

# Economic impact on poor mental health throughout the Great Recession of 2008

Cameron O'Neill  
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**Abstract:**

Poor mental health, and the symptoms associated with it, are well-established factors associated with significant economic burdens to the U.S. Additionally, numerous studies have shown that macroeconomic changes affect the quality of an individual's mental health significantly. What remains unclear, however, is how outcomes of poor mental health can vary across sex and race/ethnicity during a negative macro-economic change such as the Great Recession of 2008. I used data from MEPS to estimate the effect of the recession on various indicators on various effects of mental health. I find that there are noticeable effects across gender and race/ethnicity on both economic and mental health-related indicator outcomes during the Great Recession.

## **Introduction:**

Poor mental health, and untreated mental illness, costs the United States an estimated \$300 billion every year due to losses in productivity [NAMI 2016; CDC 2017, MK 2019]. Previous research has shown that individuals who were affected by financial, job-related, or housing-related hardships, such as the “Great Recession” of 2008, were more likely to show increased presentation of symptoms and conditions associated with poor mental health [APS 2019].

Consequently, mental health research has shown that levels of psychological distress, symptoms of depression, chronic mental illness, and mental healthcare utilization were found to have increased during the Great Recession [Cagney, 2014; Chen, 2016]. Additionally, the Great Recession affected Americans of all backgrounds, across education, age, race/ethnicity, and household type, with research indicating that there are distinct disparities in the effects of the recession across gender and race/ethnicity [Mortensen 2013]. Further, these disparities have been shown to affect previously disadvantaged racial/ethnic groups to a greater extent compared to advantaged groups [Chen, 2016].

Although population-level mental health and the Great Recession’s impact on mental health outcomes has been studied [Dagher, 2015; Glonti, 2015], these studies often do not take into account apparent differences in mental health presentation across sex and race/ethnicity [J.Agnst 2002; Rhode 2009; Williams 2007]. Instead, studies often opt for generalized scales of measuring the quality of mental health which do not account for disparities that may appear across sex, and race/ethnicity [Dagher, 2015].

This is further complicated by evidence that the Great Recession impacted the mental health of specific socio-demographic groups in different ways, with economic crises showing stronger negative effects on mental health across lower income or education, and insecure employment groups [Glonti, 2015; Zivin, 2011]. Given the large cost of mental illness, it is important from a mental health policy perspective to determine whether or not the Great Recession has been associated with different economic outcomes across sex, race/ethnicity, and socio-economic/demographic conditions which could affect poor mental health presentation.

Epidemiological studies concerning the prevalence of mental illness and distress necessitate brief, validated measures. Standardized clinical diagnostic tests based on the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition (DSM-V)* are time-intensive to administer, expensive, and identify only those who meet the criteria for a specific disorder. Thus, the need for a cost-effective and accurate measure of mental health has become a large field of research [Craske, M.G 2020, Mineka S. 2006, Rhode 2009].

Consequently, endophenotypes of poor mental health have presented themselves as a powerful tool for quickly measuring differences in mental health presentations across gender and race/ethnicity, regardless of socio-economic/demographic status [Ang 2009; Williams 2007; Rohde 2009].

Endophenotypes of poor mental health refer to pervasive clusters of symptoms that are associated with an underlying condition. In this case, poor mental health can be assessed by tracking associated negative endophenotypic presentations of mental health within our dataset. In

this light, not only will we be able to compare economic impacts of the Great Recession across gender and race/ethnicity, but also take into account the impact on the severity of negative endophenotypic presentations of mental health as well. Furthermore, endophenotypes are particularly useful as they separate behavioral symptoms into more stable measurable phenotypes [Iacono, 2018]. While there are well-established endophenotypic presentations associated with the aforementioned DSM-V, many of these symptoms rely on clinical-based operational definitions which are not readily available in most datasets or able to be analyzed by non-clinicians. Consequently, this study employed endophenotypic presentations from established survey research on symptoms associated with poor mental health to create a measure of differences in sex and race/ethnicity [Iacono, 2018; Agnst 2002; Rhode 2009; Williams 2007]. From this, we constructed a novel endophenotypic presentation of poor mental health around the constraints of our data set with the available symptomatic presentations associated with poor mental health.

Additionally, previous research has shown differences in symptoms associated with poor mental health across gender and race/ethnicity. Physical pain has been shown to present itself at a larger rate in male populations vs. female [Ang, 2009]. Furthermore, this same research has shown that within a male population, differences are noticed across race/ethnicity with Asian males often presenting comparatively larger rates of physical pain associated with poor mental health. Also, differences have been noticed in self-reported poor mental health with females showing a greater likelihood of identifying written/verbal indications of poor mental health such as low energy levels and self-reported poor health, whereas men are less likely to identify verbal/written presentations compared to presenting somatic physical symptoms associated with poor mental

health such as joint pain and overall poor physical health [Agnst 2002]. In this light, differences in sex again present themselves with certain racial/ethnic groups showing strong relationships between chronic conditions such as asthma and arthritis in individuals with associated poor mental health conditions [Chun, 2008]. Moreover, sociodemographic differences in seeking care for mental health problems have also been shown to differ across sex and race/ethnicity [De Luca, 2016] which carries important implications for future mental health and insurance-related policy.

This study examined the relationship between recession indicators (pre/during/post) and population mental health separately by gender and race/ethnicity. We hypothesized that in comparison to the period preceding the recession (1) symptoms of poor mental health may worsen during the recession and (2) the recession will replicate findings that previously disadvantaged groups are further disadvantaged by the economic crisis such as the Great Recession. We also conducted stratified analyses by U.S. region, employment status, income, age, education, and health services use, given the potential differential association of the recession with mental health across these different subgroups of people.

### **Econometric Model:**

$$Y_i = \beta_0 + \beta_1 Rec_t + \beta_2 Rec * Gender_{it} + \beta_3 Rec * Race/Ethnicity_{it} + \beta_4 Gender_i + \beta_5 R/\epsilon_i + \gamma X_{it} + \delta Trend + \epsilon_{it}$$

In the model of our research presented above,  $Y_i$  represents the outcome of our model where “i” is used as the unit of analysis.  $\beta_0$  is used to mark our intercept.  $\beta_1$  tracks the recessions (Rec) over time (t).  $\beta_2$  represents our interaction of the recession and gender as a unit of analysis (i) over time.  $\beta_3$  interacts the recession with race/ethnicity as a unit of analysis over time.  $\beta_4$  tracks gender as a unit of analysis.  $\beta_5$  represents the recession (r) interacted with our error term ( $\epsilon$ ) as a unit of analysis. “X” represents our selected controls for poor mental health as a unit of analysis over time. The “Trend” term is used as an indicator of change in a variable over time.  $\epsilon$  represents our error term which tracks the actual relationship between our independent and dependent variables.

For our study we used an Ordinary Least Squares regression (OLS), otherwise known as a linear regression. We additionally employed a marginal analysis to further assess the covariates and coefficients of our OLS regression

## **Data and Methods:**

### **Medical Expenditure Panel Survey (MEPS):**

The MEPS is a nationally representative survey of health care utilization and expenditures for the U.S noninstitutionalized civilian population, carried out by the Agency for Healthcare Research and Quality [MEPS, 2018]. MEPS is a panel-based survey with an overlapping cohort design. A novel cohort is instituted each year and provides information for a two-year reference period. MEPS conducts 5 rounds of in-person interviews, usually with one person per household, who reports information on all of their household members. MEPS interviewers ask that this be the person most knowledgeable about the health and health care use of the family. Current analyses utilize data ranging from 2001-2010.

The MEPS dataset has many sub-files. The MEPS consolidated file contains highly detailed information on participants' demographics and socioeconomic characteristics. The MEPS medical condition files allow for large amounts of data to be analyzed from different MEPS subfiles including healthcare utilization and sought ambulatory care. A self-administered questionnaire (SAQ) is also included in MEPS, which aggregates information that may be possibly unreliable if reported by a proxy and was administered across rounds. Importantly, the SAQ contains the Short Form 12-item survey (SF-12) which encapsulates important information on patient-reported health. The SF-12 is widely used as it produces accurate respondent results for physical and mental health with less respondent burden for the production of these scores compared to larger surveys such as the Short Form 36-item survey. The information we utilized from the SF-12 included our outcome variable's economic and endophenotypic use counts of: work lost days (WLD), wage, poor physical health, pain, poor mental health, joint pain, family

income, energy levels, employment, asthma, arthritis, and mental health-related ambulatory care over the calendar year. For analyzing this questionnaire data, special survey weights were employed incorporating adjustments for questionnaire responses.

Furthermore, the MEPS core interview collected detailed data on sociodemographic characteristics and medical conditions of each household member. Education was categorized as less than high school, high school graduate, some college, college, or graduate school. Age was categorized as 18-24, 25-34, 35-44, 45-54, or 55-64. Race/ethnicity was coded as white (non-Hispanic), Black (non-Hispanic), Hispanic, and Asian. Binary indicators represented these categories and gender. The MEPS medical consolidated file provided detailed information on the respondent's region of residence for Northeast, Midwest, South, and West.

## **Population**

For our study, we used data nationally representative of the civilian noninstitutionalized US population from MEPS for 2001-2010 for adults aged 18-64 years. The total sample (N = 559,360) included non-Hispanic Whites (n = 249,207), non-Hispanic Blacks (n = 104,853), non-Hispanic Asians (n = 34,151), and Hispanics (n = 161,157). Some participants (n = 9,992) were dropped due to "other" categorization. We also controlled for the respondents' demographics, socioeconomic status, health insurance coverage, education, chronological age, and region of residence. Characteristics of the sample are available in the Descriptive Statistics Table in our tables section.

## **Years studied**

The explanatory variables used included a dichotomous indicator equal to 1 for 2008-2009 to mark the Great Recession, and equal to 0 from 2001-2008 and 2008-2010 to mark the pre and post-periods. It is worth noting that in our identified time period there was a short recession during 2001 (March 2001 – November 2001) in the USA. The duration of the 2001 recession relatively quick, and the consequences were comparatively low (e.g. unemployment rate was 4%-6% during 2001 recession) compared to the Great Recession [Chen, J. et al. 2016]. As we are studying the economic impact of poor mental health resulting from the Great Recession, it is important to establish a framework for when the recession started and ended to accurately track individuals across this time period. This allows us to accurately measure the effects of the macroeconomic crisis on our population. Unfortunately, there are several different operational definitions of what the duration of the financial crisis could be construed as. For example, if we are using the stock market as a leading indicator, then October 1st 2007 (pre-recession high 14,164 down 50% by march) would be the first indication of the start of the great recession and the end March 31st 2009 (intraday low 6469, lowest point of crisis) when the market began correcting. Additionally, we could use a declining GDP perspective as our definition tracking the start of the financial crisis as Q2 of 2008 (2.1% contracted 15.7 trillion) with corrections being seen in Q3 of 2009 (14.42 trillion low) [FED, Rich et al. 2013]. Furthermore, as a more general historical definition, there is also the FED which pegs the start and end of the recession from December 2007 through June 2009 [FED, Rich et al. 2013]. Unfortunately, even though all of these definitions are important economic indicators of when the great recession took place, they do not fully encapsulate when the actual effects of the Great Recession impacted U.S citizens themselves. As the economic effect on the population as a whole is the basis of the population

we are employing, unemployment presents itself as our defining factor for measuring the timeframe of the crisis with a start of 2008 (4.7% unemployment) through the end of 2009 (peak 10% unemployment) [Bureau of Labor Statistics].

### **Measures of poor mental health:**

#### *Self-Reported Poor Mental Health:*

Self-reported poor mental health was analyzed from the SF-12 survey. To measure symptoms associated with poor mental health, participants were asked: “In general, would you say that (person’s) mental health is excellent, very good, good, fair, or poor?” Responses ranged from 1 (excellent) through 5 (poor). Responses between 3-5 were used as a dummy variable to mark individuals as having perceived poor mental health.

#### *Poor Physical Health*

Poor physical health was measured using the SF-12 self-reported perceived health status scale where responses ranged from 1(excellent) and 5 (poor). Responses of 4 (fair) and 5 (poor) were as a dummy variable to mark individuals as having perceived poor physical health.

#### *Joint Pain:*

Joint pain in participants was measured using the SF-12 self-reported joint pain score, where 1 marked “yes, joint pain present,” and 2 “no, joint pain present.”

*Pain Limiting Work:*

Pain present which limits ability to work was measured using the SF-12 self-reported pain limiting work scale, where 1 represented “No pain at all,” and 5 “Extreme pain limiting work.” Responses of 3 (moderate pain limiting work) through 5 were used as dummy variables of self-reported pain limiting work.

*Energy Levels:*

Energy levels were measured using the SF-12 self-reported energy levels, where 1 represented “Had a lot of energy all of the time,” and 5 “constant lack of energy.” We used responses of 3 (some energy) through 5 as a dummy variable of low energy levels.

*Asthma:*

Asthma diagnosis was measured using MEPS full year consolidated data. Respondents could respond with “Yes” or “No” for having a clinician-based asthma diagnosis. ‘Yes’ was used as a binary indicator of a patient receiving an asthma diagnosis.

*Arthritis:*

Arthritis diagnosis was measured using MEPS full year consolidated data. Respondents could respond with “Yes” or “No” for having a clinician-based asthma diagnosis. ‘Yes’ was used as a binary indicator of a patient receiving an arthritis diagnosis.

*WLD:*

Across rounds, respondents reported whether each household member was “limited in any way in the ability to work at a job, do housework, or go to school because of an impairment or a

physical or mental health problem.” This was coded as “1” for a “yes” response, and zero otherwise.

## **Results:**

### *Poor Mental Health:*

Table 1 contains estimated marginal effects on the recession for different sex and racial/ethnic groups. Unadjusted statistics show that the marginal effect on self-reported poor mental health was associated with a larger (-0.008) reduction in females than males (-0.0037) during the identified recession period (Table 1). Whites displayed lower associated marginal effects on self-reported poor mental health (-0.003) when compared to Blacks (-0.01), Asians (-0.018). Hispanics displayed a positive marginal effect compared to other racial/ethnic groups for self-reported poor mental health during the recession (0.003). No significant differences were found when gender and race were interacted (Supplemental Table 1).

### *Wage:*

Table 2 contains estimated marginal effects on the recession for different sex and racial/ethnic groups. Unadjusted statistics show that the marginal effect on wage had a lower associated effect (-1273.3) in females compared to males (-260.7) during the identified recession period (Table 2). Whites displayed lower associated marginal effects on wage (-555.6) when compared to Blacks (-1428.9), Asians (253.3), and Hispanics (-1728.8). Hispanic males showed a significant associated difference between sex with Hispanic females (-2227.8) having a reduction marginal effects compared to males (766.9) when gender and race were interacted (Supplemental table 2).

*WLD:*

Table 3 contains estimated marginal effects on the recession for different sex and racial/ethnic groups. Unadjusted statistics show that the associated marginal effect on work lost days (WLD) decreased (-0.26) in females compared to males (-0.9) during the identified recession period (Table 3). Whites displayed reduced associated marginal effects on WLD (-0.25) when compared to Blacks (0.46), and Asians (-0.04). Hispanics (0.46) displayed a larger marginal effect when compared to other races. Significant differences in marginal effect on WLD were found when gender and race were interacted between Black males (0.55) and black females (0.37) (Supplemental table 3).

*Poor Health:*

Table 4 contains estimated marginal effects on the recession for different sex and racial/ethnic groups. Unadjusted statistics show that the marginal effect on self-reported poor physical health was larger (-1.83) in females compared to males (-0.72) during the identified recession period (Table 4). Whites displayed lower marginal effects on self-reported poor physical health (-0.002) when compared to Blacks (-4.1), Asians (-1.67), and Hispanics (1.89). No significant differences were found when gender and race were interacted (Supplemental table 4).

*Pain:*

Table 5 contains estimated marginal effects on the recession for different sex and racial/ethnic groups. Unadjusted statistics show that the associated marginal effect on self-reported pain levels was greater (-0.008) in females compared to males (-0.003) during the identified recession period (Table 5). Whites displayed lower marginal effects on self-reported pain levels (0.0007) when

compared to Blacks (-0.013), Asians (-0.024), and Hispanics (-0.006). No significant differences were found when gender and race were interacted (Supplemental table 5).

*Joint Pain:*

Table 6 contains estimated marginal effects on the recession for different sex and racial/ethnic groups. Unadjusted statistics show that the marginal effect on self-reported joint pain levels was larger (-0.02) in females compared to males (-0.03) during the identified recession period (Table 6). Whites displayed larger marginal effects on self-reported joint pain (-0.02) when compared to Blacks (-0.01), and Asians (-0.04). Hispanics (0.003) showed larger marginal effects of self-reported joint pain when compared to whites. Significant marginal effects on self-reported joint pain were found when gender and race were interacted (Supplemental table 6).

*Family Income:*

Table 7 contains estimated marginal effects on the recession for different sex and racial/ethnic groups. Unadjusted statistics show that the associated marginal effect of family income was decreased (31141) in females compared to males (31323.7) during the identified recession period (Table 7). Whites displayed larger associated marginal effects on increased family income (35153.6) when compared to Blacks (20495.6), Asians (18644.9), and Hispanics (27044.7). No significant differences were found when gender and race were interacted (Supplemental table 7).

### *Energy Levels:*

Table 8 contains the estimated marginal effects on the recession for different sex and racial/ethnic groups. Unadjusted statistics show that the associated marginal effect on self-reported energy levels decreased (-0.01) in females compared to males (-0.05) during the identified recession period (Table 8). Whites displayed a decrease in associated marginal effects on self-reported energy levels (-0.0007) when compared to Blacks (-0.134), Asians (-0.059), and Hispanics (-0.01). There were also significant differences found when gender and race were interacted between Black females (-0.11) and Black males (-0.16) who showed a higher marginal effect on energy levels (Supplemental table 8).

### *Employment:*

Table 9 contains estimated marginal effects on the recession for different sex and racial/ethnic groups. Unadjusted statistics show that the marginal effect on employment was associated with a decrease (0.00005) in females compared to males (0.004) during the identified recession period (Table 9). Whites displayed lower marginal effects on employment (-0.004) when compared to Blacks (0.0046), Asians (-0.04), and Hispanics (-.25). No significant differences were found when gender and race were interacted (Supplemental table 9).

### *Asthma:*

Table 10 contains estimated marginal effects on the recession for different sex and racial/ethnic groups. Unadjusted statistics show that the associated marginal effect on asthma diagnosis decreased (0.009) in females compared to males (-0.024) during the identified recession period (Table 10). Whites displayed lower associated marginal effects on asthma diagnosis (-0.004)

when compared to Blacks (0.0046), Asians (-0.04), and Hispanics (-0.25). Significant differences were found when gender and race were interacted in Asians, with Asian females (-0.008) having a decreased marginal effect on asthma diagnosis than males (-0.05) (Supplemental table 10).

*Arthritis:*

Table 11 contains estimated marginal effects on the recession for different sex and racial/ethnic groups. Unadjusted statistics show that the marginal effect on arthritis diagnosis was decreased (-0.002) in females compared to males (-0.017) during the identified recession period (Table 11). Whites displayed overall decreased associated marginal effects on arthritis diagnosis (-0.01) when compared to Blacks (-0.003), Asians (-0.27), and Hispanics (-0.24). Significant differences were found when gender and race were interacted between White Females (-0.17) and White Males (-0.002) and Asian Females (0.02) and Asian Males (0.34) (Supplemental table 11).

*Ambulatory Care (Mental Health):*

Table 12 contains estimated marginal effects of the recession for different sex and racial/ethnic groups. Unadjusted statistics show that the marginal effect on number of ambulatory visits for mental health reasons increased (-0.005) in females compared to males (-0.002) during the identified recession period (Table 12). Whites displayed decreased associated marginal effects on number of ambulatory visits recorded (-0.0006) when compared to Blacks (-0.01), Asians (-0.01), and Hispanics (-0.0009). No significant differences were found when gender and race were interacted (Supplemental table 12).

### *Discussion:*

This study shows mixed evidence of economic impact differing across sex and race/ethnicity throughout the identified economic markers associated with the Great Recession. Loss of employment is one of the leading indicators of our economic recession; yet, employment status showed no significant differences across gender or race/ethnicity. Additionally, family income also increased across both sex and race/ethnicity significantly, with additional disparities across race/ethnicity where White family income was noticeably larger compared to other groups. This could potentially be explained by individuals finding other forms of work after being unemployed and not officially leaving the workforce, with previously advantaged groups such as whites being more likely to find a job. This is supported by wages showing a significant decrease in black and Hispanic populations compared to whites, except in Asians where both male and female groups displayed surprising wage increases despite the Great Recession. This supports previous findings that previously disadvantaged groups are more severely impacted by economic stressors such as the Great Recession. Additionally, the Great Recession showed moderate effects on WLD across gender and race/ethnicity; however, Blacks displayed a frighteningly high increase in WLD compared to other groups. This was furthered by Black men having a 67% larger effect on WLD compared to Black females.

This study also showed mixed evidence of symptoms associated with poor mental health varying across sex and gender/ethnicity when impacted by the Great Recession. Self-reported poor mental health actually showed signs of improvement on mental health across gender and race/ethnicity but not at a significant level. Interestingly enough, low energy levels additionally went against what we would expect and increase dramatically during the Great Recession across

sex and race/ethnicity. This could be due to the Great Recession having an inverse effect on written/verbal symptoms of poor mental health due to dealing with the adversity of an economic stressor; however, this is merely speculative and has no literature to back it up. Additionally, pain levels associated with joints or inability to work displayed no significant differences across gender or race/ethnicity which is interesting as other studies displayed these markers with significant differences across both sex and racial/ethnic groups.

Chronic illness diagnoses of arthritis and asthma also did not align with previous research, with males showing a significantly lower marginal effect on number of asthma and arthritis diagnosis during the Great Recession period compared to females. Furthermore, unexpected differences also presented themselves across race and ethnicity with Asians and Hispanics showing significantly lower rates of asthma and Arthritis during the Great Recession across gender. From a speculative perspective, this could be due to the cost of visiting clinician for a diagnosis of arthritis and asthma being too much of a financial burden during the Great Recession leading to fewer diagnoses being made. This is supported by Blacks and Asians displaying a significantly decreased propensity to seek ambulatory care across gender and compared to other racial/ethnic groups.

### *Limitations*

It should be noted that this study has several important limitations. First, the association of economic recession with symptoms of poor mental health may be misrepresented. Our study does not employ patients diagnosed with any disorders, just symptoms associated with poor mental health. In this light, we also employ self-reported data which could display associated recall bias. To counter this point, these reports of mental health status were validated by patients' doctors and pharmacists. Additionally, as we employ differing scales to capture the severity of poor mental health from SF-12, it is likely that the severity of associated poor mental health presentations and other commodities were not fully captured in our analysis. Further, the design of MEPS surveys does not allow longitudinal analysis. Consequently, it is difficult to see the actual causal relationship between the Great Recession and associated poor mental health.

### *Implications*

Our research provides evidence that there can be significant differences in the marginal effect of a financial crisis, in this case the Great Recession, on economic and mental health-related outcomes across sex and race/ethnicity. For this reason, a policy such as the Affordable Care Act (ACA) could potentially benefit from taking into account studied differences in sex and race/ethnicity when seeking to improve mental health care coverage. By paying attention to these differences, the U.S government can create a more representative healthcare program for its citizens across socio-demographic and socio-economic status.

**Tables:**

Table Of Descriptive Statistics					
Variables	Mean	S.D	Min	Max	
Male	0.48	0.50	0	1	1
Female	0.52	0.50	0	1	1
White	0.45	0.50	0	1	1
Black	0.19	0.39	0	1	1
Asian	0.06	0.24	0	1	1
Hispanic	0.29	0.45	0	1	1
Kessler Distress 6	1.94	0.98	0	1	1
Work Lost Days	4.12	18.58	0	365	365
Wage	16296.5	27465.0		731,653	731,653
Poor Physical Health	0.07	0.25	0	1	1
Pain	0.47	1.47	0	1	1
Poor Mental Health	0.06	0.24	0	1	1
Joint Pain	0.81	1.48	0	1	1
Family Income	174592.8	139203.7	1	1,228,594	1,228,594
Energy Levels	1.11	0.02	0	1	1
Employment	0.48	0.50	0	1	1
Asthma	1.88	0.57	0	1	1
Arthritis	0.97	1.37	0	1	1
Ambulatory Care	0.06	0.24	0	1	1
Age 25-34	0.13	0.34	0	1	1
Age 35-44	0.13	0.34	0	1	1
Age 45-54	0.13	0.34	0	1	1
Age 55-64	0.10	0.30	0	1	1
Public Insurance	0.28	0.45	0	1	1
Private Insurance	0.47	0.50	0	1	1
PY Private insurance	0.06	0.23	0	1	1
Less than H.S	0.36	0.48	0	1	1
HS Diploma	0.22	0.41	0	1	1
Some College	0.16	0.37	0	1	1
BA	0.10	0.29	0	1	1
BA +	0.05	0.22	0	1	1
Midwest	0.19	0.40	0	1	1
South	0.38	0.49	0	1	1
West	0.27	0.45	0	1	1
Northeast	0.15	0.36	0	1	1
<b>Notes:</b>					
Number of Observations = 559,360					
HS = Highschool					
BA = College Degree (+ = graduate school)					
Age = chronological age in years					
PY = Plan Year					

**Table 1: Marginal Effects of recession on self-reported Poor Mental Health, 2001-2010.**

Male :	-0.003
Female:	-0.005
White:	-0.003
Black:	-0.01 ***
Asian:	-0.018 ***
Hispanic:	0.0033
Observations	158,266
<b>Source:</b> Medical Expenditure Panel Survey (MEPS).	
<b>Notes:</b> Adults only. * = p < 0.1, **=p<0.05,***=p<0.01	

**Table 2: Marginal Effects of recession on wage from, 2001-2010.**

Male :	-260.7 *
Female:	-1273.3 *
White:	-555.6 *
Black:	-1428.9 *
Asian:	253.3 *
Hispanic:	-1728.8 *
Observations	158,266
<b>Source:</b> Medical Expenditure Panel Survey (MEPS).	
<b>Notes:</b> Adults only. * = p < 0.1, **=p<0.05,***=p<0.01	

**Table 3: Marginal Effects of recession on number work loss days from, 2001-2010 .**

Male :	-0.09 **
Female:	-0.26 **
White:	-0.25 **
Black:	0.46 **
Asian:	-0.04 **
Hispanic:	-0.39 **
Observations	132,933
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS).
<b>Notes:</b>	Adults only. * = p < 0.1, **=p<0.05,***=p<0.01

**Table 4: Marginal Effects of recession on self-reported poor physical health from, 2001-2010.**

Male :	-0.72 ***
Female:	-1.83 **
White:	-0.002 **
Black:	-4.1 **
Asian:	-1.67 **
Hispanic:	1.89 **
Observations:	158,266
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS).
<b>Notes:</b>	Adults only. * = p < 0.1, **=p<0.05,***=p<0.01

**Table 5: Marginal Effects of recession on self-reported pain levels from, 2001-2010.**

Male :	-0.004
Female:	-0.008
White:	0.0007
Black:	-0.013
Asian:	-0.024
Hispanic:	-0.006
Observations	156,991
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS).
<b>Notes:</b>	Adults only. * = $p < 0.1$ , **= $p < 0.05$ , ***= $p < 0.01$

**Table 6: Marginal Effects of recession on self-reported Joint Pain from, 2001-2010.**

Male:	-0.02	***
Female:	-0.03	***
White:	-0.019	***
Black:	-0.013	***
Asian:	-0.048	***
Hispanic:	-0.046	***
Observations:	158,266	
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS).	
<b>Notes:</b>	Adults only. * = $p < 0.1$ , **= $p < 0.05$ , ***= $p < 0.01$	

**Table 7: Marginal Effects of recession on family income from, 2001-2010.**

Male :	31323.7 *
Female:	31141.3 *
White:	35153.6 *
Black:	20495.6 *
Asian:	18644.9 *
Hispanic:	27044.7 *
Observations	158,266
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS).
<b>Notes:</b>	Adults only. * = $p < 0.1$ , **= $p < 0.05$ ,***= $p < 0.01$

**Table 8: Marginal Effects of recession on self-reported energy levels from, 2001-2010.**

Male :	-0.05 **
Female:	-0.01 **
White:	-0.0007
Black:	-0.13 **
Asian:	-0.06 **
Hispanic:	-0.0142 ***
Observations	137,266
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS).
<b>Notes:</b>	Adults only. * = $p < 0.1$ , **= $p < 0.05$ ,***= $p < 0.01$

**Table 9: Marginal Effects of recession on employment from, 2008-2010.**

Male :	0.004
Female:	0.00005
White:	0.0035
Black:	0.00061
Asian:	-0.005
Hispanic:	-0.0003
Observations	158,266
<p><b>Source:</b> Medical Expenditure Panel Survey (MEPS).</p> <p><b>Notes:</b> Adults only. * = p &lt; 0.1, **=p&lt;0.05,***=p&lt;0.01</p>	

**Table 10: Marginal Effects of recession on number of Asthma diagnosis recorded from, 2008-2010.**

Male:	-0.024	***
Female:	0.009	
White:	-0.004	
Black:	0.004	
Asian:	-0.04	***
Hispanic:	-0.25	*
Observations:	158,185	
<p><b>Source:</b> Medical Expenditure Panel Survey (MEPS).</p> <p><b>Notes:</b> Adults only. * = p &lt; 0.1, **=p&lt;0.05,***=p&lt;0.01</p>		

**Table 11: Marginal Effects of recession on number of arthritis diagnosis recorded from, 2001-2010.**

Male :	-0.017 ***
Female:	-0.002
White:	-0.01 ***
Black:	-0.003
Asian:	-0.27 **
Hispanic:	-0.24 **
Observations	68,549
<b>Source:</b>	
Medical Expenditure Panel Survey (MEPS).	
<b>Notes:</b>	Adults only. * = p < 0.1, **=p<0.05,***=p<0.01

**Table 12: Marginal Effects of recession on number of ambulatory visits for mental health recorded from, 2001-2010.**

Male :	-0.002
Female:	-0.005
White:	-0.0006
Black:	-0.01 ***
Asian:	-0.01 ***
Hispanic:	-0.0009
Observations	158,266
<b>Source:</b>	
Medical Expenditure Panel Survey (MEPS).	
<b>Notes:</b>	Adults only. * = p < 0.1, **=p<0.05,***=p<0.01

**Supplementary Table 1: Marginal Effects of recession on self reported Poor Mental Health from, 2001-2010**

<b>Supplemental Figure 1:</b>	
White Male:	-0.004
Black Male:	-0.01 ***
Hispanic Male:	0.0025
Asian Male:	-0.01 ***
White Female:	-0.002
Black Female	-0.009
Asian Female:	-0.02 ***
Hispanic Female:	0.004
Observations:	158,266
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS). Content last reviewed August 2018. Agency for
<b>Notes:</b>	= p < 0.1, **=p<0.05,***=p<0.01

**Supplementary Table 2: Marginal Effects of recession on wage from, 2001-2010**

<b>Supplemental Figure 2:</b>	
White Male:	-43.3 *
Black Male:	-915.3 *
Asian Male:	-1215.2 *
Hispanic Male:	766.9 *
White Female:	-1055.9 *
Black Female	-1927.9 *
Asian Female:	-245.6 *
Hispanic Female:	-2227.8 *
Observations:	158,266
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS). Content last reviewed August 2018. Agency for
<b>Notes:</b>	= p < 0.1, **=p<0.05,***=p<0.01

**Supplementary Table 3: Marginal Effects of recession on number work loss days from, 2001-2010**

Supplemental Figure 3:	
White Male:	-0.16 *
Black Male:	0.55 *
Asian Male:	-0.31 *
Hispanic Male:	0.04 *
White Female:	-0.34 *
Black Female:	0.37 *
Asian Female:	-0.12 *
Hispanic Female:	-0.48 *
Observations:	132,933
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS). Content last reviewed August 2018. Agency for
<b>Notes:</b>	= p < 0.1, **=p<0.05, ***=p<0.01

**Supplementary Table 4: Marginal Effects of recession on self reported poor physical health from, 2001-2010.**

Supplemental Figure 4:	
White Male:	-0.003
Black Male:	-0.021 *
Asian Male:	-0.01 *
Hispanic Male:	0.003
White Female:	-0.004
Black Female:	-0.017 *
Asian Female:	-0.008
Hispanic Female:	0.007
Observations:	158,266
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS). Content last reviewed August 2018. Agency for
<b>Notes:</b>	= p < 0.1, **=p<0.05, ***=p<0.01

**Supplementary Table 5: Marginal Effects of recession on self reported pain levels from, 2001-2010.**

<b>Supplemental Figure 5:</b>	
White Male:	-0.003
Black Male:	-0.02 ***
Hispanic Male:	-0.01 ***
Asian Male:	-0.02 ***
White Female:	0.005
Black Female:	-0.01 ***
Asian Female:	-0.02 ***
Hispanic Female:	-0.002
Observations:	156,991
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS). Content last reviewed August 2018. Agency for
<b>Notes:</b>	= p < 0.1, **=p<0.05,***=p<0.01

**Supplementary Table 6: Marginal Effects of recession on self reported Joint Pain from, 2001-2010.**

<b>Supplemental Figure 6:</b>	
White Male:	-0.01 ***
Black Male:	-0.007
Hispanic Male:	-0.04 ***
Asian Male:	-0.04 ***
White Female:	-0.02 ***
Black Female:	-0.01 ***
Asian Female:	-0.05 **
Hispanic Female:	-0.05 **
Observations:	158,266
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS). Content last reviewed August 2018. Agency for
<b>Notes:</b>	= p < 0.1, **=p<0.05,***=p<0.01

**Supplementary Table 7: Marginal Effects of recession on family income from, 2001-2010.**

Supplemental Figure 7:	
White Male:	35246.1 *
Black Male:	20500.1 *
Hispanic Male:	27137.2 *
Asian Male:	10737.4 *
White Female:	35063.7 *
Black Female:	20405.7 *
Asian Female:	26954.8 *
Hispanic Female:	18555.1 *
Observations:	158,266
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS). Content last reviewed August 2018. Agency for
<b>Notes:</b>	= p < 0.1, **=p<0.05,***=p<0.01

**Supplementary Table 8: Marginal Effects of recession on self reported energy levels from, 2001-2010.**

Supplemental Figure 8:	
White Male:	-0.03 ***
Black Male:	-0.16 *
Hispanic Male:	-0.04 ***
Asian Male:	-0.08 **
White Female:	0.01 ***
Black Female:	-0.11 *
Asian Female:	-0.04 ***
Hispanic Female:	0.008
Observations:	137,266
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS). Content last reviewed August 2018. Agency for
<b>Notes:</b>	= p < 0.1, **=p<0.05,***=p<0.01

**Supplementary Table 9: Marginal Effects of recession on employment from, 2001-2010.**

Supplemental Figure 9:	
White Male:	0.005
Black Male:	0.002
Hispanic Male:	0.002
Asian Male:	-0.003
White Female:	0.001
Black Female:	-0.001
Asian Female:	-0.007
Hispanic Female:	-0.002
Observations:	158,266
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS). Content last reviewed August 2018. Agency for
<b>Notes:</b>	= p < 0.1, **=p<0.05,***=p<0.01

**Supplementary Table 10: Marginal Effects of recession on number of Asthma diagnosis recorded from, 2001-2010.**

Supplemental Figure 10:	
White Male:	-0.02 ***
Black Male:	-0.01 ***
Hispanic Male:	-0.04 ***
Asian Male:	-0.05 *
White Female:	0.01 ***
Black Female:	0.02 ***
Asian Female:	-0.008
Hispanic Female:	-0.02 ***
Observations:	158,185
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS). Content last reviewed August 2018. Agency for
<b>Notes:</b>	= p < 0.1, **=p<0.05,***=p<0.01

**Supplementary Table 11: Marginal Effects of recession on number of arthritis diagnosis recorded from, 2001-2010.**

Supplemental Figure 11:	
White Male:	-0.002
Black Male:	0.003
Hispanic Male:	-0.17 *
Asian Male:	0.34 *
White Female:	-0.17 *
Black Female:	-0.01 ***
Hispanic Female:	-0.03 ***
Asian Female:	0.02 ***
Observations:	60,549
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS). Content last reviewed August 2018. Agency for
<b>Notes:</b>	= p < 0.1, **=p<0.05,***=p<0.01

**Supplementary Table 12: Marginal Effects of recession on number of ambulatory visits recorded from, 2001-2010.**

Supplemental Figure 12:	
White Male:	0.001
Black Male:	-0.01 ***
Hispanic Male:	-0.007
Asian Male:	-0.01 ***
White Female:	-0.002
Black Female:	-0.01 ***
Hispanic Female:	-0.01 ***
Asian Female:	-0.01 ***
Observations:	158,266
<b>Source:</b>	Medical Expenditure Panel Survey (MEPS). Content last reviewed August 2018. Agency for
<b>Notes:</b>	= p < 0.1, **=p<0.05,***=p<0.01

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