

# MENTAL ILLNESS, LABOR SUPPLY, AND WAGES

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## Abstract

**Background:** Previous studies have analyzed the relationship between broadly defined measures of mental illness and either earnings or employment. Comparisons of the effects of alternatively defined measures of mental health, of a specific mental health disorder, and in different subgroups are sparse.

**Aims:** This paper aims to evaluate the effects of general diagnoses of mental illness and self-reported K-6 psychological distress scores, as well as specific mental disorders such as depressive and non-depressive conditions, on labor market outcomes for four groups: single men, single women, married men, and their wives.

**Methods:** Using data from the Panel Study of Income Dynamics (PSID), we follow a two-step approach with which we first estimate the effect of mental illness on hours worked per week, allowing for non-random selection into employment. Then, conditioning on hours worked, we estimate the effect of mental illness on hourly wages. The endogeneity of mental health measures is addressed using individual fixed effects and differences in effects across different types of mental health disorders.

**Results:** Estimation of a reduced-form earnings equation reveals that the negative effects of mental illness on weekly earnings are concentrated mostly among single women and married men, and not among single men and married women. Conditioning on labor supply, we find negative effects of mental illness on hourly wages for the same two groups. However, diagnoses of mental illnesses adversely affect the weekly work hours of all four groups. For married women, the negative effect of mental illness on their hourly wages, conditional on labor supply, operates mainly through the diagnosis of spousal mental illness. Having a depressed spouse reduces married women's conditional hourly wage by 22.4 percent.

**Implications:** This study provides evidence that the most pronounced effects of mental illness on labor market outcomes are experienced by single women and married men. From a policy perspective, this finding may be useful to mental-health professionals in designing interventions targeted at the groups most at-risk for experiencing adverse labor market effects of mental disorders.

Keywords: mental illness, earnings, labor supply, wages

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## 1. Introduction

Mental illness or mental disorder is defined as the presence of one or more psychological or emotional conditions such as depression, anxiety, alcohol or drug addiction, and phobias.<sup>1</sup> Economic theory suggests that mental illness diminishes productivity and hinders normal work functioning. As a result, the presence of a mental disorder is expected to reduce the amount of time spent working and lower labor market earnings among those who work. In this study, we report empirical estimates of the separate effects of mental illness on individuals' labor supply and wage rates.

Previous research provides some evidence that mental illness interferes with the ability to supply labor and earn an income.<sup>2-8</sup> Several studies also show large earnings reductions associated with the presence of psychoses.<sup>4,5</sup> Moreover, individuals with mental disorders find it difficult to look for, find, and retain adequately paying jobs.<sup>7</sup> In particular, affected individuals may not know how to apply for jobs, may not interview well, and therefore may not compete successfully for good jobs.<sup>9</sup> Additionally, persons with mental illnesses may not have sufficient social skills and cognitive abilities to adapt to work-related stress.<sup>10</sup> The reduced cognitive skills of those affected by mental disorders also suggest a causal relationship between mental illness and educational attainment, at least among adolescents.<sup>11</sup> Finally, individuals with mental disorders are more likely to work in entry-level positions that have high turnover rates.<sup>12</sup>

The results reported in the previous literature have usually been interpreted as the effects of mental illness *per se* rather than the effects of having received a diagnosis of mental illness. This distinction is important because most mental disorders have a long prodromal phase and take many years to develop.<sup>13</sup> Moreover, mental illnesses are often under-diagnosed due to the

social stigma associated with them. As a result, the true incidence of mental illness is often not accurately recorded in many databases, and therefore its effects cannot be properly studied. Instead, most of the estimated effects of mental illness reported in the literature are best interpreted as the consequences for various economic outcomes of having received a diagnosis of a general or specific mental illness.

Our attempt to estimate the casual relationship between mental illness and labor market outcomes using observational data must confront several potential threats to the identification of such a relationship. First, there is the possibility that omitted risk factors associated with receiving a diagnosis of mental illness also affect labor market outcomes.<sup>7</sup> However, most of these potential confounders are typically durable features of an individual's health, environment, and lifestyle over time. Thus, drawing strength from the panel structure of our data, the inclusion of extensive controls for time-varying observable characteristics, and the use of a fixed-effects estimator, we are able to control carefully for many potentially relevant observables and unobservables.

Second, there may be time-varying, unobserved factors that would bias estimates of the effects of mental illness, including the possibility of reverse causality between receiving a diagnosis of mental illness and various labor market outcomes. For example, Sareen *et al.* find that individuals who experienced a recent reduction in earnings are more likely to suffer from depression, anxiety, or substance-abuse problems.<sup>14</sup> Similarly, higher earnings might help alleviate mental strain, mild depression, or anxiety through an improvement in self-esteem. There is also evidence that self-esteem is significantly affected by relative wages and the human capital accumulated previously by individuals.<sup>15</sup> However, there is no evidence that changes in earnings directly affect severe personality disorders or chronic conditions, such as schizophrenia,

that typically emerge early in life. We explore the implications of using alternative measures of mental illness, such as having received a diagnosis of specific, non-depressive condition, and a self-reported indicator of severe, but non-specific, psychological distress. A detailed description of these different measures is included in the Data and Empirical Model section, below.

Third, we account for nonrandom selection into employment when estimating the effect of mental illness on wages. In particular, we employ a Type-3 Tobit model to separate the effect of mental illness on labor supply from its effect on hourly wages.<sup>16</sup> We follow a two-step approach in which we first estimate the effect of mental illness on labor supply. Then, conditioning on hours worked, we estimate the effect of mental illness on the hourly wage. In every step, we use a fixed-effects estimator to control for unobserved person-specific heterogeneity, and also include an extensive set of observable controls.

Finally, we examine differences in the labor market effects of mental illness by marital status and also by the joint effect of marital status and sex. Past studies have examined differences in these effects by sex<sup>7, 8</sup> since there is considerable evidence that women earn less than men.<sup>17, 18</sup> However, we argue that the nexus between sex and marital status is an important dimension to consider because of the well-documented relationships between marital status and mental health, and between marital status, sex, and labor-market outcomes. Specifically, mental illness reduces one's chances of becoming and staying married,<sup>4</sup> and married men not only earn more than unmarried men<sup>19, 20</sup> they are also more likely to be attached to the labor force.<sup>21</sup> Additionally, married women are more likely than men or unmarried women to engage in temporary employment rather than pursue a sustained career in order to specialize in childbearing and childrearing.<sup>22</sup>

Using data from the Panel Study of Income Dynamics (PSID),<sup>23</sup> we find that there is a strong, negative relationship between mental illness diagnoses and weekly earnings for single women and married men. Conditional on work hours, we find that there is a negative effect of own mental illness on the hourly wage for the same two groups. We also find that a diagnosis of depression in their respective spouses reduces the hourly wage of both married men and married women.

## 2. Theory and Background

Becker argues that an individual's earnings-generating capacity is determined both by innate ability and by investments in human capital in the form of education, health, and training.<sup>24</sup> An individual with a mental-health disorder will spend less time on human capital accumulation and at work than otherwise similar, but mentally healthy, persons. These reductions in both educational attainment and work-related experience will ultimately translate into lower labor-market earnings.

Mental-health problems may also directly impair job performance. Stewart *et al.* find that mentally-ill individuals have difficulty concentrating on their work, leading to reduced productivity.<sup>25</sup> Moreover, mental illness may result in a large number of sick days, which translates into both a lower probability of retaining a job and lower earnings.\* Additionally, to avoid work-related stress, persons suffering from mental illness may choose less challenging work with lower pay. Draine *et al.* find that the mentally ill typically hold jobs that not only pay less but have high turnover rates, thereby reducing job tenure and earnings.<sup>12</sup> It is also possible that individuals with psychological problems choose to work for employers who provide good

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\* Mental-health problems may also affect labor supply by reducing the effective time endowment, thereby altering the marginal rate of substitution between goods and leisure.

health insurance and require tasks that can be performed even when these individuals are in a fragile mental state, thus allowing them to trade certain advantageous job characteristics for lower monetary rewards.<sup>8†</sup> Finally, poor mental health may increase employers' medical expenses and productivity loss,<sup>26</sup> which, once known to the employer, could reduce the probability of retaining a job. In particular, Goetzel *et al.* find bipolar disorder, depression, personality and non-psychotic disorders, alcoholism, anxiety disorders, schizophrenia, and psychoses, among other mental health conditions, to be relatively costly in terms of the medical expenses and productivity losses borne by employers.<sup>26</sup>

Several researchers have found sex differences in the earnings effects of mental-health disorders. Marcotte *et al.*<sup>27</sup> and Ettner *et al.*<sup>7</sup> find stronger effects of mental illness on the earnings of women, compared to men, using an instrumental variables (IV) approach. By contrast, other empirical studies that rely primarily on ordinary least squares (OLS) estimation report that mental illness affects men's earnings more than women's.<sup>8, 28</sup>

Another difficulty with analyzing the relationship between mental health and labor market outcomes is that the great variety of mental health problems may have very different effects. It is difficult to categorize mental health disorders by the severity of their associated disability, as this depends on individual circumstances. Mental health problems tend to have high co-morbidity rates; for example, a person diagnosed with depression is also likely to suffer from anxiety, thus making it difficult to isolate the separate effects of the two conditions. Moreover, individuals with identical symptoms may be affected very differently by their illness. Therefore, the effects of specific mental illnesses on labor market outcomes are unclear. If there are

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<sup>†</sup> In the absence of effective treatment or because of an inability to cope with the illness as it progresses, mentally ill individuals may choose to work at less stressful jobs that offer lower monetary rewards.

opposing effects on these outcomes from co-morbid conditions, then aggregating across the separate illnesses may result in estimating a small effect for a specific condition when it actually has a large effect.

There have only been a handful of studies that have attempted to estimate the labor market effects of specific types of mental illness. Bartel and Taubman divide mental illnesses into three groups: psychoses, neuroses, and other mental illnesses.<sup>4</sup> Psychoses, including schizophrenia, affective psychosis, and paranoia, were found to reduce earnings by 32 to 47 percent. Neuroses are relatively less incapacitating from a labor market standpoint, and lower earnings by 12 to 14 percent. Other mental illnesses, such as personality disorders, reduce earnings only if they were recently diagnosed. Research also shows that only one-third of individuals with schizophrenia are employed even if they have experienced a significant reduction in their symptoms.<sup>29</sup> Miller and Kelman<sup>30</sup> find that people diagnosed with schizophrenia have 10 to 35 percent lower earnings, and people with anxiety have 3 to 10 percent lower earnings, than their mentally healthy counterparts, while Marcotte *et al.*<sup>27</sup> report that the initial earnings losses associated with depression are mitigated over time.

Based on economic theory and the empirical evidence from prior studies, we hypothesize that mental illnesses reduce labor market earnings by (i) reducing work hours and (ii) lowering hourly wages. We empirically examine the effects of various types of mental illness on these labor-market outcomes by sex and by couple status.

### 3. Data and Empirical Model

#### Data

The data used in this study come from the Panel Study of Income Dynamics (PSID),<sup>23</sup> a nationally representative longitudinal survey that includes over 8,000 households and contains questions on mental health and labor market variables. Most families in the data have participated in the survey since 1968. For this study, we use the seven most recent waves, 1999 through 2011. The PSID oversamples low-income families and minorities, so we use the sample weights provided by the PSID to obtain a representative sample. We drop observations for which data on employment or mental-health status are missing. Also excluded from the sample are retired persons, students, persons who are incarcerated or institutionalized, and housewives. We further restrict the sample by including only those households in which the head is between the ages of 18 and 65.

We analyze four groups: single men ( $n = 6,794$ ), single women ( $n = 13,461$ ), men in couple households ( $n = 24,397$ ) and their partners or wives ( $n = 25,493$ ).<sup>‡</sup> These samples include multiple observations over time on the same people. Couples are defined as opposite-sex individuals who live in the same household but who may or may not be married to each other. The head of household in a couple is always a male, while his partner or wife is always a female.

#### *Mental-Health Variables*

We use various measures of mental illness in our analysis. First, individuals are asked in all six PSID waves whether they have been diagnosed with any kind of psychological or emotional problems by a doctor. We create a dummy variable equal to one if the answer to this

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<sup>‡</sup> There are more wives than husbands because of the sample-selection criteria.



question is affirmative, and equal to zero otherwise. Second, in the 2005, 2007, 2009, and 2011 waves there is a follow-up question that lists nine specific types of mental illness: depression, bipolar disorder (mania), schizophrenia, anxiety, phobias, alcohol abuse, drug addiction, obsessive compulsive disorder, and “other disorders.” Respondents can record up to three conditions. Using this information, mental-health disorders are labeled depressive if the respondent indicated depression among the three allowable responses, and they are categorized as non-depressive if the respondent reports having been diagnosed with a mental illness but none of the three allowable responses was depression.

Our final measure of mental illness is based on six questions in which individuals are asked whether they had felt sad, nervous, hopeless, restless, worthless, or “everything was an effort” in the past thirty days. These questions were asked only in the 2001, 2003, 2007 and 2011 waves. Respondents answered on a scale from 0 (= none of the time) to 4 (= all of the time). The exact wording of the questions is provided in Appendix A1. The total score is the sum of the respondent’s answers to all six questions; the resulting K-6 scale ranges from 0 to 24. A K-6 score of 13 or higher is interpreted to mean that the respondent suffers from a serious mental illness. We create a binary variable using this cutoff score (equal to 1 if the K-6 score is greater than or equal to 13, and equal to 0 otherwise), and use this variable as an alternative measure of mental illness.<sup>§</sup>

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<sup>§</sup> We also considered using mental health status during adolescence as an alternative measure of mental illness. Adolescent mental health is potentially an important determinant of current labor-market outcomes, mainly through its effects on individuals’ educational and job-market skill attainment. However, there are two disadvantages of using this measure: first, data on this variable are available for only two waves and, thus, using this variable would exclude a substantial number of households from the analysis; second, once responses are collected for a household, this becomes a time-invariant variable, making it impossible to estimate the separate effect of this measure of mental illness on labor-market outcomes in a fixed-effects model specification. We created a dichotomous variable combining respondents’ answers from three questions on whether they were diagnosed with depression, drug/alcohol problems, or other mental-health problems before they were 17 years old, and used this variable as an instrument for mental illness diagnosis in the empirical analysis. OLS estimates of a reduced-form earnings equation

There are advantages and disadvantages to each of these measures of mental illness. The diagnosis variable is a relatively objective measure of the presence of mental illness, and it is available in all six waves of the PSID we analyze. Data on the diagnostic presence of depression and non-depressive disorders is available for only four waves, but they allow us to explore possible differences in the effects that these two broad types of mental illnesses have on labor market outcomes. The K-6 psychological distress score does not require a physician's diagnosis and, therefore, it is more subjective in nature. Nevertheless, some studies find that the K-6 score is a good predictor of depression and anxiety<sup>43,44</sup>, although the exact mental condition(s) it identifies can be difficult to ascertain. Since mentally ill individuals with low socioeconomic status are less likely to obtain a medical diagnosis of their condition, the use of the self-reported K-6 score may result in a more accurate representation of the extent of mental illness. However, using a K-6 score of 13 or higher to define the presence of mental illness may result in classifying only the most severely affected individuals as mentally ill.

For couples ("husbands and wives"), the most appropriate measure of mental illness includes the mental health status of both the husband and the wife because of evidence that the mental health of spouses are related.<sup>31</sup> There is some indirect evidence that physical or mental illness may have different consequences in couple households than in single-headed households because of the possibility of significant health spillover effects between spouses.<sup>31-34</sup> There is also evidence suggesting that family members or spouses of mentally ill individuals may develop coping mechanisms to lower their own probability of becoming mentally ill.<sup>7\*\*</sup> Therefore, it is

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indicate reductions in weekly earnings among individuals associated with depression and substance-abuse problems in adolescence: there was a 15.5 percent reduction in weekly earnings for single men, a 17.9 percent reduction for single women, 17.5 percent lower earnings for married men, and no difference in earnings for wives. However, there was no effect of adolescent mental health status on labor supply for any group.

\*\* Ettner *et al.* (1997) find that children of alcoholics drink more, on average, than the children of non-alcoholics. However, there are also individuals who abstain from alcohol consumption in light of their parents' alcohol abuse.

not clear whether spouses exacerbate or mediate the effects of mental-health problems. For couple households, K-6 scores are reported only for the respondent, so we cannot control for the mental-health status of both the husband and the wife in the same regression equation when using the K-6 score as the indicator of mental health.

### *Labor Market Variables*

The PSID asks a series of questions related to employment, earnings, and other labor market outcomes. The primary dependent variables used in our analysis are weekly earnings, weekly hours of work, and the hourly wage rate. The variable “weekly work hours” is defined as the number of hours worked in a given week on all jobs. Individuals report the hourly wage rate for themselves and their partners (if applicable) in one of three categories: first, they report the exact amount if they worked at an hourly wage rate between 1 cent and \$998.99; second, they report whether they earned more than \$999; and third, respondents report whether they had no labor market income that year. We also performed analyses in which labor supply was measured by employment status and number of weeks out of the labor force in the past year, where employment status is measured by a binary variable indicating whether the respondent is currently employed. All nominal values have been converted into constant 2011 dollars using the all-items, seasonally-adjusted consumer price index. Further, to minimize skewness, as is typical in wage or earnings models, we log-transform the hourly wage rate, while specifying hours worked in levels.

### **Empirical Model**

Table 2 provides summary statistics on the comprehensive list of control variables we use in this study. Socio-economic status is captured by four categories of education, household

wealth, the non-labor income of family members, whether anyone in the household is a welfare recipient, whether the respondent or partner has a salaried or a non-salaried job, and the union status of the respondent's job. The demographic variables are age, race, number of children in the household, whether the family lives in a rural area, and couple ("marital") status. The physical health variables are self-rated health, whether any individuals in the household are disabled, the health insurance coverage of individuals and family members, smoking behavior, and alcohol abstinence.

We initially estimate the following reduced-form relationship between mental health and weekly earnings:

$$\ln y_{it} = MH'_{it}\alpha + X'_{it}\beta + c_i + \delta_t + \varepsilon_{it} . \quad (1.1)$$

The dependent variable  $y_{it} = w_{it} \cdot h_{it}$  is weekly earnings, where  $w_{it}$  is the hourly wage rate and  $h_{it}$  is the weekly work hours of individual  $i$  in interview year  $t$ .  $MH_{it}$  denotes one of the several alternative measures of mental illness discussed above. The sign of the coefficient  $\alpha$  is expected to be negative, reflecting the hypothesis that individuals with mental disorders experience reduced labor market earnings.  $X_{it}$  denotes a vector of time-varying socio-economic and demographic control variables, such as educational attainment, race, union status, and physical health, which are known to affect earnings, and  $c_i$  is a fixed effect representing time-invariant, unobservable individual and household characteristics that are potentially correlated with both mental health and weekly earnings. To capture overall trends in the economy and extraneous time-varying factors affecting weekly earnings, we include a time variable  $\delta_t$ .

Estimates of the reduced-form relationship in equation (1.1) cannot distinguish whether a change in weekly earnings  $y_{it}$  occurs through a change in  $w_{it}$  or a change in  $h_{it}$  or both.

Additionally, the coefficients in equation (1.1) are inconsistent if only those individuals for whom we observe labor market earnings are included in the sample. To correct for this potential selection bias, we employ a Type-3 Tobit model<sup>13</sup> which allows for non-random selection into employment. We rely on the panel version of the Tobit model, which is the censored fixed effects (FE) specification developed by Honore to difference out time-invariant sources of individual heterogeneity. The first stage of this model determines labor supply by

$$h_{it} = MH'_{it}\eta + Z'_{it}\zeta + c_i + \delta_t + u_{it} \quad (1.2)$$

where the dependent variable  $h_{it} \geq 0$  is observed weekly work hours,  $MH_{it}$  represents one of the alternative measures of mental illness, and  $Z_{it}$  is a vector of exogenous variables. The hypothesis that individuals with mental illness work fewer hours implies  $\eta < 0$ .

The residuals obtained from estimating (1.2) by the censored FE Tobit specification, along with a subset of the exogenous human-capital variables, are then included in the following second-stage wage equation,

$$\ln w_{it} = MH'_{it}\psi + P'_{it}\gamma + c_i + \delta_t + u_{it} + v_{it} \quad (1.3)$$

that is estimated by FE. The dependent variable in (1.3) is the logarithm of the hourly wage  $w_{it}$ ,  $P_{it}$  is a vector of socioeconomic and demographic controls affecting the hourly wage, and  $MH_{it}$ ,  $c_i$ , and  $\delta_t$  are defined as before. We make the orthogonality assumption  $E(v_{it} | MH_{it}, P_{it}, c_{it}, s_{it}) = 0$ , where  $s_{it} = 1$  if the observed wage  $w_{it}$  is greater than or equal to the (unobserved) reservation wage and  $s_{it} = 0$  otherwise. Together, equations (1.2) and (1.3) comprise a censored-regression model with a Tobit selection rule, since we observe the explanatory variables for all values of the dependent variables. With this model, we are able to estimate the separate effects of mental illness on labor supply and on the wage rate.

One problem with using  $\ln y_{it}$  or  $\ln w_{it}$  as the outcome variable in a least-squares model is that the coefficients on the right hand side variables cannot be interpreted as an exact percentage change since, in a model determining  $\ln y$ ,  $E(\ln(y|x))$  does not equal  $\ln(E(y|x))$ . A generalized linear model (GLM), on the other hand, provides estimates of both  $E(y|x)$  and  $\ln(E(y|x))$  directly without any requirement for variable transformation. Therefore, earnings and wage rates were also modeled using a GLM with a log link function and a gamma distributed error term. Instead of using, for example,  $X_{it}$  as a regressor, the GLM specifies  $(X_{it} - X_{i-bar})$  and  $X_{i-bar}$  as separate covariates, where  $X_{i-bar}$  is the average  $X$  for each  $i$ , and the coefficient on  $(X_{it} - X_{i-bar})$  is the within estimator for the coefficient on  $X$  and gives the marginal effect as a percentage change.

An additional issue that need to be addressed is that, in empirical specifications of the “traditional family” model of labor supply, husband’s earnings is one of the determinants of the wife’s work hours, while married men’s labor supply is treated as independent of the work decision and the human capital attributes of their wives.<sup>35, 36</sup> However, this model ignores the possibility that household labor supply is the solution to a joint (couples’) decision problem reflecting efficient intra-household bargaining.<sup>37-40</sup> To capture the effect of own and spousal mental health on own labor supply, while isolating the effect of spousal participation in the labor market, we include spousal labor supply ( $N^S$ ) as an additional explanatory variable in the labor-supply equation:

$$h_{it} = MH'_{it}\eta + Z'_{it}\zeta + N^S'_{it}\theta + c_i + \delta_t + u_{it}. \quad (1.2')$$

To strengthen identification, we impose certain exclusion restrictions on the model. The hours (selection) equation includes spousal labor supply, number of children in the household, the non-labor income of family members, and information on household wealth, all of which are

excluded from the wage equation. Thus, we assume these variables have direct, causal effects on hours of work but only indirect effects on the hourly wage.<sup>††</sup>

#### 4. Empirical Results

Table 1 provides weighted averages of our alternative measures of mental illness. The data show that between 3.8% and 14.9% of all respondents or their partners have been diagnosed with a psychological disorder, with men in couple households having the lowest prevalence of mental illness and single women bearing the highest incidence. Rates of depression range from 2.5% for men in couple households to 10.1% for single women. The K-6 score indicates a similar pattern for the presence of severe psychological distress, with men in couple households having the lowest prevalence and single women having the highest. However, using the K-6 > 12 screen results in lower prevalence rates overall, since that measure indicates the presence of relatively severe mental distress.

The summary statistics for the employment status variable are also reported in Table 1. The employment rate is highest for coupled (“married”) men (92.7%) and lowest for their partners (“wives”), 69.8%. The variables defining “weekly work hours” and “weeks out of the labor force” exhibit a similar pattern, indicating that married men have the highest labor market

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<sup>††</sup> We also explored estimation of a dynamic panel model that allowed the values of the outcome variables to depend on their values from previous periods, since past earnings, labor supply and wage rates likely affect current earnings, work hours and wages. For this model, we used lagged values of the endogenous variables as their own instruments. Seven years of data on both the dependent and explanatory variables were sufficient to obtain IV estimates of an AR(2) model for weekly earnings and for work hours and wage rates, using the binary (past diagnosis) definition of mental illness. However, data on the variables measuring specific mental-illness diagnoses and on the K-6 scores were not available for all seven years. Therefore, we did not run dynamic panel regressions using these measures of mental illness, as the results would likely have been less reliable. Our empirical results indicated a statistically significant association between past earnings and current earnings, past labor supply and current labor supply, and past hourly wages and wages in the current period. We also found a statistically significant negative relationship between having received a mental illness diagnosis and both hours worked and wages, but only for married men. For the other three groups, there was generally no consistent association between receiving a diagnosis of mental illness and labor market outcomes.

participation rate, and, among those working, the longest work weeks, while their wives have the lowest. Among those employed, married men earn the most per hour (\$30.60), while single women earn the least (\$16.20).

The results from estimating the reduced-form earnings equation and the two-stage model of labor supply and wages for all four groups are reported in Tables 3 through 6. FE-least squares and FE-GLM results from the second step are reported side-by-side in these tables, while only the results from the FE-GLM estimation are interpreted as percentage changes. In each of these tables, there are three panels containing results obtained from using the alternative measures of mental illness. We include the control variables listed in Table 2, and discussed above, in all of these models.

#### *Reduced-Form Earnings Equation*

First, we estimated the reduced-form earnings equation (1.1) separately for single men, single women, men in couple households, and their partners, using FE. These results are then compared with those obtained by estimating the Type-3 Tobit model, which allowed estimation of the separate effects of mental illness on weekly hours worked and on the hourly wage rate.

The FE results reported in Panel A of Table 3 show that having received a diagnosis of any type of mental illness is associated with a reduction in the weekly earnings of single women and married men, but not of the other two groups. While own-diagnoses of mental illness do not have adverse effects on the weekly earnings of married women, diagnoses of mental illness in their spouses have a statistically significant, positive effect on married women's weekly earnings. Married men are affected most severely by the presence of any mental illness; compared to their healthy counterparts, married men who received a diagnosis of any type of



mental illness earned 12.3 percent less in the labor market. Having a mentally ill spouse also lowered married men's earnings by 9.9 percent.

Diagnoses of either depression or non-depressive symptoms are associated with lower weekly earnings for single men, single women, and married men (Table 3, Panel B). For single men, single women, and married men, non-depressive diagnoses are associated with 32.0 percent, 22.6 percent, and 23.9 percent lower weekly earnings, respectively, compared to their healthy counterparts. Diagnoses of depression have negative effects on the weekly earnings of single women and married men only. Single women with depressive diagnoses fare worst, receiving 34.9 percent lower weekly earnings, and depressed married men have an estimated 26.2 percent lower weekly earnings. Depressed spouses also affect married men's weekly earnings; having a wife who received a diagnosis of depression reduces a married man's weekly earnings by 14.2 percent, on average.

The results reported in panel C of Table 3 indicate that single men, single women, and married men who are severely psychologically distressed, as indicated by a K-6 score of 13 or higher, have lower weekly earnings than their mentally healthy counterparts. The FE-GLM results for single women and married men indicate a 20.2 percent and 56.9 percent reduction in weekly earnings, respectively, associated with a K-6 score of 13 or higher. In addition, these estimates reveal a negative relationship between the K-6 score and earnings that is stronger for men than for women, regardless of couple status. However, there is no statistically significant relationship between a high K-6 score and married women's earnings.

### *Two-stage Model of Labor Supply and Wages*

The empirical results reported in Panel A in Table 4 show that having received a diagnosis of any type of mental illness reduces the labor supply of all four groups. Diagnoses of either depression or non-depression symptoms are generally associated with lower labor supply. However, the magnitudes of the reductions in hours worked for those having received non-depression diagnoses are larger for all four groups (Panel B). The results reported in Panel C show no statistically significant association between the presence of a severe mental disorder (as indicated by a K-6 score greater than 12) and weekly work hours.

Conditional on labor supply, a diagnosis of mental illness of any type reduces the hourly wage rate of single women and married men, but has no effect on the hourly wage rates of single men and married women (Table 5, Panel A). Single women and married men with diagnoses of mental illness of any types experience, respectively, reductions in the hourly wage rate of 14.1 percent and 2.3 percent. Having received a depression diagnosis is associated with a 5.6 percent lower hourly wage for married men, while for single women depression and non-depressive diagnoses lower their hourly wage by 28.7 percent and by 31 percent, respectively (Panel B). For married women, receiving a diagnosis of any mental illness has no statistically significant association with their hourly wage. However, having a husband who was diagnosed with a mental illness implies a reduction in the wife's hourly wage (Panel A). In particular, having a clinically depressed husband lowers a wife's hourly wage by 22.4 percent, on average, and having a husband who has received a non-depressive diagnosis is also associated with a reduction in the wife's hourly wage (Panel B). The results reported in Panel C indicate that having a K-6 score of 13 or higher is associated with a 30.2 percent reduction in the hourly wage for single women, and a 29.5 percent reduction in the hourly wage for married men; for single

men and married women, we find no statistically significant relationship between the presence of a severe mental illness and their respective hourly wage rates.

Using the data on households comprised of couples, we also estimated models incorporating spousal labor supply in the equation determining individuals' own labor supply. The censored FE results indicate no statistically significant effect of spousal hours of work on own work hours (results not shown). Estimates of the effects on hours worked of the primary indicators of mental illness are essentially unchanged by the inclusion of spousal labor supply (Table 6). The presence of a diagnosis of any mental illness reduces the work hours and wages of married men, while their wives' mental health has no effect on either married men's weekly work hours or their hourly wage (Table 6, Panel A). Among wives, own mental illness reduces own work hours but has no effect on their hourly wages. However, having a husband who received a diagnosis of any mental illness reduces the wife's wage rate. Because the FE-GLM estimate of the effect of spousal mental illness on married women's wages is not statistically significant, the exact percentage change is not reported.

For married men, having received a diagnosis of either depression or a non-depressive condition lowers their own work hours and hourly wages; in particular, married men experience a reduction in their hourly wage of 7.6 percent (Table 6, Panel B). Depressed married women suffer a reduction in their hourly wage rate of 22.3 percent. Diagnoses of depression and non-depressive conditions in the spouses of married women lower their hourly wage, while there is no effect of spousal diagnoses of non-depressive conditions on the hourly wage rate for married men. However, having a depressed wife lowers the hourly wage of married men by 11.2 percent (Table 6, Panel B). Married men with a K-6 psychological distress score of 13 or higher experience a reduction in their wages, but there is no statistically significant association between

this measure of (severe) mental illness and either the weekly work hours or the wages of their wives (Table 6, Panel C).

## 5. Discussion and Conclusions

This paper presents an empirical analysis of the relationship between mental illness and labor market outcomes using longitudinal data from the PSID from 1999 to 2011. Our study advances the literature on this subject in several novel and important ways. First, we include an extensive set of time-varying observable characteristics, and use a fixed-effects estimator to control for potentially relevant unobservables. Certain personality traits or stressful life events may make individuals more prone to mental illness. Accordingly, we believe that omitted variables bias has been attenuated substantially. Second, we are able to distinguish diagnoses of depression from other, non-depressive disorders, and this enables us to confront and isolate the potential bias from reverse causality between mental illness and labor market outcomes. The source of the attenuation of this bias is our assumption that most non-depressive conditions, such as schizophrenia, are generally pre-market in gestation. Third, we account for nonrandom selection into employment when estimating the effect of mental illness on wages. This allows us to separate the effect of mental illness on labor supply from its effect on hourly wages, clarifying the channel through which earnings reductions typically occur. Fourth, we use both diagnosis-based and self-reported measures to classify the mental health of individuals in our sample. Finally, we separate our sample by sex and by couple (“marital”) status, enabling us to explore differences in the labor market effects of mental illness for women and men within and outside the context of opposite-sex relationships.

FE estimates of a reduced-form earnings equation indicate that having been diagnosed with a mental illness is generally associated with lower weekly earnings for single women and married men, with the largest earnings reductions experienced by single, depressed women (a reduction in weekly earnings of 34.9 percent). Conditional on hours worked, we find that, among those who received a general diagnosis of mental illness, the same two groups, single women and married men, experience a decrease in their hourly wage. Single women again fare the worst, with those having received a diagnosis of any mental illness earning 14.1 percent less. Diagnoses of depression or non-depressive conditions lower the conditional hourly wage by 28.7 percent and 31.0 percent, respectively, for single women. This latter result is similar to the findings of Marcotte *et al.*<sup>27</sup> and Ettner *et al.*<sup>7</sup>, who also report strong negative effects of mental illness on women's earnings. Similarly, Fletcher<sup>41</sup> finds a reduction of 15% in earnings for individuals who exhibited depressive symptoms as an adolescent. However, Fletcher does not separate out the effects of mental illness on labor supply and wages as we are able to do, nor does he examine the role of marital status and, especially, spousal mental health on employment and earnings. Additionally, Fletcher uses OLS to estimate separate equations for determining the probability of employment and the annual earnings of those who are employed, and does not take into account nonrandom sample selection.

For married men, we find a reduction of 56.9 percent in weekly earnings associated with a self-reported K-6 score of 13 or higher, the largest among all groups. A high K-6 score is also associated with a 47.3 percent decrease in the conditional hourly wage of married men, again the most pronounced among all groups. In this regard, our results are similar to Cseh<sup>8</sup> and Jofre-Bonet *et al.*<sup>28</sup>, who report stronger effects of mental illness on men's earnings, although their analyses do not distinguish married men from single men. However, our findings differ from

those of Chatterji *et al.*<sup>42</sup> who, using cross-sectional data, find no effects of mental illness on either earnings or hours worked among employed individuals. Although the negative effects of mental illness on earnings and hourly wages that we estimate are concentrated mostly among single women and married men, we find statistically significant adverse effects of diagnoses of any mental illness on the weekly work hours (labor supply) of all four groups.

Our findings reveal that spousal mental health affects labor market outcomes for both men and women. Having a depressed wife lowers the weekly earnings of married men by 14.2 percent, and their conditional hourly wages are reduced by 11.2 percent when spousal work hours are incorporated in the selection equation. For married women, having a depressed husband leads to a reduction of 22.4 percent in their conditional hourly wage. For married men, both own and spousal mental illnesses have pronounced adverse effects on earnings and hourly wages; however, for married women the negative effect of mental illness on their hourly wage, conditional on labor supply, operates mainly through the diagnosis of spousal mental illness. Thus, own and spousal mental illnesses give rise to different labor market effects for married men and married women.

We also estimated model specifications which included interaction terms between the mental health of the wife and the husband to account for a “synergistic” effect of household mental health on labor market outcomes (results not shown). Husbands’ weekly work hours were lower when both spouses had received diagnoses of any mental illness; however, there were no statistically significant effects on wives’ work hours. A diagnosis of depression for both spouses lowered the hourly wages of married men by 21.3 percent, conditional on their labor supply, while there were no effects on wives’ hourly wages. When we incorporated spousal labor supply in these specifications, the results were qualitatively similar.

We also find that the effects of mental illness on labor market outcomes vary by the type of mental illness. In general, the estimated effects of having received a diagnosis of a depressive disorder are larger in magnitude and are more precisely estimated. This conclusion differs from Bartel and Taubman<sup>4</sup> and Miller and Kelman<sup>30</sup>, who associate schizophrenia with lower job market earnings relative to other mental-illness diagnoses.

In summary, our results reveal that there are relatively fewer adverse effects of mental illness on labor market outcomes for single men and married women. For married women, the negative effects of mental illness on their hourly wages operate primarily through the channel of their husbands' mental illness. By contrast, single women and married men are more likely to experience negative labor market consequences of mental illness. These findings may be helpful in designing policy interventions that target high-risk groups for treatment and financial assistance.

Certain personality traits or stressful life events may make individuals more prone to mental illness. Therefore, our use of the fixed-effects estimator is important, as it allows us to control for unobserved person-specific heterogeneity and address a source of bias not properly examined in prior studies. The potential endogeneity of mental health measures is also addressed, using differences in effects across different types of mental health disorders. However, there is a stigma attached to mental illness, so it is quite possible that many of the self-reported indicators of mental illness were inaccurately reported by the respondents, a data limitation that warrants mention. One potentially interesting extension of this research would be to separate untreated individuals with mental illness from those who were treated. It would also be informative to examine whether medical interventions improve the labor market outcomes of

individuals with mental disorders. However, the PSID is quite limited for these purposes since it does not contain data on individuals' treatment history.

## References

1. Association AP. *A Psychiatric Glossary*. Basic: New York; 1975.
2. Kessler RC, Frank RG. The impact of psychiatric disorders on work loss days. *Psychological Medicine*. Jul 1997;27(4):861-873.
3. Bartel A, Taubman P. Health and labor market success: the role of various diseases. *Review of Economics & Statistics*. 1979;61(1):1.
4. Bartel A, Taubman P. Some Economic and Demographic Consequences of Mental Illness. *Journal of Labor Economics*. 1986;4:243-256.
5. Benham L, Benham A. Employment, Earnings, and Psychiatric Diagnosis. In: Fuchs V, ed. *Economic Aspects of Health*. Chicago: University of Chicago Press; 1981:203-220.
6. Frank RG, Gertler PJ. Assessment of Measurement Error Bias for Estimating the Effect of Mental Distress on Income. *Journal of Human Resources*. 1991;26:154-164.
7. Ettner S, Frank RG, Kessler RC. The Impact of Psychiatric Disorders on Labor Market Outcomes. *Industrial and Labor Relations Review*. 1997;51:64-81.
8. Cseh A. The Effects of Depressive Symptoms on Earnings. *Southern Economic Journal*. 2008;75(2):383-409.
9. Liberman R, Jacobs H, Blackwell G. Overcoming Psychiatric Disability Through Skills Training. In: Meyerson A, Fine T, eds. *Psychiatric Disability: Clinical, Legal, and Administrative Dimensions*. Washington DC: American Psychiatric Press; 1987.
10. Strauss JS, Carpenter W. *Schizophrenia*. New York: Plenum; 1981.
11. Kessler RC, Foster CL, Saunders WB, Stang PE. Social consequences of psychiatric disorders, I: Educational attainment. *American Journal of Psychiatry*. Jul 1995;152(7):1026-1032.
12. Draine J, Salzer MS, Culhane DP, Hadley TR. Role of Social Disadvantage in Crime, Joblessness, and Homelessness Among Persons With Serious Mental Illness. *Psychiatric Services* 2002;53(5):565-573.
13. Beiser M, Erickson D, Fleming JAE, Iacono WG. Establishing the onset of psychotic illness. *American Journal of Psychiatry*. 1993;150:1349-1354.
14. Sareen J, Afifi TO, McMillan KA, Asmundson GJG. Relationship between Household Income and Mental Disorders. *Archives of General Psychiatry*. 2011;68(4):419-427.
15. Goldsmith AH, Veum JR, Darity W. The Impact of Psychological and Human Capital on Wages. *Economic Inquiry*. 1997;35:815-829.
16. Amemiya T. *Advanced Econometrics*. Cambridge: Harvard University Press; 1985.
17. Blau F. Trends in the well-being of American women, 1970-1995. *Journal of Economic Literature*. 1998;36:112-165.
18. Blau FD, Kahn LM. Swimming upstream: Trends in the gender wage differentials in the 1980s. *Journal of Labor Economics*. 1997;15(1):1-42.
19. Schoeni R. Marital Status and Earnings in Developed Countries. *Journal of Population Economics*. 1995;8(4):351-359.



20. Cornwell C, Rupert P. Unobservable Individual Effects, Marital Status and the Earnings of Young Men. *Economic Inquiry*. 1997;35:285-294.
21. Bowen WG, Finegan TA. *The Economics of Labor Force Participation*. New Jersey: Princeton University Press; 1969.
22. Guendouzi J. The Guilt Thing: Balancing Domestic and Professional Roles. *Journal of Marriage and Family* 2006;68(4):900-909.
23. Panel Study of Income Dynamics, public use dataset Ann Arbor, MI Survey Research Center, Institute for Social Research, University of Michigan; 1999-2011.
24. Becker GS. Human Capital and the Personal Distribution of Income. *W. S. Woytinsky Lecture No. 1*. Ann Arbor: University of Michigan; 1967.
25. Stewart WF, Ricci JA, Chee E, Hahn SR, Morganstein D. Cost of lost productive work time among US workers with depression. *Journal of the American Medical Association*. Jun 18 2003;289(23):3135-3144.
26. Goetzel RZ, Hawkins K, Ozminkowski RJ, Wang S. The health and productivity cost burden of the "top 10" physical and mental health conditions affecting six large U.S. employers in 1999. *Journal of Occupational and Environmental Medicine*. Jan 2003;45(1):5-14.
27. Marcotte DE, Wilcox-Gok V, Redmon DP. The Labor Market Effects of Mental Illness: The Case of Affective Disorders. In: Salkever D, ed. *The Economics of Disability*. Greenwich, CT: JAI Press; 2000:181-210.
28. Jofre-Bonet M, Busch SH, Falba TA, Sindelar JL. Poor mental health and smoking: interactive impact on wages. *Journal of Mental Health Policy and Economics*. Dec 2005;8(4):193-203.
29. Slade E, Salkever D. Symptom Effects on Employment in a Structural Model of Mental Illness and Treatment: Analysis of Patients with Schizophrenia. *Journal of Mental Health Policy and Economics*. 2001;4:25-34.
30. Miller LS, Kelman S. Estimates of the Loss of Individual Productivity from Alcohol and Drug Abuse and from Mental Illness. In: Frank RG, Manning WG, eds. *Economics and Mental Health*. Baltimore: Johns Hopkins Press; 1992.
31. Fletcher J. All in the Family: Mental Health Spillover Effects between Working Spouses. *The B.E. Journal of Economic Analysis and Policy*. 2009;9(1).
32. Siegel M, Bradley E, Gallo W, Kasl S. The Effect of Spousal Mental and Physical Health on Husbands' and Wives' Depressive Symptoms among Older Adults: Longitudinal Evidence from the Health and Retirement Survey. *Journal of Aging and Health*. 2004;16:398-425.
33. Dufouil CA. Alperovitch for the EVA Study Group: Couple Similarities for Cognitive Functions and Psychological Health. *Journal of Clinical Epidemiology*. 2000;53:589-593.
34. McLeod J. Spouse Concordance for Depressive Disorders in a Community Sample. *Journal of Affective Disorders*. 1993;27:43-52.
35. Lundberg S. Labor Supply of Husbands and Wives: A Simultaneous Equations Approach *The Review of Economics and Statistics*. 1988;70(2):224-235.
36. Hall RE. Wages, Income and Hours of Work in the U.S. Labor Force. In: Cain GG, Watts HW, eds. *Income Maintenance and Labor Supply*. New York: Academic Press; 1973.
37. Chiappori PA. Rational household labor supply. *Econometrica*. 1988;56(1):63-90.
38. Chiappori PA. Collective labor supply and welfare. *Journal of Political Economy*. 1992;100(3):437-467.

39. Olivetti C. Changes in women's hours of market work: The role of returns to experience. *Review of Economic Dynamics*. 2006;9:557-587.
40. Knowles J. Why are married men working so much? The macroeconomics of bargaining between spouses. *IZA Discussion Paper*; 2007.
41. Fletcher J. Adolescent Depression and Adult Labor Market Outcomes. *Southern Economic Journal*. 2013;80(1):26-49.
42. Chatterji P, Alegria M, Takeuchi D. Psychiatric Disorders and Labor Market Outcomes: Evidence from the National Comorbidity Survey-Replication. *Journal of Health Economics*. 2011;30:858-868.
43. Cairney J, Veldhuizen S, Wade TJ, Kurdyak P, Streiner DL. Evaluation of 2 Measures of Psychological Distress as Screeners for Depression in the General Population. *Évaluation de 2 mesures de détresse psychologique pour le dépistage de la dépression dans la population générale*. 2007;52(2):111-120.
44. Furukawa TA, Kessler RC, Slade T, Andrews G. The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of Mental Health and Well-Being. *Psychol Med*. Feb 2003;33(2):357-362.

Table 1 Weighted Means of Mental Illness and Employment Variables by Marital Status and Sex

	Singles			Couples		
	Men	Women	Heads	Men	Women	Wives
<i>N (number of repeated observations)</i>	6,794	13,461	24,397			25,493
<i>Mental Illness Variables</i>	Mean	SE	Mean	SE	Mean	SE
Mental Illness Diagnosis	0.088	(0.004)	0.149	(0.004)	0.038	(0.001)
Depression Diagnosis (if available)	0.044	(0.004)	0.101	(0.004)	0.025	(0.001)
Non-Depressive Diagnosis	0.048	(0.004)	0.061	(0.003)	0.018	(0.001)
K-6 Score > 12	0.036	(0.003)	0.061	(0.003)	0.006	(0.001)
<i>Employment Variables</i>	Mean	SE	Mean	SE	Mean	SE
Employed	0.827	(0.005)	0.774	(0.005)	0.927	(0.002)
Hourly Wage Rate†	20.439	(0.365)	16.242	(0.194)	30.639	(0.311)
Weekly Work Hours	39.138	(0.248)	33.327	(0.201)	43.779	(0.102)
Weeks Out of Labor Force	4.338	(0.184)	7.832	(0.197)	1.924	(0.063)
					11.762	(0.160)

†Converted to hourly average in constant (2011) dollars

Table 2 Weighted Means of Control Variables by Marital Status and Sex

	Singles						Couples					
	Men			Women			Heads			Wives		
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE		
<i>N (number of repeated observations)</i>	6,794		13,461		24,397		25,493					
<i>Socio-Economic Status</i>												
Some High School	0.130	(0.005)	0.166	(0.004)	0.131	(0.002)	0.111	(0.002)				
High School	0.312	(0.007)	0.305	(0.005)	0.272	(0.003)	0.307	(0.003)				
Some College	0.255	(0.006)	0.258	(0.005)	0.222	(0.003)	0.239	(0.003)				
College Degree	0.164	(0.005)	0.142	(0.004)	0.205	(0.003)	0.174	(0.003)				
Some Post-Graduate Education	0.138	(0.005)	0.129	(0.004)	0.170	(0.003)	0.169	(0.003)				
Wealth*	144,064.3	(10256.160)	123,281.9	(9917.366)	388,379.8	(15268.470)	394,652.2	(16219.000)				
Welfare Recipient	0.020	(0.002)	0.056	(0.002)	0.007	(0.001)	0.006	(0.001)				
Salaried Job	0.270	(0.006)	0.278	(0.005)	0.429	(0.003)	0.286	(0.003)				
Union Member	0.127	(0.005)	0.116	(0.004)	0.137	(0.002)	0.098	(0.002)				
Household Non-Labor Income*	4,284.0	(229.888)	5,642.0	(227.693)	3,213.3	(71.094)	3,170.9	(76.598)				
<i>Demographic Characteristics</i>												
Age	38.920	(0.186)	44.373	(0.178)	45.258	(0.085)	45.319	(0.103)				
Black	0.124	(0.004)	0.178	(0.004)	0.050	(0.001)	0.043	(0.001)				
Other Race	0.052	(0.004)	0.051	(0.002)	0.081	(0.002)	0.066	(0.002)				
Number of Children	0.616	(0.015)	0.892	(0.013)	1.130	(0.008)	1.028	(0.009)				
Non-Urban	0.271	(0.006)	0.278	(0.005)	0.332	(0.003)	0.361	(0.004)				
Divorced/Separated/Widowed	0.402	(0.007)	0.570	(0.005)	0.032	(0.001)						
<i>Physical Health/Substance Use Variables</i>												
Fair/Poor Physical Health	0.139	(0.005)	0.181	(0.004)	0.098	(0.002)	0.119	(0.002)				
Disabled	0.057	(0.003)	0.055	(0.003)	0.029	(0.001)	0.024	(0.001)				
Smoker	0.325	(0.007)	0.267	(0.005)	0.184	(0.003)	0.137	(0.002)				
Non-Drinker	0.224	(0.006)	0.381	(0.005)	0.302	(0.003)	0.555	(0.004)				
Health Insurance	0.783	(0.006)	0.902	(0.003)	0.949	(0.002)	0.958	(0.001)				

\*Converted to constant (2011) dollars

Table 3 FE Estimates of Reduced Form Earnings Equation: Log Weekly Earnings Equations

	(1) Single Men		(2) Single Women		(3) Married Men		(4) Married Women		
	FE	FE-GLM	FE	FE-GLM	FE	FE-GLM	FE	FE-GLM	
<b>Non-Specific Mental Illness</b>									
A	Self: Any Diagnosis	-0.126 (0.146)	-0.096 (0.102)	-0.145+ (0.0859)	-0.075 (0.081)	-0.345** (0.111)	-0.123+ (0.063)	-0.114 (0.0800)	-0.276 (0.487)
	Spouse: Any Diagnosis					-0.0764 (0.0850)	-0.099* (0.048)	0.163+ (0.0968)	0.348 (0.467)
<b>Specific Mental Illness</b>									
B	Self: Depression	-0.212 (0.219)	-0.189 (0.149)	-0.304* (0.132)	-0.349** (0.099)	-0.521** (0.182)	-0.262** (0.091)	-0.198 (0.139)	-0.325 (0.695)
	Self: Non-Depressive	-0.267 (0.199)	-0.320* (0.150)	-0.342* (0.143)	-0.226+ (0.120)	-0.328* (0.156)	-0.239* (0.095)	-0.0657 (0.0893)	-0.348 (0.546)
	Spouse: Depression					-0.00541 (0.123)	-0.142* (0.068)	-0.128 (0.160)	0.446 (0.743)
	Spouse: Non-Depressive					-0.123 (0.0914)	-0.069 (0.057)	0.213 (0.216)	-0.361 (0.690)
<b>K-6 Non Specific Psychological Distress Scale</b>									
C	Self: K6 Score >12	-0.571** (0.188)	-0.112 (0.122)	-0.264* (0.106)	-0.202* (0.099)	-0.670** (0.253)	-0.569** (0.207)	-0.063 (0.110)	0.334 (0.853)

Robust standard errors in parentheses

+ significant at 10%; \* significant at 5%; \*\* significant at 1%

Control variables for these specifications are listed in Table 2

Table 4 Tobit FE Estimates: Labor Supply Equations

	(1)	(2)	(3)	(4)
	Single Men	Single Women	Married Men	Married Women
	Weekly Work Hrs	Weekly Work Hrs	Weekly Work Hrs	Weekly Work Hrs
<b>Non-Specific Mental Illness</b>				
A	-2.995* (1.406)	-4.222** (0.863)	-2.713** (0.852)	-3.560** (0.963)
			-0.0684 (0.617)	1.593 (1.240)
<b>Specific Mental Illness</b>				
B	-4.934* (2.470)	-4.863** (1.363)	-2.335+ (1.405)	-2.458+ (1.389)
	-3.925 (2.490)	-5.192** (1.330)	-4.965** (1.456)	-4.232** (1.152)
			0.166 (1.092)	2.557 (1.937)
			-0.336 (0.638)	-0.997 (1.847)
<b>K-6 Non-Specific Psychological Distress Scale</b>				
C	-0.913 (3.390)	-1.928 (1.411)	-0.375 (2.039)	-1.445 (2.172)

Robust standard errors in parentheses

+ significant at 10%; \* significant at 5%; \*\* significant at 1%  
Control variables for these specifications are listed in Table 2

Table 5 Second Stage FE Estimates: Log Hourly Wage Equations

	(1)		(2)		(3)		(4)	
	Single Men	Single Women	Single Men	Single Women	Married Men	Married Women	Married Men	Married Women
	FE	FE-GLM	FE	FE-GLM	FE	FE-GLM	FE	FE-GLM
<b>Non-Specific Mental Illness</b>								
Self: Any Diagnosis	0.128 (0.119)	-0.0139 (0.0689)	-0.00124 (0.0481)	-0.141+ (0.0857)	-0.208** (0.0709)	-0.0229** (0.00510)	0.0305 (0.0448)	0.0301 (0.0623)
Spouse: Any Diagnosis					-0.00349 (0.0369)	-0.0421 (0.0491)	-0.169** (0.0448)	-0.115 (0.0779)
Residual	0.912** (0.349)	0.925** (0.190)	0.0916** (0.0257)	-0.134 (0.159)	-0.0768 (0.227)	0.336 (0.432)	0.541** (0.0783)	0.248** (0.0940)
<b>Specific Mental Illness</b>								
Self: Depression	0.106 (0.121)	-0.0341 (0.172)	-0.0505 (0.0700)	-0.287** (0.102)	-0.315** (0.107)	-0.0564* (0.0254)	-0.0239 (0.0640)	-0.0742 (0.0882)
Self: Non-Depressive	-0.0703 (0.116)	-0.0587 (0.165)	-0.120+ (0.0693)	-0.310* (0.128)	-0.262* (0.115)	0.0626 (0.106)	0.0676 (0.0521)	0.0763 (0.0721)
Spouse: Depression					0.0356 (0.0490)	-0.108 (0.0684)	-0.205** (0.0698)	-0.224* (0.114)
Spouse: Non-Depressive					-0.0222 (0.0446)	0.000938 (0.0577)	-0.143+ (0.0801)	-0.0177 (0.118)
Residual	0.0563* (0.0258)	0.880** (0.196)	0.0450** (0.0134)	-0.172 (0.160)	-0.0443 (0.217)	0.383 (0.289)	0.554** (0.0786)	0.243** (0.0938)
<b>K-6 Non Specific Psychological Distress Scale</b>								
K6 Score > 12	0.0696 (0.209)	-0.0918 (0.137)	-0.0673 (0.0677)	-0.302** (0.0903)	-0.295* (0.148)	-0.473** (0.132)	-0.016 (0.086)	-0.0676 (0.115)
Residual	0.568* (0.226)	0.960** (0.187)	0.378** (0.102)	-0.0726 (0.152)	-0.101 (0.212)	-0.074 (0.395)	0.586** (0.074)	0.242** (0.0932)

Robust standard errors in parentheses

+ significant at 10%; \* significant at 5%; \*\* significant at 1%

Control variables for these specifications are listed in Table 2

Table 5 Second Stage FE Estimates: Log Hourly Wage Equations after adjusting for spousal labor supply

	(2)		(4)		
	Married Men	Married Women	Married Men	Married Women	
	FE	FE-GLM	FE	FE-GLM	
<b><i>Non-Specific Mental Illness</i></b>					
A	Self: Any Diagnosis	-0.217** (0.0698)	-0.0424** (0.0113)	0.0306 (0.0448)	-0.113 (0.0780)
	Spouse: Any Diagnosis	-0.00370 (0.0369)	-0.0410 (0.0486)	-0.169** (0.0448)	0.0295 (0.0624)
	Residual	0.00957 (0.0105)	-0.617 (0.497)	0.542** (0.0781)	0.243** (0.0937)
<b><i>Specific Mental Illness</i></b>					
B	Self: Depression	-0.323** (0.107)	-0.076+ (0.042)	-0.0242 (0.0640)	-0.223+ (0.114)
	Self: Non-Depressive	-0.281* (0.113)	0.0757 (0.0722)	0.0671 (0.0521)	-0.0173 (0.118)
	Spouse: Depression	0.0361 (0.0490)	-0.112+ (0.0677)	-0.205** (0.0698)	-0.0749 (0.0883)
	Spouse: Non-Depressive	-0.0236 (0.0445)	0.00563 (0.0571)	-0.142+ (0.0801)	0.0757 (0.0722)
	Residual	-0.0994 (0.209)	0.606 (0.405)	0.552** (0.0786)	0.237* (0.0934)
	<b><i>K-6 Non Specific Psychological Distress Scale</i></b>				
C	Self: K6 Score > 12	-0.296* (0.148)	-0.0812 (0.136)	-0.015 (0.086)	-0.0683 (0.115)
	Residual	-0.131 (0.209)	0.691** (0.135)	0.586** (0.074)	0.238* (0.0929)

Robust standard errors in parentheses

+ significant at 10%; \* significant at 5%; \*\* significant at 1%

Control variables for these specifications are listed in Table 2



Appendix Table 1: K-6 Non-Specific Psychological Distress Scale

No.	Questions
1	In the past 30 days, how often did you feel so sad that nothing could cheer you up?
2	In the past 30 days, how often did you feel nervous?
3	In the past 30 days, how often did you feel restless or fidgety?
4	In the past 30 days, how often did you feel hopeless?
5	In the past 30 days, how often did you feel that everything was an effort?
6	In the past 30 days, how often did you feel worthless?