity among Adults Living in Private Households*, London: Her Majesty's Stationery Office.
- Moskvina V., Farmer A. and Swainson V. (2007), "Interrelationship of Childhood Trauma, Neuroticism, and Depressive Phenotype", *Depression and Anxiety*, **24**: 163–168.
- Nazroo, J. (2001), "Exploring Gender Differences in Depression", *Psychiatric Times*, **18**: 1–2.
- Negele, A., Kaufhold, J., Kallenbach, L. and Leuzinger-Bohleber, M. (2015) "Childhood Trauma and its Relation to Chronic Depression in Adulthood", *Depression Research and Treatment* **2015**: 650804. doi:10.1155/2015/650804.
- Nielsen, H.S. (1998), "Discrimination and Detailed Decomposition in a Logit Model", *Economics Letters*, **61**: 115–20.
- Nolen-Hoeksema, S. (2001), "Gender Differences in Depression", *Current Directions in Psychological Science*, **10**: 173–176.
- Nolen-Hoeksema, S. (2003), *Women Who Think Too Much: How to Break Free of Overthinking and Reclaim your Life*. London: Little Brown and Co.
- Nolen-Hoeksema, S., Larson, J. and Grayson, C. (1999), "Explaining the Gender Difference in Depression", *Journal of Personality and Social Psychology*, **77**: 1061–1072.
- Oaxaca, R. (1973), "Male–Female Wage Differentials in Urban Labor Markets", *International Economic Review*, **14**: 693–709.
- OECD (2018), "How is Depression Related to Education?", *Education Indicators in Focus*, No. 60, Paris: OECD Publishing.
- Richards, M., Maughan, B., Hardy, R., Hall, I., Strydom, A. and Wadsworth, M. (2001), "Long-term Affective Disorders in People with Mild Learning Disability", *British Journal of Psychiatry*, **179**: 523–527.
- Ronneberg, C.R., Miller, E.A., Dugan, E. and Porell, F. (2016), "The Protective Effects of Religiosity on Depression: A 2-Year Prospective Study", *Gerontologist*, **56**: 421–431.

- Sareen, J., Afifi, T.O., McMillan, K.A. and Asmundson, G.J.G. (2011), “Relationship between Household Income and Mental Disorders: Findings from a Population-Based Longitudinal Study”, *Archives of General Psychiatry*, **68**: 419–427.
- Sharkin, B.S. (1993), “Anger and Gender: Theory Research Implications”, *Journal of Counselling & Development*, **71**: 386–389.
- Trollor, J. (2016), *An Introduction to Depression in People with Intellectual Disability*, Sydney: University of New South Wales.
- Weiss, E.L., Longhurst, J.G. and Mazure, C.M. (1999), “Childhood Sexual Abuse as a Risk Factor for Depression in Women: Psychosocial and Neurobiological Correlates”, *American Journal of Psychiatry*, **156**: 816–828.

## Notes

<sup>1</sup> See: <https://nndc.org/facts/> (accessed 19 September 2019).

<sup>2</sup> See: [https://www.huffingtonpost.co.uk/entry/depression-statistics\\_n\\_6480412?guccounter=1&guce\\_referrer=aHR0cHM6Ly9jb25zZW50LnlhaG9vLmNvbS8&guce\\_referrer\\_sig=AQAAAFSPwpTcCmRop1HXptdMOB605-jSjxvVM20No\\_CcurK7ZyyTt3EVm9gCErD4eBIxwjUIOVdM8R1RHEi\\_yUJTm00CcG8dSyUVISdXeld80QHU3i\\_gv00FRnAFTgLuy9RuWk7q\\_d9CC49\\_iS3lwpwETFzFiGyLdOEgOkPtZMsL7Y6Q](https://www.huffingtonpost.co.uk/entry/depression-statistics_n_6480412?guccounter=1&guce_referrer=aHR0cHM6Ly9jb25zZW50LnlhaG9vLmNvbS8&guce_referrer_sig=AQAAAFSPwpTcCmRop1HXptdMOB605-jSjxvVM20No_CcurK7ZyyTt3EVm9gCErD4eBIxwjUIOVdM8R1RHEi_yUJTm00CcG8dSyUVISdXeld80QHU3i_gv00FRnAFTgLuy9RuWk7q_d9CC49_iS3lwpwETFzFiGyLdOEgOkPtZMsL7Y6Q) (accessed 19 September 2019).

<sup>3</sup> An early analysis of these data is to be found in Borooah (2010). The analysis and discussion in this chapter differs, however, from that in Borooah (2010) in several important respects.

<sup>4</sup> Gender specific response rates were not provided.

<sup>5</sup> Needless to say, violent behaviour is but one manifestation of rage, as the vile and violent language used by (usually male) internet trolls makes evident. For an account of white, male rage see Lerner (2019).

<sup>6</sup> Black: African American, Afro-Caribbean; Hispanic: Puerto Rican, Mexican, all other Hispanic; Asian: Vietnamese, Filipino, Chinese, all other Asian.

<sup>7</sup> See: <https://www.stata.com/manuals13/rmlogitpostestimation.pdf>.

<sup>8</sup> It is important to draw a distinction between the *estimation* sample and the *total* sample; because the equation can only be estimated for non-missing values on *all* the variables, the estimation sample will, typically, be smaller than the total sample.

<sup>9</sup> In operational terms, these hypothetical scenarios are constructed in STATA by estimating the logit equation and then using the predict command *after* the command “replace  $X_{it}=1$ ” has been executed: the average of these predictions over the  $N$  persons will yield  $\tilde{p}^M$ ; next, use the predict command *after* the command “replace  $X_{it}=2$ ” has been executed: the average of these predictions over the  $N$  persons will yield  $\tilde{p}^W$ . In practice, STATA’s margin command will perform these calculations.

<sup>10</sup> Childhood traumas were any of the following: fidgety childhood; frequently in trouble with adults for six months or more during childhood or adolescence; lying, stealing as child or teenager; ran away frequently, played truant, or stayed out late as child or teenager; had separation anxiety, for one month or more, as a child.

<sup>11</sup> In statistical parlance, under the null hypothesis that men and women had the same PP of having experienced depression, there was a less than 5% chance of observing a 7.2 point difference and that, therefore, this hypothesis could be rejected (or, at least, not accepted).

---

<sup>12</sup> The hypothalamic-pituitary-adrenal (HPA) axis plays a major role in regulating stress responses and, compared to men, women are more likely to have dysfunctional HPA responses to stress (Weiss *et al.*, 1999).

<sup>13</sup> With the consequence that conflicts in, or the ending of, relationships are more likely to produce depression in women than in men.

<sup>14</sup> A greater propensity to rumination in response to stress increases the risk of developing depression, according to Nolen-Hoeksema (2003).

<sup>15</sup> Martin Seligman, University of Pennsylvania, as quoted in the *New York Times*, <https://www.nytimes.com/2013/01/14/us/susan-nolen-hoeksema-psychologist-who-studied-depression-in-women-dies-at-53.html> (accessed 15 September 2019).

<sup>16</sup> Subsequent tests showed that Asians were significantly less likely to have experienced depression and anxiety (52.2% and 35.8%) than Blacks (56.3% and 38.9%) but that there was no significant difference between Asians and Hispanics in their likelihood of experiencing anger.

<sup>17</sup> As defined earlier, high education represented 16 or more years of education; medium education was 13–15 years; moderate education was 12 years and low education was 0–11 years.

<sup>18</sup> There was, however, no significant difference between the three work status categories in terms of their likelihood of experiencing anger.

<sup>19</sup> As cited by Adams (2014).

<sup>20</sup> See: <https://www.apa.org/news/press/releases/stress/2011/region> (accessed 18 September 2019).

<sup>21</sup> See also Long and Freese (2014).

<sup>22</sup> The three exceptions for depression were men and women who were: Asian, inactive, or church members. For these three categories there was no significant difference between men and women in their predicted likelihood of having been depressed. The one exception for anxiety was men and women who were Asian. For this category there was no significant difference between men and women in their predicted likelihood of having known anxiety.

<sup>23</sup> The exceptions were men and women who were Black and men and women who had cognitive disabilities. For these two categories, there was no significant difference (at the 5% level) between men and women in their predicted likelihood of having known anger.

<sup>24</sup> See Blinder (1973) and Oaxaca (1973) for seminal analyses of wage discrimination between men and women.