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HEALTH AND HEALTH BEHAVIORS DURING THE WORST OF TIMES

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ABSTRACT

Previous studies have shown that recessions are typically associated with better health and health behaviors. However, majority of these studies use data from the periods of relatively milder economic downturns that predate the "Great Recession." In this paper, we examine the relationship between measures of macroeconomic conditions and a large set of outcomes of health and health behaviors using data from BRFSS between 1990 and 2014 with an emphasis on the period enveloping the Great Recession. Our results provide some support for the notion that weaker macroeconomic conditions are positively associated with health related outcomes, although the evidence is stronger for some of the outcomes (e.g., smoking and physical exercise) than others and is not present for some of the other outcomes (e.g., experiencing poor mental health) at all. But overall, the estimates are too small and imprecisely estimated to have any meaningful implications. Furthermore, the estimates become weaker over time and largely disappear in years prior to the period of the Great Recession and continues to remain small during periods enveloping the recession and the afterwards. Overall, we found no evidence that the Great Recession had a significant influence on the existing trends in health and health behaviors.

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I. Introduction

The most recent recession in the United States, commonly referred to as the "Great Recession," differs significantly from any other economic crisis since World War II, and closely resembles the Great Depression, particularly in terms of its severity and duration. The recession, which lasted for 18 months, officially ended in June 2009, but the recovery had been slow, particularly in job creation with the unemployment rate remaining at a stubbornly high level until recently. According to the Bureau of Labor Statistics, between 2007 and 2010, the average unemployment rate more than doubled from 4.6 percent to 9.6 percent. During the same period, the employment rate decreased from 63 percent to 58.5 percent and approximately 5.2 million individuals left the labor force.[1]

The fact that the recent economic downturn was both deeper and longer than the previous recessions prompts an important question: to what extent has the Great Recession affected health and health behaviors of Americans, and has the rising unemployment or decreasing employment experienced during the Great Recession had a different effect on these outcomes than in previous recessions? Although there is an extensive literature on the relationship between economic conditions and health outcomes, the coverage period of the majority of existing studies predate the period of Great Recession. But it is not clear whether the findings from these studies can serve as a reliable guide to the relationship in more recent years for several reasons. First, the sharp rise in unemployment and poor prospects of re-employment experienced during the Great Recession may have led to an unprecedented number of Americans struggling with financial strain. Consequently, the poverty rate rose sharply from 12.5 percent to 15 percent between 2007 and 2011 (U.S. Census Bureau 2012). Furthermore, the caseload for the Supplemental Nutrition

[1] See http://www.bls.gov/cps/cpsaat01.pdf.

Assistance Program (SNAP) reached record levels, with about one in seven Americans participating in the program in 2011 (U.S. Department of Agriculture 2012). Second, the collapse of the United States housing market in the same period and the subsequent decline in the housing prices caused foreclosure rates to rise to historically high levels, further creating a difficult burden on the lives of millions of Americans. As a culmination of a period of financial strain, foreclosure often represents both a highly stressful event and a major shock to family wealth, effects of which might be exacerbated by high unemployment rates during a recession (Currie and Tekin 2015). Third, there was a sharp decline in the proportion of the population with employer-sponsored health insurance during the Great Recession, driven by the significant loss of employment during that time (e.g., Cawley et al. 2011, Holahan 2011, White and Reschovsky 2012). According to Cawley et al. (2011), the number of Americans who lost health insurance during the Great Recession was about nine times higher than the number who lost insurance during the previous [2001] recession. Finally, the recession took a particularly significant toll on local governments and their health departments across the United States, undermining their capacity to provide critical core public health services for local communities (Willard et al. 2012). Therefore, it is not clear whether one can make inferences from the studies of earlier periods that would reliably apply to the most recession and the years since then.

This paper provides a fresh look at the relationship between macroeconomic conditions and health and health behaviors. We use individual level data from the Behavioral Risk Factor Surveillance System (BRFSS) to examine the relationship between macroeconomic conditions and individuals' health risk behaviors between 1990 and 2014. The range of outcome measures we consider include modifiable health behaviors pertaining to smoking, alcohol consumption, and physical activity, as well as self-reported general physical and mental health. While the

BRFSS was used previously to study the relationship between unemployment and health outcomes of individuals, our study is novel in terms of studying a large set of outcomes reflecting both health and health behaviors for a period that leads up to, coincides with, and follows the Great Recession. Furthermore, the previous studies usually rely on aggregate unemployment rate as the proxy for the business cycle.[2] In our analysis, we provide evidence from two measures to capture macroeconomic conditions. The first measure is state unemployment as utilized by the extant literature. The second measure that we use is the employment rate, measured by the percentage of the state population who has a job. This measure is potentially important because one of the key developments during the Great Recession and the period that follows was the sharp rise in the number of people who have left the labor force after losing hope of finding a job. Therefore, an analysis relying solely on changes in the unemployment rate may not properly reflect a state's economic condition. For example, an improvement in the economic outlook may cause discouraged workers who had left the labor force earlier to re-enter, leading to an increase in the unemployment rate or a prolonged period of high unemployment. Conversely, a decrease in unemployment may reflect that individuals are leaving the labor market after giving up hope of finding a job, rather than improving economic conditions. However, despite these points it turns out that our results are extremely consistent between these two measures.

Our analysis also has the potential to provide useful information from a policy perspective. According to data from the National Health Expenditure Accounts, the health care spending represents a significant and increasing burden on the U.S. economy, accounting for 17.5 percent of the nation's annual gross domestic product (Centers for Medicare & Medicaid

[2] Several exceptions to this include Ruhm (1995; 2000; 2005), who employ measures of employment rate.

Services, 2016). If, in fact, the sharp increase in unemployment during the Great Recession had an adverse effect on health and, therefore is partially responsible for the rise in health care costs, then this information could provide further basis for government interventions to reduce the unemployment rate or mitigate its effects, including the American Jobs Act and expansions in the Unemployment Insurance Program.

II. Literature

There is a sizeable literature examining the relationship between macroeconomic fluctuations and health. In a widely cited study, Ruhm (2000) found that mortality and morbidity in the United States follow a pro-cyclical pattern, i.e., they both worsen when the economy temporarily improves. This finding was largely confirmed by a series of follow-up studies by Ruhm (e.g., Ruhm 2003, Ruhm 2005, Ruhm 2007) and was echoed by others as well (e.g., Dehejia and Lleras-Muney 2004). To a large extent, a similar pattern was also established for other countries (e.g., Neumayer 2004, Granados 2005, Gerdtham and Ruhm 2006, Ásgeirsdóttir et al. 2014).

Motivated by a desire to explain the mechanisms for the pro-cyclicality in mortality, this finding has spawned a new wave of research focusing on the relationship between macroeconomic conditions and health behaviors. The overall finding from these studies is that health behaviors mostly improve during economic downturns. One common explanation offered for this finding was that recessions lead to changes in certain life styles, which are health promoting. In particular, it was argued that work itself is stressful and a reduction in time at work may reduce the prevalence of stress-induced illness as well as make more time available for salutary behaviors, such as exercise and healthy dieting (e.g., Catalano, Goldman-Mellor et al. 2011). For example, Ruhm (2005) used data from the BRFSS between 1987 and 2000 and found

that changes in health behaviors represent a key mechanism for the pro-cyclical variation in mortality and morbidity observed in the literature. In particular, he showed that smoking and excess weight decline during temporary economic downturns, while leisure-time and physical activity increase. In another study, Ruhm and Black (2002) used data from 1987 to 1999 waves of the BRFSS to show that alcohol consumption decreased in bad economic times. The authors concluded that any stress-induced increases in alcohol consumption during recessions were more than offset by income effects.[3]

More recently, Xu (2013) combined health data from the BRFSS between 1984 and 2005 and the National Health Interview Survey (NHIS) between 1976 and 2001 along with employment data from the Current Population Survey (CPS) to examine the relationship between wages and hours of work on health behaviors of low-educated individuals. He found that higher wages and hours of work tied to economic expansions were associated with increased smoking and decreased physical activity. His study also provided evidence suggesting that economic downturns may have heterogeneous effects on health behaviors based on the extent to which behaviors are time-intensive.

Studies using data sources other than the BRFSS usually reach similar conclusions, although the consensus appears to be less robust and the findings to be more sensitive to the time period considered. For example, Ettner (1997) used data from the 1988 National Health Interview Survey (NHIS) and found that non-employment significantly reduced both alcohol consumption and dependence symptoms, possibly due to an income effect. Ásgeirsdóttir et al. (2014) examined the effect of the October 2008 economic crisis in Iceland on a range of health

[3] In contrast, Dee (2001) finds that the prevalence of binge drinking is strongly counter-cyclical using data from the BRFSS over the period of 1984-1995. Ruhm and Black (2002) offer a number of explanations for the contradictory finding in Dee (2001), including the relatively small number of states contained in the BRFSS in early years and the lack of sampling weights in the analysis performed in Dee (2001).

behaviors and found that the crisis led to reductions in health-compromising behaviors, including smoking, heavy drinking, consumption of sugared soft drinks and fast food, and indoor tanning. Furthermore, they documented that the crisis reduced consumption of fruits and vegetables, but increased consumption of fish oil and getting recommended hours of sleep. The authors also argued that these behavioral changes were explained by increases in prices during the crisis. On the other hand, Böckerman et al. (2007) explored the relationship between weight and economic conditions using Finnish data from the period of 1978-2002. They found that an improvement in economic conditions, measured by the regional unemployment rates, resulted in a decrease in Body Mass Index (BMI). Similarly, Charles and DeCicca (2008) used data from the NHIS for the years 1997-2001 to document evidence of a pro-cyclical relationship for weight-related health and mental health among men.

Most recently, several studies documented that the pro-cyclical relationship between macroeconomic conditions and mortality obtained in earlier studies might be weakening. For example, Ruhm (2015a) revisited the aggregate mortality and unemployment relationship using data from multiple sources over the period between 1976 and 2010. He found that the strong procyclical pattern of mortality present in the 1970s and 1980s has largely disappeared or even become countercyclical in recent years. One exception to this is the deaths from cardiovascular disease and transport accidents. Interestingly, Ruhm (2015a) showed that the decline in the procyclicality of mortality began long before the Great Recession and in fact increased slightly in the recession. In another recent study, Ruhm (2015b) extended the analysis period to 2013 and confirmed the earlier findings of a declining procyclical fluctuation in U.S. mortality. Furthermore, this analysis also revealed that the two severe economic crises occurring at the beginning of1980s and the Great Recession both had a protective effect on mortality that was

about twice as large as that estimated by the higher unemployment rates experienced during such periods alone.

Relatedly, McInerney and Mellor (2012) examined the relationship between recessions and seniors' health and health behaviors using data from the Medicare Beneficiary Survey. They found that the relationship between unemployment and mortality of the elderly was negative for the analysis period of 1976-1991, but positive for the period of 1994-2008.

It is important to stress that the existing evidence was largely built on information that predates the period of the Great Recession, with the exception of the two recent Ruhm studies mentioned above and a handful other studies (e.g., Macy et al. 2013; Colman and Dave 2013, 2014). Macy et al. (2013) used data from a county in Indiana to study the health behaviors of individuals between 2005 and 2011. The authors found that financial strain reported during the great recession had a negative impact on a range of health behaviors overall. Colman and Dave (2013) examined the relationship between unemployment and physical activity using data from the American Time Use Survey. Using within-state variation in employment and unemployment, the authors found that recreational exercise increased during recessions as employment decreased. In addition, they also found that individuals substituted into television watching, sleeping, childcare, and housework. In a follow up study, the same authors studied the effects of individual experience of unemployment on a range of health behaviors during the most recent recession using data from the Panel Study of Income Dynamics and the National Longitudinal Survey of Youth 1979 (Colman and Dave 2014). Their findings were largely consistent with prior studies based on cross-sectional data, i.e. becoming unemployed was associated with a small increase in leisure-time exercise and in body weight, a moderate decrease in smoking, and a substantial decline in total physical activity.

III. Data

The Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System (BRFSS) is an on-going health survey system tracking the health conditions and risk behaviors in the United States since 1984. Steadily expanding from 15 states in 1984, the BRFSS is a representative telephone survey that currently provides coverage of all 50 states and the District of Columbia. Over the course of each year, the BRFSS contacts over 200,000 individuals to create a repeated annual cross section. The present study focuses on the period from 1990 to 2014, for which the sample size totals around 2.36 million individuals after limiting the analysis to individuals ages 25 to 55 and excluding missing observations on key variables.[4] Descriptive statistics for the health behaviors and all of our covariates are presented in Table 1.

Measures of Macroeconomic Conditions

Our first measure of economic conditions is the state unemployment rate. This measure is obtained from the Local Area Unemployment Statistics (LAUS) of the Bureau of Labor Statistics (BLS). As shown in Table 1, the average state unemployment rate was 6.3 percent during our analysis period. We take the average of this measure over a three-month period because contemporaneous values might not reflect the true economic conditions in a state, but rather capture short-term fluctuations.[5] This is similar in principle to the approach in studies using annual data, which basically smooth over a 12-month period.

Our second measure is based on the percentage of individuals employed at the state level, again averaged over a three-month period. In particular, we construct the average percentage of the civilian non-institutionalized state population (aged 16 and over) employed during the three

[4] Note however that the sample size for each regression slightly differs from the baseline sample size due to the number of observations in the outcome variables.

[5] Note that we also estimate our models using one-month-lagged measures of these variables. These results produced estimates that are very similar to those presented in this paper and are available from the authors upon request.

months ending with the survey month.[6] This measure is also available from the BLS's LAUS. As illustrated in Table 1, the average state employment rate was 61.3 percent during our analysis period.

Outcome Variables

Topics included in BRFSS provide an extensive overview of a respondent's current health, health history, and health behaviors. Current health questions range from broad ones, such as those asking about general health, to specific ones, such as questions asking if the respondent snores. Included in this range are questions regarding smoking and drinking behavior, stress, and mental health. In addition to detailed health questions, the BRFSS provides information on the typical demographic characteristics of its respondents.

We focus on smoking behavior as the first domain of outcomes in our study. The "Current Smoker" outcome is an indicator variable equal to 1 if the respondent is a current smoker, and 0 otherwise. BRFSS provides information on the smoking behavior based on whether the respondent smokes daily, some days, is a former smoker, or has never smoked. The current smoker variable indicates whether the respondent smokes daily or some days. Similarly, "Daily Smoker" indicates whether the respondent smokes every day. In the past, smoking has typically been considered a normal good and has exhibited a pro-cyclical pattern (Bobak, Jha et al. 2000, Ruhm 2000). However, the prevalence of tobacco use has changed dramatically in the United States in the past few decades and emerging evidence suggests that it might have shifted from being normal good to an inferior good (Cheng and Kenkel 2010; Kenkel et al. 2014). As shown in Table 1, about 23 percent of our sample reported being a current smoker and 18 percent reported being a daily smoker.

[6] These measures closely follow those used by Ruhm (2005).

Our next set of outcomes is related to alcohol consumption. Specifically, we examine three measures of alcohol use: being a current drinker, binge drinking, and chronic drinking. The outcome of being a "current drinker" measures overall alcohol use, with any reported use over the past month resulting in a value of 1. Being a "binge drinker" is measured by an indicator, which takes on the value of 1 if the respondent drank more than five servings of alcohol in one sitting during the previous month, and 0 otherwise. Lastly, the "chronic drinking" is defined as a binary indicator for drinking more than 60 alcoholic beverages per month. The evidence on alcohol use during the economic cycle is also mixed. A number of studies found pro-cyclical effects (Ruhm and Black 2002, Johansson et al. 2006) while others have found no relationship (Ogwang and Cho 2009) or even an increase in alcohol use during economic turmoil (Cotti et al. 2013). While the evidence on overall alcohol use is mixed, it has been suggested that heavy and light drinkers might exhibit an opposite response to poor economic conditions, with heavy drinkers reducing consumption and light drinkers slightly increasing consumption (Ruhm and Black 2002). On average, 59 percent of our sample report drinking at least alcoholic beverage in a month. The prevalence of binge and chronic drinkers are about 16 and 6 percent, respectively.

In addition to changes in consumption patterns of potentially harmful products, the economic cycle can also affect physical activity patterns and dieting. We examine this potential channel through the "Physical Activity" and "Obesity" outcomes. In the BRFSS, the respondents are asked: "During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?" If the respondent reported any physical activity in the past 30 days other than that which he or she does while working, we defined a "Physical Activity" indicator that takes on the value of 1, and otherwise 0. Similarly, the "Overweight," "Obese," and "Severely Obese"

outcomes are indicator variables equal to 1 if the respondent's self-reported height and weight result in a Body Mass Index greater than 25, 30, and 35, respectively.[7] As shown in Table 1, approximately 76 percent of sample respondents reported having engaged in physical activity, while the proportion of the sample who is overweight, obese, and severely obese is 60, 24, and 9 percent, respectively.

The outcome variables thus far have measured potential channels through which the business cycle can affect health. Our next set of outcomes measures the respondent's reported health directly. The outcome of "General Health" captures the respondent's overall general health at the time of the interview. While the original response is a categorical variable on a Likert scale from 1 to 5, we condense respondent's answers to a binary variable equal to 1 if the respondent is in very good or excellent health, and 0 otherwise. Likewise, the outcomes of "Excellent Health" and "Poor Health" are indicators if the respondent reports being in excellent or poor health, respectively. We also have an outcome to represent those individuals who report being in either "poor" or "fair" health. The next two outcomes focus on the respondent's mental well-being, which includes stress, depression, and problems with emotions over the 30 days preceding the interview. These outcomes are measured by indicator variables equal to 1 if the respondent reports poor mental health for more than 10 or 20 days in the past month, and 0 otherwise. About 87 percent of our respondents were in either good or excellent health. The proportions of our sample in excellent and poor health were 24 percent and 3 percent, respectively. Finally, approximately 14 percent of our sample reported having mental health problems for at least 10 days in the past 30 days, while eight percent reported having such problems for at least 10 days during that period.

[7] Body Mass Index is calculated as the ratio of weight in kilograms and height in meters squared.

Finally, we also supplement our analysis with a set of explanatory variables including binary indicators representing age, gender, race and ethnicity, marital status, and education.

IV. Empirical Method

We estimate a series of regressions that relate changes in health and health behaviors to macroeconomic conditions along with a vector of individual level characteristics. Specifically, our basic empirical model is in the following form:

$$H_{ismy} = \alpha_0 + \alpha_1 E_{smy} + \mathbf{X}_{ismy}\alpha_2 + \mu_s + \delta_m + \lambda_y + \rho_s y + \varepsilon_{ismy}\,, \qquad (1)$$

where H_{ismy} is one of our outcome measures for individual *i* living in state *s* interviewed in month *m* of year *y*. The vector $\mathbf{X}_{ismy}$ represents exogenous individual characteristics displayed in Table 1. The variable of interest in equation (1) is E_{smy}, one of the two measures of state level macroeconomic conditions.

In equation (1), we also control for state fixed effects, μ_s, which would account for permanent differences across states that may affect health and health behaviors, such as lifestyles associated with weather patterns, persistent smoking propensities, and state infrastructures on health care and education. Therefore, the identification of α_1 in equation (1) comes from within state variation in economic conditions over time, rather than fluctuations across states. The δ_m is a vector of month fixed effects, which accounts for the impact of seasonality that may exist in some of the health behaviors such as physical activity (Ruhm 2005). We also control for year fixed effects, λ_y, which would capture nationwide trends and shocks that may influence health behaviors, such as national fluctuations in food and cigarette prices, calorie content in national chain restaurants, the reduction in payroll tax in 2010, and federal regulations related to health. We further control for confounding factors that may trend linearly by adding a vector of state-specific linear time trends denoted by $\rho_s y$. Adding state-specific linear time trends help us

account for unobserved factors that vary within states over time, such as social norms related to health behaviors like smoking and exercise. These trends also help us control for other state level time-varying factors such as changes in health care delivery services that closely follow tax revenues. The ε_{ismy} is an idiosyncratic random error term. We estimate linear probability models using Ordinary Least Squares (OLS) and report robust standard errors clustered at the state level. All the regressions are weighted using the BRFSS sampling weights.[8]

Estimating equation (1) would shed light into the relationship between macroeconomic conditions and the outcome variables, but it would not provide any insights into our main question, i.e., whether this relationship has changed over time with a special emphasis on the period enveloping the Great Recession. We implement two methods to get at this question. First, we augment equation (1) by adding a binary variable indicating whether the observation belongs to a period that coincides with the Great Recession. This specification is similar to the one estimated by Ruhm (2005), which examines the impact of severe national recessions along with the effect of unemployment rate. In this specification, the estimate on the Great Recession indicator reveals whether the recession had any impacts on health and health behaviors beyond those expected due to the associated higher rates of unemployment (or lower rates of employment). We also go beyond this specification by estimating regressions with a binary indicator for Great Recession as well as an interaction between this indicator and each of our measure of macroeconomic conditions. In these specifications the year fixed effects, λ_y, must be excluded in order to avoid perfect collinearity. Thus, these estimates should be viewed with caution due to potential omitted variable bias.[9]

[8] Note that we also estimate unweighted regressions. These results are similar to those presented here and are available from the authors upon request.

[9] Note that the beginning and end dates for state-level recessions are harder to define and we are aware of no reliable source to gather that information accurately. While the depth and the duration of the recession vary considerably

Second, we turn our attention to our second and also the main strategy, in which we estimate equation (1) for different periods and observe how the predicted impact of macroeconomic conditions evolve over time. Following Ruhm (2015ab), we implement this analysis using differing starting dates and varying lengths of analysis periods. Furthermore, we also estimate models in which we keep the analysis period fixed, but sequentially move the sample window to cover all years between 1990-2014 using sample window periods of 5-year, 10-year, and 15-year. These analyses allow us to see how the pattern in the relationship between macroeconomic conditions and health and health behaviors has evolved over time and between periods that occurred prior to, during, and after the Great Recession.

V. Results

Table 2 presents the estimates of the relationship between state unemployment rate and health and health behaviors from equation (1). The first column corresponds to estimates from a specification with state, month, and year fixed effects along with time-variant state characteristics. The second column adds state-specific linear time trends to the list of controls in column 1. Robust standard errors clustered at state level are shown in parentheses.[10]

The emerging pattern from Table 2 is that the coefficients are mostly small in magnitude and imprecisely estimated, and this pattern is largely consistent between columns 1 and 2. Focusing on the estimates in column 2, in which we account for unobserved differences across states that trend linearly, the only coefficients that are estimated with precision are those of the two smoking variables and both of them correspond to relatively small effect sizes. In particular,

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across states, we adopt the official dating scheme determined by the National Bureau of Economic Research in order to avoid arbitrariness. Our results are largely robust to alternative dating schemes. Nevertheless, the potential discrepancy between the timing of the Great Recession experienced nationwide and state-specific recessions experienced around the same period.

[10] We symbolize statistical significance at the 95 and 99 percent levels of confidence. The estimates on other control variables are consistent with those found in the relevant literature are available from the authors upon request.

a one-percentage point increase in the state unemployment rate is associated with a 0.469 percentage-point decrease in the likelihood of being a current smoker and a 0.353 percentage-point decrease in the likelihood of being a daily smoker. These point estimates translate into an effect size of approximately 2 percent for both outcomes. The negative relationship between unemployment and smoking behavior obtained here is largely consistent with the previous literature (e.g., Ruhm, 2005). The estimates on the other variables draw a mixed picture in terms of the direction of the relation. For example, chronic drinking appears to be negatively associated with unemployment while being a current drinker or a binge drinker is positively associated. Similarly, the relationship between unemployment rate and being overweight appears to be positive, but it is the opposite for being obese or severely obese. Physical activity has a positive coefficient, suggesting that a rise in unemployment increases physical exercise. The point estimate translates into an effect size of 0.431 percentage point or less than one percent calculated at the sample mean of 0.763.

Regarding the self-reported health outcomes, the evidence in Table 2 is again mixed in terms of the direction of estimates. For example, unemployment rate appears to be negatively associated with both being excellent health and fair to poor health, but the estimates are economically and statistically insignificant in both cases. The pattern is similar for the two mental health outcomes, where the estimates are with opposite sign, but neither is significant nor sizeable. Note that the physical and mental health measures in BRFSS are self-assessed and therefore subject to reporting bias. For example, the response patterns to these questions may be influenced by economic conditions. This reporting bias may be even more severe if the responses of survey participants are also influenced by the physical and mental health of other people close to them. These potential measurement problems may be one reason for the

inconsistency between the findings on health outcomes in our analysis and the procyclical mortality obtained in the literature. Overall, nine of the 15 estimates, including the two statistically significant ones, imply that an increase in unemployment is associated with an improvement in health and health behaviors. Having said that, they are all small in magnitude to have any meaningful implications for any practical purposes.

The results from the estimation of equation (1) with state employment rate are presented in Table 3. Similar to Table 2, the estimates are presented from specifications without and with state-specific linear as shown in columns 1 and 2. Focusing on column 2, the estimates are again small in magnitude and, with the exception of the two smoking outcomes, statistically insignificant, suggesting that the relationship between state employment rate and health and health behaviors is largely inconsequential once observable differences across individuals and states are accounted for. The estimates on smoking variables are consistent with those in Table 2, indicating that employment rate and the prevalence of smoking appears to be positively related with each other. Although none of the estimates on other health behavior outcomes are significant and sizeable, they appear to point to a pattern of a negative relationship between employment and prevalence of healthy behaviors, i.e., an increase in state employment rate is likely to increase the likelihood of obesity as well as being severely obese, and being a chronic drinker, but likely to decrease engaging in physical activity. While this is consistent with the previous research in general, it is important to stress that all of the coefficients in Table 3 including those of physical and mental health are small and imprecisely estimated.

One possible interpretation of the results presented in Tables 2 and 3 is that the counter-cyclical pattern in health and health behaviors obtained by much of the previous research has become inconsequential when the analysis period is extended to more recent years including the

Great Recession. In order to investigate this possibility further, we next turn our attention to results from models which include a separate indicator for the Great Recession. In the first set of results presented in Tables 4 and 5, we report the estimates on our measures of macroeconomic condition and a binary indicator for the period of Great Recession. As shown in Table 4, the estimates on unemployment rate are very similar to those displayed in Table 2. The coefficients on the Great Recession indicator shown in column 3 reveal no association between our outcomes and the recession. In other words, there are no changes in health and health behaviors during the period of Great Recession that are beyond those captured by an increase in the state unemployment rate. All of the estimates in Table 4 are very small ranging from 0.1 percentage point to 0.6 percentage points, but always imprecisely estimated. The employment rate results shown in Table 5 point to a similar a story. The only statistically significant estimate is for the current drinking model, in which the estimated Great Recession effect is equivalent to a reduction in being current drinker by 0.7 percentage point. However, this effect size is very small for all practical purposes.

Note that our question of main interest is whether the relationship between indicators of macroeconomic conditions and health and health behaviors exhibited a different pattern during the period enveloping the Great Recession. The specification in Tables 4 and 5 show whether the trajectory of outcomes in health and health behaviors considered in this paper changed in this period, but do not really address the question of main interest. In order to shed light into this question, we need to specify an equation that not only contains an indicator for Great Recession, but also an interaction term between this indicator and our measures of macroeconomic conditions. The estimates from this specification are shown in Tables 6 and 7 for the unemployment rate and the employment rate, respectively. The unemployment rate estimates

shown in column 1 are largely consistent with the results from the basic model presented in Table 2. The unemployment rate is negatively associated with both smoking models and the estimates are statistically significant at the five percent level in both cases. Regarding the estimates for the other outcome variables, none are statistically significant, but the overall pattern appears to favor the notion that an increased unemployment is more likely to result in an improvement in health and health behaviors than the opposite. For example, the estimates on chronic drinking, being obese and severely obese, physical exercise, being in fair to poor health and having at least 10 days of poor mental health are all negative, implying that an increase in unemployment is associated with an improvement in these outcomes. Exceptions to this pattern are binge drinking, being overweight, being in at least good health, and experiencing poor mental health for more than 20 days. But it is important to keep in mind that, if anything, the overall evidence in Table 6 is weak and therefore should be interpreted with caution since none of the estimates other than the two that are related to smoking behavior are statistically significant. The estimates on the Great Recession indicator shown in column 3 are again small and imprecise, offering no evidence of a particular recession effect beyond that of anticipated by unemployment.

Next we turn our attention to the interaction coefficients shown in column 5 of Table 6 where we present the estimates on the interaction between the unemployment rate and the Great Recession. First of all, with the exception of four coefficients, all of the estimates on the interaction variables are opposite in sign to those of the unemployment rate variable. This suggests that whatever is the pattern in the relationship between unemployment and health and health behaviors, that pattern is likely to have been mitigated during the period of Great Recession for those outcomes. Moreover, of the fifteen outcome variables considered in the

regressions, 11 of them indicate that the unemployment had an effect in the direction of worsening health and health behaviors during the period coincided with the Great Recession. For example, the interaction coefficient is positive for both smoking variables, implying that any smoking reducing effect of unemployment obtained previously appeared to be mitigated during the Great Recession. A similar dampening effect is also obtained for the outcomes of all three obesity measures, physical activity, being in good and excellent general health, being in fair to poor health, and having more than 10 days of poor mental health. Note that the estimate on fair to poor health is the only one estimated with statistical significance in this group. Among the outcomes exception to this pattern, the only one estimated precisely is being in poor health, which suggest that an increase in unemployment reduced the likelihood of being in poor health during the Great Recession. Although there is no clear explanation for this result, it is noteworthy that the estimate on unemployment for this model shown in column 1 is essentially zero. It is important to keep in mind the potential measurement error in this variable for the reasons mentioned above. This is also the variable with the lowest mean among all the fifteen outcomes, which may make the regression results more sensitive to outliers.

The corresponding estimates for the interaction between the employment rate and the Great Recession are shown in Table 7. Consistent with the results shown in Table 6, the estimates in columns 1 and 5 of Table 7 are discordant in sign with each other in vast majority of cases – 13 out of 15 to be exact. Keeping in mind that most of the estimates continue to remain statistically insignificant, one interpretation of this evidence is that the underlying mechanisms driving the relationship between macroeconomic conditions and health and health behaviors likely worked in different directions during the period of Great Recession. Focusing on the estimates on the interaction terms alone, about half of them point to a positive relationship

between the employment rate and health and health behaviors. Moreover, all of the estimates remain too small to have any meaningful implications.

The overall evidence from Tables 6 and 7 lend some, albeit not strong, support to the notion that a deterioration in macroeconomic conditions as measured by either rising unemployment or decreasing employment is associated with an improvement in health and health behaviors. However, as mentioned earlier, these specifications exclude year fixed effects to avoid perfect collinearity, raising the possibility of omitted variable bias. Thus, we next turn attention to our main set of analyses, which is based on estimating the relationship between macroeconomic conditions and outcomes of interest for different sub-periods, and then exploring whether there are any detectable changes in this relationship in sub-periods that envelops the Great Recession. For ease of exposition, we present the results from these analyses in a series of graphs.

Figure 1A shows the unemployment rate coefficients from regressions in which the analysis period begins in 1990 and ends in years ranging between 1999 and 2014. Similarly, the employment rate coefficients are displayed in Figure 1B. Solid lines represent point estimates and dotted lines show the 95% confidence intervals. It is not surprising that the confidence intervals become narrower over time since the sample size grows as the analysis period is extended. Interestingly however, the estimates get closer to zero not only statistically but also economically in the process and this pattern is present in both Figures 1A and 1B. In other words, the relationship between macroeconomic conditions and health and health behaviors appear to become monotonically smaller over time between 1990 and 2014 regardless of the outcome. Furthermore, the decline in the macroeconomic effect appears to have started in the years prior to the beginning of the Great Recession and remained largely unchanged in the years

following the recession.[11] In addition to this pattern, the estimates have become less volatile over time as they approach closer to zero.

Next, we specify analysis periods of fixed durations and then sequentially estimate models for all alternative sample windows permitted by out data. This analysis is performed using sample window periods of 5-years, 10-years, and 15-years for each of the two measures of macroeconomic conditions. Figures 2A and 2B display the point estimates along with the 95% confidence intervals using 5-year sample windows beginning in the specified year for unemployment and employment rates, respectively. The pattern in these figures imply that although the effects on health and health behaviors fluctuates around zero throughout the period between 1990 and 2014, they steadily diminish and approach to zero over time.

The results using 10-year sample windows shown in Figures 3A and 3B are highly consistent with the pattern observed in the 5-year window analysis, i.e., the relationship between macroeconomic conditions and health and health behaviors becomes weaker and approaches to zero over time for both unemployment and employment rates. The seemingly positive (negative) association between unemployment (employment) for the smoking indicators, overweight and obesity, physical exercise, general health, and fair to poor health indicators observed for early periods of windows disappear rather quickly and fluctuate around zero until getting much closer to zero during the period of Great Recession and afterwards. The relationship is opposite for binge drinking and the two mental health indicators, but follows the same pattern over time as the point estimates diminish and become zero. Note that the coefficients are also less volatile for the 10-year sample windows than the 5-year windows, though we almost always fail to reject the null hypothesis of no macroeconomic effect on health and health behaviors.

[11] One important policy change in the years immediately following the Great Recession is the passage of the Affordable Care Act (ACA) in 2010. One implication of this finding is that the overall pattern of the relationship obtained in our analysis is unlikely to be influenced by the ACA.

Finally, the Figures 4A and 4B display the estimates from sample windows specified at 15-year intervals. The estimates become even smoother in these figures compared to those from 5 and 10-year windows, but they are still imprecisely estimated despite a considerable increase in sample size. This is consistent with Ruhm (2015a) who concludes from his analyses of the relationship between unemployment and mortality using similar methods is that the estimates could be too noisy to be informative when analysis periods are too short.

The results presented so far assume that the relationship between macroeconomic conditions and health and health behaviors is identical for all demographic groups. Such an assumption may obscure potentially important differences in the cyclicality of the relationship across different population groups. We investigated this issue by estimating our models by gender as well as race and ethnicity. In the interest of space, we only display figures for the estimates for unemployment rate for the models in which the analysis period begins in 1990 and ends in years ranging between 1999 and 2014.[12] The results for males and females are shown in Appendix Figures 1A and 1B, and the results for whites, blacks, and Hispanics are displayed in Figures 2A, 2B, and 2C, respectively. The overall pattern obtained in these regressions is strongly consistent with the one from the full sample discussed above. One of the consistent patterns found in the estimations with full sample was the negative relationship between unemployment rate and two smoking indicators and the positive relationship between unemployment rate and the likelihood of physical exercise. Appendix Figures 1A and 1B show that this pattern is largely present among males and not so much among females. Focusing on race and ethnicity results shown in Appendix Figures 2A-2C, the similar pattern is present for the two smoking outcomes among whites and Hispanics, but not for blacks. Furthermore, the

[12] The results from other models are similar and available from the authors upon request.

relationship appears to be reversed for physical exercise among Hispanics with no clear pattern among whites and blacks. However, all of these arguments should be viewed with caution since the vast majority of coefficients are imprecisely estimated. Furthermore, regardless of these potential differences observed in earlier years, the relationship weakens over time and converge towards zero during the period of the Great Recession and in the years afterwards.

V. Conclusion

While the effects of economic conditions on health and health behaviors have been well-studied, the consequences of the Great Recession on these outcomes are not well-understood due to relative paucity of research focusing on this period. Evidence obtained from studies of previous recessions may not be applicable to understanding the effect of the recent recession on health outcomes and health behaviors because the labor market difficulties that individuals experienced during the recent recession were much more severe in this downturn. In this paper, we examine the impacts of macroeconomic conditions as measured by state unemployment and employment rates on a large set of health behaviors and health outcomes using data from BRFSS between 1990 and 2014 with a close attention to the period enveloping the Great Recession.

Our results provide some support for the notion that weaker macroeconomic conditions are positively associated with health and health behaviors, although the evidence is stronger for some of the outcomes (e.g., smoking and physical exercise) than others and is not present for some of the other outcomes (e.g., experiencing poor mental health). But overall, the estimates are too small to have any meaningful implications. Furthermore, any evidence for the counter-cyclical pattern for health and heath behaviors has become weaker over time and largely disappear in the period prior to the Great Recession and remain near zero in the years since. Our Finally, the patterns observed for the full sample largely persist when we split our sample by

gender as well as race and gender. The mechanisms for the potential weakening in the relationship between macroeconomic conditions and health and health behaviors are not well-understood and remains an important question for future research.

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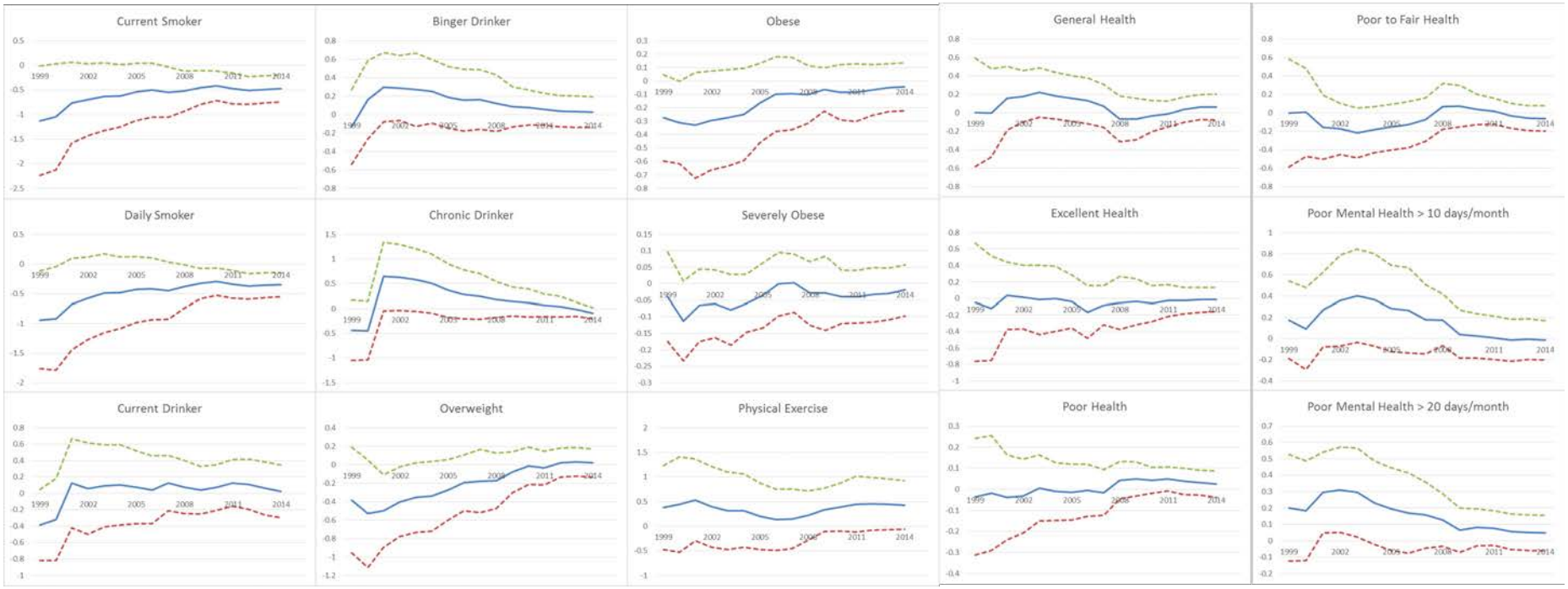
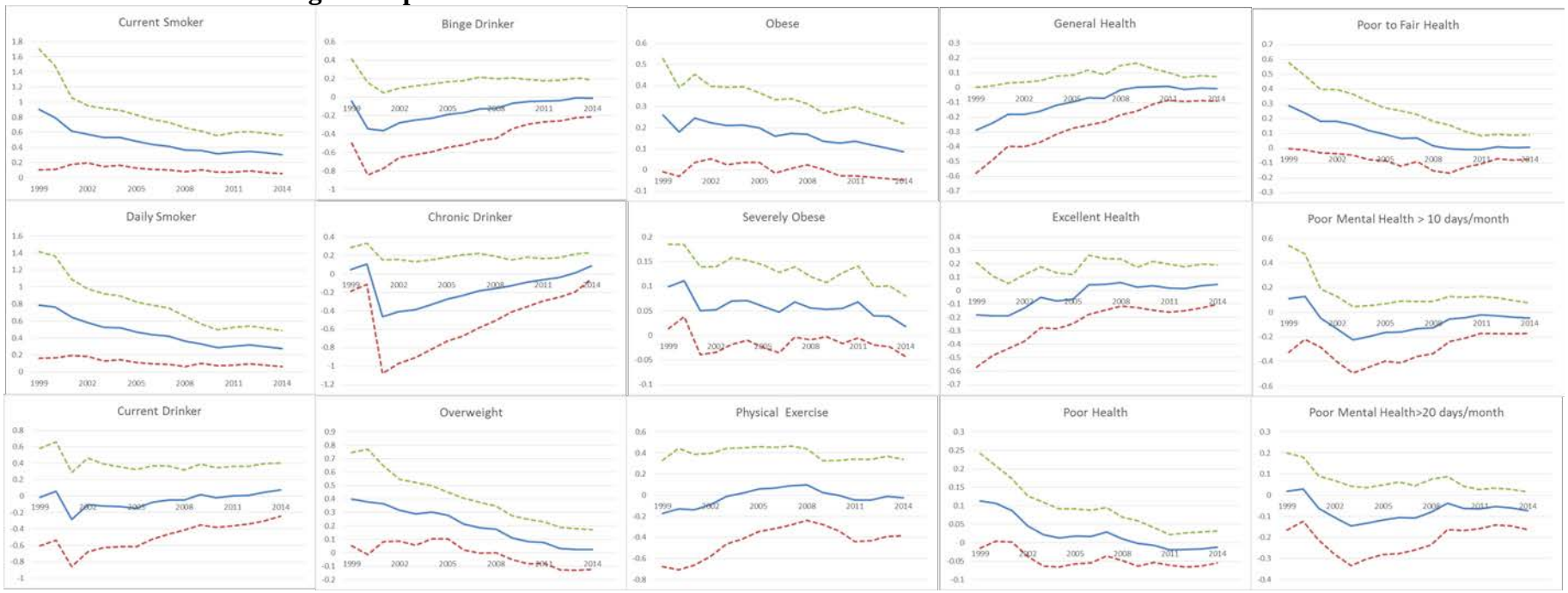
Figure 1A: Changes in the Relationship Between Unemployment and Health and Health Behaviors over Time: Sample Begins in 1990 and Continues through the Specified Year



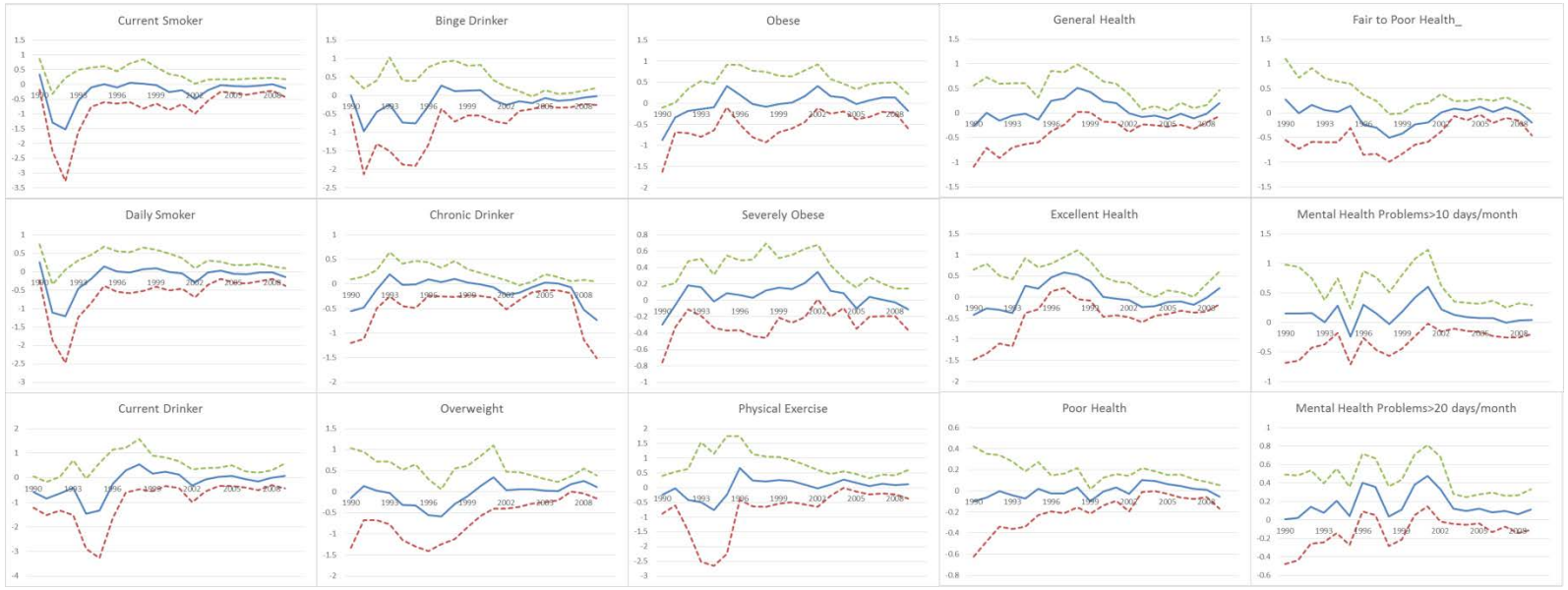
Note: The dotted lines represent the 95% confidence intervals.

Figure 1B: Changes in the Relationship Between Employment and Health and Health Behaviors over Time: Sample Begins in 1990 and Continues through the Specified Year



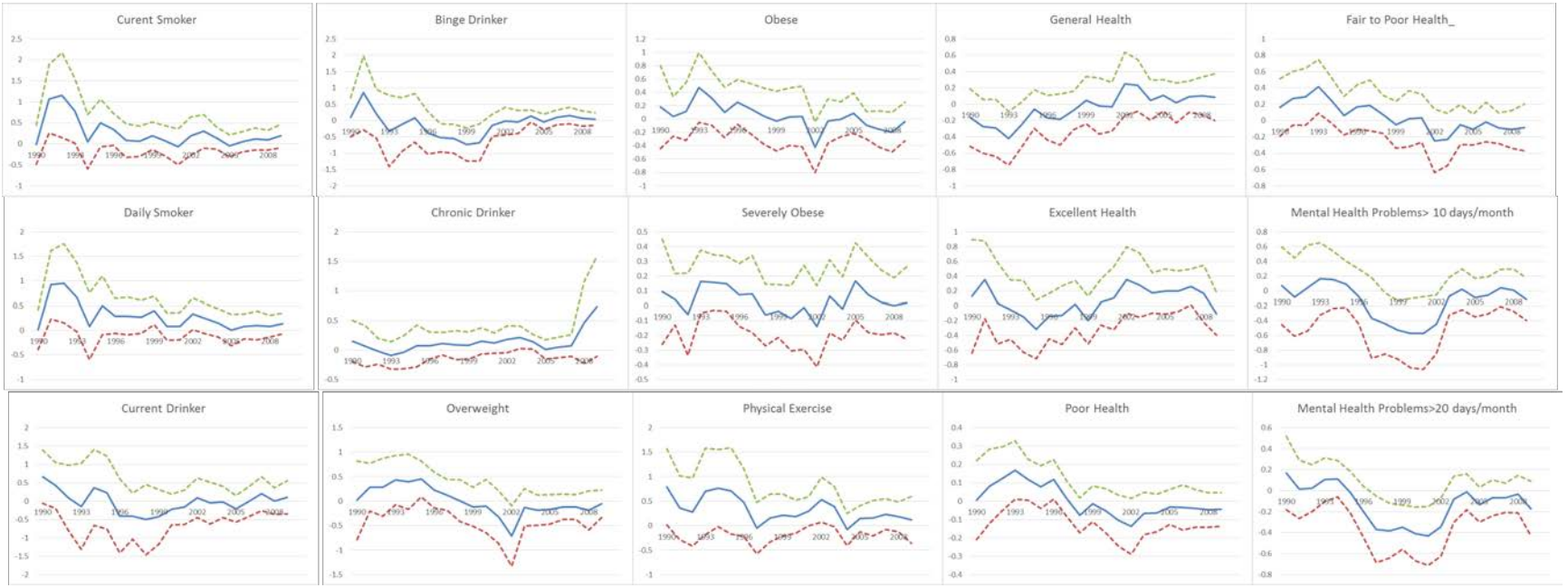
Note: The dotted lines represent the 95% confidence intervals.

Figure 2A: Changes in the Relationship Between Unemployment and Health and Health Behaviors over Time: 5-Year Windows



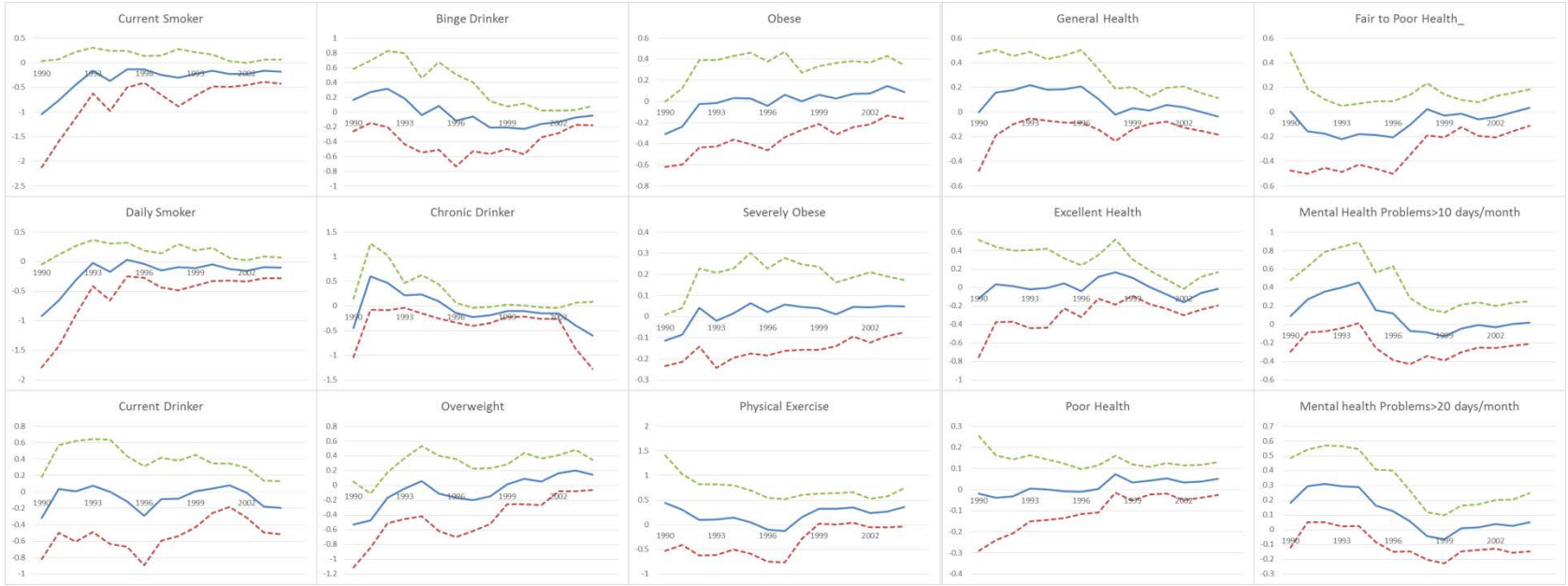
Note: The dotted lines represent the 95% confidence intervals.

Figure 2B: Changes in the Relationship Between Employment and Health and Health Behaviors over Time: 5-Year Windows



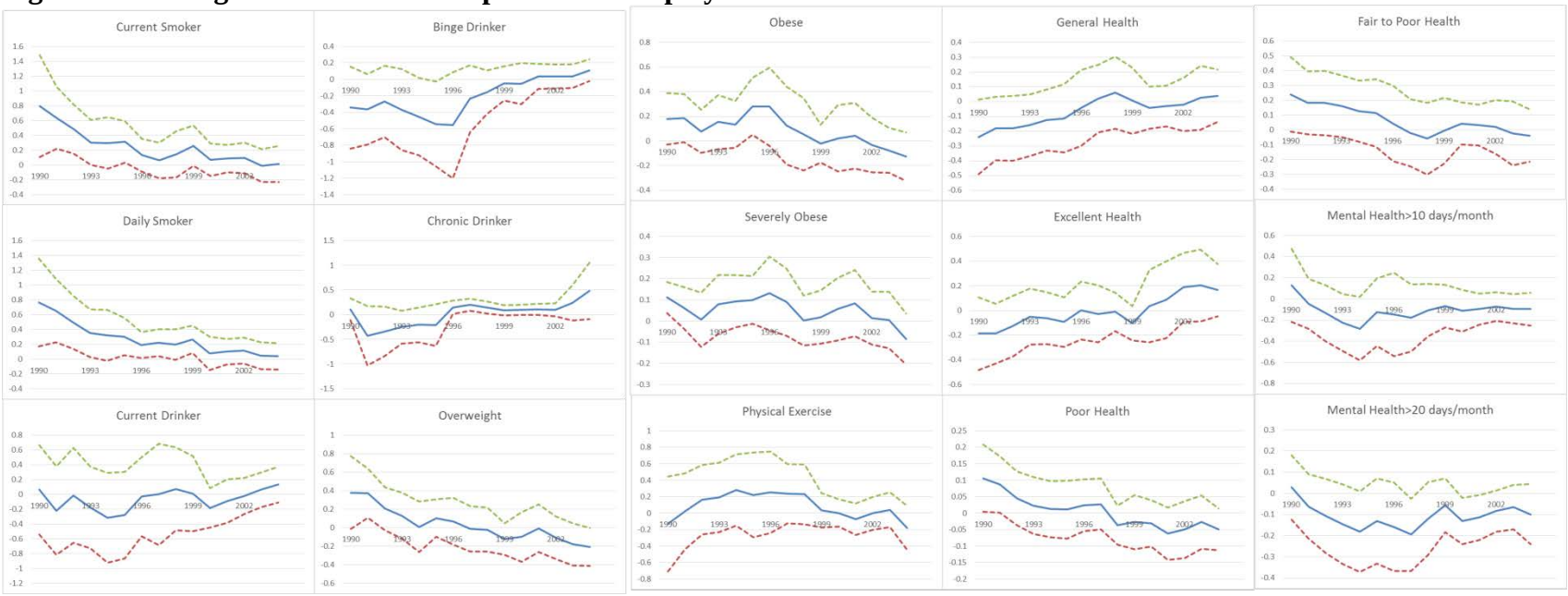
Note: The dotted lines represent the 95% confidence intervals.

Figure 3A: Changes in the Relationship Between Unemployment and Health and Health Behaviors over Time: 10-Year Windows



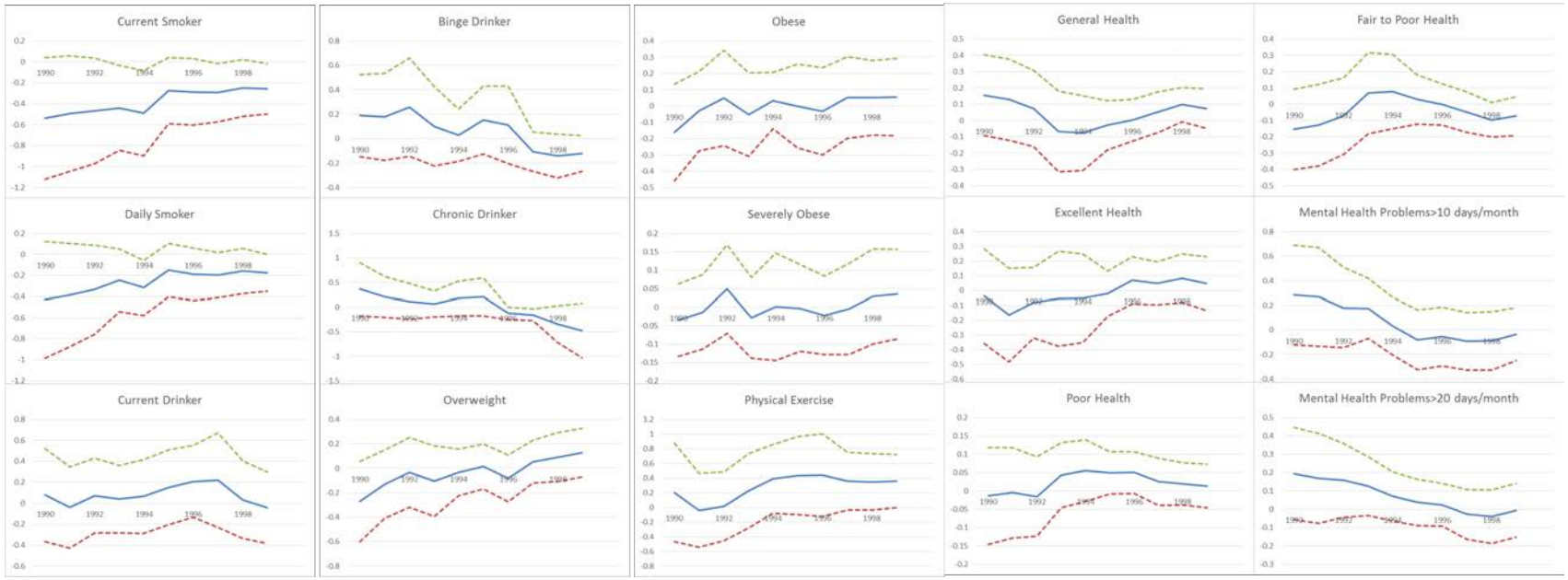
Note: The dotted lines represent the 95% confidence intervals.

Figure 3B: Changes in the Relationship Between Employment and Health and Health Behaviors over Time: 10-Year Windows



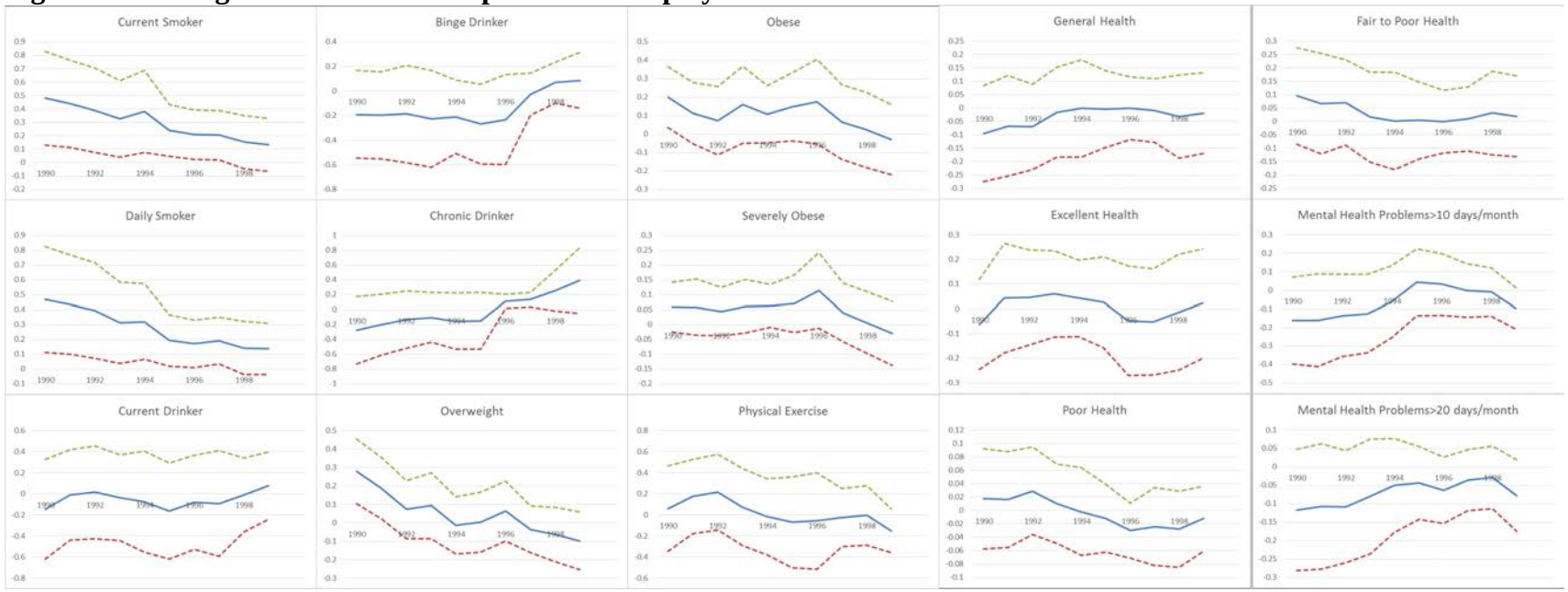
Note: The dotted lines represent the 95% confidence intervals.

Figure 4A: Changes in the Relationship Between Unemployment and Health and Health Behaviors over Time: 15-Year Windows



Note: The dotted lines represent the 95% confidence intervals.

Figure 4B: Changes in the Relationship Between Employment and Health and Health Behaviors over Time: 10-Year Windows



Note: The dotted lines represent the 95% confidence intervals.

Table 1: Descriptive Statistics

Variable	Mean	Standard Deviation
Outcomes		
Current Smoker	0.230	0.421
Daily Smoker	0177	0.359
Current Drinker	0.587	0.486
Binge Drinker	0.156	0.401
Chronic Drinker	0.057	0.233
Physical Exercise	0.763	0.410
Overweight	0.599	0.472
Obese	0.240	0.452
Severely Obese	0.087	0.282
General Health	0.874	0.305
Excellent Health	0.240	0.420
Poor Health	0.029	0.121
Fair to Poor Health	0.126	0.331
Mental10: Poor Mental Health>10 days/month	0.142	0.333
Mental20: Poor Mental Health>20 days/month	0.078	0.248
Control Variables		
State Employment Rate	0.613	0.040
State Unemployment Rate	0.063	0.024
Age: 25-29	0.164	0.352
Age: 30-34	0.185	0.385
Age: 35-39	0.170	0.367
Age: 40-44	0.177	0.388
Age: 45-49	0.153	0.367
Age: 50-54	0.151	0.375
Male	0.484	0.498
Married	0.638	0.479
Divorced	0.104	0.295
Widowed	0.012	0.098
Other Marital Status [a]	0.247	0.435
Less Than High School [a]	0.105	0.291
High School	0.263	0.434
Some College Education	0.273	0.443
College	0.358	0.487
White	0.664	0.475
Black	0.117	0.318
Other [a]	0.109	0.264
Hispanic	0.110	0.362

Note: Data are from1990 to 2014 years of the BRFSS. Number of observations are 2,362,954 for the summary statistics.

[a] Omitted category.

Table 2: Estimates of the Relationship between Unemployment and Health and Health Behaviors

Outcome	I	II
Current Smoker	-0.382**	-0.469**
	(0.120)	(0.136)
Daily Smoker	-0.321**	-0.353**
	(0.085)	(0.101)
Current Drinker	0.083	0.026
	(0.179)	(0.160)
Binge Drinker	0.126	0.026
	(0.145)	(0.083)
Chronic Drinker	-0.060	-0.092
	(0.040)	(0.057)
Overweight	-0.017	0.019
	(0.077)	(0.076)
Obese	-0.009	-0.043
	(0.104)	(0.089)
Severely Obese	-0.012	-0.019
	(0.063)	(0.039)
Physical Activity	0.507*	0.431
	(0.240)	(0.246)
General Health	-0.108	0.062
	(0.119)	(0.069)
Excellent Health	-0.052	-0.012
	(0.098)	(0.072)
Poor Health	0.045	0.024
	(0.027)	(0.031)
Fair to Poor Health	0.108	-0.062
	(0.119)	(0.069)
Mental Health Problems >10 days	0.100	-0.016
	(0.083)	(0.092)
Mental Health Problems >20 days	0.119*	0.047
	(0.056)	(0.054)
Month Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
State Fixed Effects	Yes	Yes
State-specific Linear Trends	No	Yes

Notes: Standard errors are clustered at state. A * and ** indicate that the estimate is statistically significance at the 95 and 99 percent levels of confidence, respectively.

Table 3: Estimates of the Relationship between Employment and Health and Health Behaviors

Outcome	I	II
Current Smoker	0.123	0.306*
	(0.087)	(0.128)
Daily Smoker	0.118	0.277*
	(0.073)	(0.106)
Current Drinker	-0.088	0.078
	(0.127)	(0.161)
Binge Drinker	-0.122	-0.013
	(0.142)	(0.100)
Chronic Drinker	0.059	0.088
	(0.058)	(0.071)
Overweight	0.001	0.024
	(0.060)	(0.074)
Obese	-0.031	0.086
	(0.075)	(0.066)
Severely Obese	-0.042	0.018
	(0.048)	(0.031)
Physical Activity	-0.173	-0.024
	(0.169)	(0.180)
General Health	0.078	-0.007
	(0.042)	(0.041)
Excellent Health	0.034	0.045
	(0.072)	(0.073)
Poor Health	-0.028	-0.012
	(0.022)	(0.021)
Fair to Poor Health	-0.078	0.007
	(0.042)	(0.041)
Mental Health Problems >10 days	-0.125*	-0.048
	(0.060)	(0.061)
Mental Health Problems >20 days	-0.119*	-0.074
	(0.045)	(0.045)
Month Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
State Fixed Effects	Yes	Yes
State-specific Linear Trends	No	Yes

Notes: Standard errors are clustered at state. A * and ** indicate that the estimate is statistically significance at the 95 and 99 percent levels of confidence, respectively.

Table 4: Estimates of the Relationship Between Unemployment and Health and Health Behaviors with an Indicator for Great Recession

Outcome	Unemployment Rate		Great Recession	
Current Smoker	-0.474**	(0.138)	-0.002	(0.002)
Daily Smoker	-0.356**	(0.108)	-0.001	(0.003)
Current Drinker	0.007	(0.166)	-0.006	(0.003)
Binge Drinker	0.016	(0.086)	-0.003	(0.004)
Chronic Drinker	-0.096	(0.057)	-0.001	(0.002)
Overweight	0.008	(0.081)	-0.004	(0.005)
Obese	-0.027	(0.086)	0.006	(0.004)
Severely Obese	-0.008	(0.040)	0.004	(0.003)
Physical Activity	0.445	(0.257)	0.005	(0.005)
General Health	0.056	(0.077)	-0.002	(0.003)
Excellent Health	-0.015	(0.078)	-0.001	(0.004)
Poor Health	0.018	(0.031)	-0.002	(0.001)
Fair to Poor Health	-0.056	(0.077)	0.002	(0.003)
Mental Health Problems >10 days	-0.011	(0.094)	0.001	(0.003)
Mental Health Problems >20 days	0.051	(0.054)	0.001	(0.002)

Notes: Standard errors are clustered at state. A * and ** indicate that the estimate is statistically significance at the 95 and 99 percent levels of confidence, respectively. In addition to time-variant state characteristics, the models also control for state and month fixed effects, and state specific linear time trends.

Table 5: Estimates of the Relationship Between Employment and Health and Health Behaviors with an Indicator for Great Recession

Outcome	Employment Rate		Great Recession	
Current Smoker	0.308*	(0.130)	-0.000	(0.002)
Daily Smoker	0.279*	(0.111)	-0.001	(0.003)
Current Drinker	0.092	(0.165)	-0.007*	(0.003)
Binge Drinker	-0.007	(0.104)	-0.003	(0.004)
Chronic Drinker	0.097	(0.071)	-0.001	(0.002)
Overweight	0.032	(0.078)	-0.005	(0.005)
Obese	0.077	(0.065)	0.005	(0.004)
Severely Obese	0.008	(0.028)	0.004	(0.003)
Physical Activity	-0.027	(0.186)	0.001	(0.005)
General Health	0.001	(0.045)	-0.002	(0.003)
Excellent Health	0.047	(0.078)	-0.001	(0.004)
Poor Health	-0.006	(0.020)	-0.002	(0.001)
Fair to Poor Health	-0.001	(0.045)	0.002	(0.003)
Mental Health Problems >10 days	-0.056	(0.064)	0.002	(0.003)
Mental Health Problems >20 days	-0.079	(0.046)	0.001	(0.002)

Notes: Standard errors are clustered at state. A * and ** indicate that the estimate is statistically significance at the 95 and 99 percent levels of confidence, respectively. In addition to time-variant state characteristics, the models also control for state and month fixed effects, and state specific linear time trends.

Table 6: Estimates of the Relationship Between Unemployment and Health and Health Behaviors with an Indicator for Great Recession and Interaction with Employment

Outcome	Unemployment Rate		Great Recession		Unemployment Rate* Great Recession	
Current Smoker	-0.488**	(0.143)	-0.011	(0.010)	0.126	(0.121)
Daily Smoker	-0.359**	(0.111)	-0.003	(0.008)	0.028	(0.084)
Current Drinker	0.036	(0.171)	0.013	(0.012)	-0.241	(0.142)
Binge Drinker	0.027	(0.089)	0.005	(0.006)	-0.103	(0.086)
Chronic Drinker	-0.086	(0.056)	0.006	(0.010)	-0.087	(0.128)
Overweight	0.002	(0.084)	-0.008	(0.010)	0.048	(0.100)
Obese	-0.033	(0.091)	0.002	(0.009)	0.050	(0.113)
Severely Obese	-0.015	(0.042)	-0.001	(0.008)	0.063	(0.113)
Physical Activity	0.459	(0.257)	0.014	(0.011)	-0.112	(0.115)
General Health	0.074	(0.076)	0.010	(0.006)	-0.147*	(0.069)
Excellent Health	0.003	(0.078)	0.010	(0.008)	-0.143	(0.096)
Poor Health	0.009	(0.031)	-0.008**	(0.003)	0.074*	(0.028)
Fair to Poor Health	-0.074	(0.076)	-0.010	(0.006)	0.147*	(0.069)
Mental Health Problems >10 days	-0.015	(0.091)	-0.001	(0.008)	0.029	(0.094)
Mental Health Problems >20 days	0.053	(0.051)	0.002	(0.006)	-0.019	(0.066)

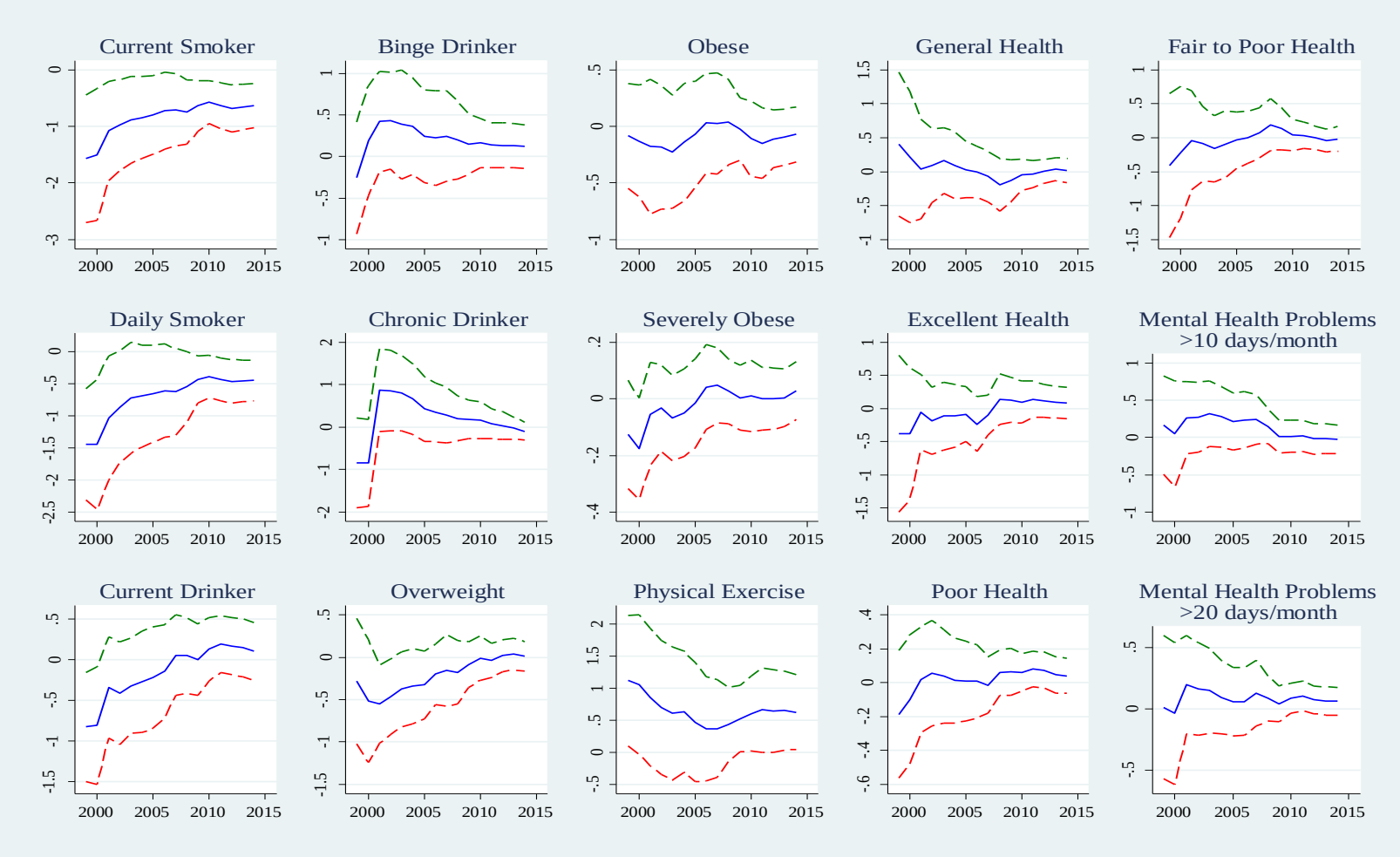
Notes: Standard errors are clustered at state. A * and ** indicate that the estimate is statistically significance at the 95 and 99 percent levels of confidence, respectively. In addition to time-variant state characteristics, the models also control for state and month fixed effects, and state specific linear time trends.

Table 7: Estimates of the Relationship Between Employment and Health and Health Behaviors with an Indicator for Great Recession and Interaction with Employment

Outcome	Employment Rate		Great Recession		Employment Rate* Great Recession	
Current Smoker	0.309*	(0.131)	0.017	(0.025)	-0.029	(0.042)
Daily Smoker	0.280*	(0.111)	0.005	(0.021)	-0.009	(0.035)
Current Drinker	0.087	(0.165)	-0.066	(0.048)	0.097	(0.080)
Binge Drinker	-0.010	(0.104)	-0.052*	(0.024)	0.081*	(0.037)
Chronic Drinker	0.096	(0.071)	-0.016	(0.019)	0.026	(0.032)
Overweight	0.033	(0.078)	0.013	(0.029)	-0.030	(0.047)
Obese	0.080	(0.065)	0.048	(0.031)	-0.071	(0.049)
Severely Obese	0.008	(0.028)	0.006	(0.024)	-0.004	(0.039)
Physical Activity	-0.030	(0.186)	-0.028	(0.035)	0.049	(0.056)
General Health	0.002	(0.044)	0.012	(0.018)	-0.024	(0.028)
Excellent Health	0.046	(0.079)	-0.011	(0.042)	0.016	(0.068)
Poor Health	-0.007	(0.020)	-0.013	(0.007)	0.018	(0.011)
Fair to Poor Health	-0.002	(0.044)	-0.012	(0.018)	0.024	(0.028)
Mental Health Problems >10 days	-0.058	(0.064)	-0.021	(0.020)	0.038	(0.033)
Mental Health Problems >20 days	-0.081	(0.045)	-0.024	(0.015)	0.041	(0.023)

Notes: Standard errors are clustered at state. A * and ** indicate that the estimate is statistically significance at the 95 and 99 percent levels of confidence, respectively. In addition to time-variant state characteristics, the models also control for state and month fixed effects, and state specific linear time trends.

Appendix Figure 1A: Changes in the Relationship Between Unemployment and Health and Health Behaviors among Males over Time: Sample Begins in 1990 and Continues through the Specified Year



Note: The dotted lines represent the 95% confidence intervals.

Appendix Figure 1B: Changes in the Relationship Between Unemployment and Health and Health Behaviors among Females over Time: Sample Begins in 1990 and Continues through the Specified Year

Note: The dotted lines represent the 95% confidence intervals.

Appendix Figure 2A: Changes in the Relationship Between Unemployment and Health and Health Behaviors among Whites over Time: Sample Begins in 1990 and Continues through the Specified Year

Note: The dotted lines represent the 95% confidence intervals.

Appendix Figure 2B: Changes in the Relationship Between Unemployment and Health and Health Behaviors among Blacks over Time: Sample Begins in 1990 and Continues through the Specified Year

Note: The dotted lines represent the 95% confidence intervals.

Appendix Figure 2C: Changes in the Relationship Between Unemployment and Health and Health Behaviors among Hispanics over Time: Sample Begins in 1990 and Continues through the Specified Year

Note: The dotted lines represent the 95% confidence intervals.