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Unequal depression for equal work? How the wage gap explains gendered disparities in mood disorders

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ABSTRACT

Mood disorders, such as depression and anxiety, are more prevalent among women than men. This disparity may be partially due to the effects of structural gender discrimination in the work force, which acts to perpetuate gender differences in opportunities and resources and may manifest as the gender wage gap. We sought to quantify and operationalize the wage gap in order to explain the gender disparity in depression and anxiety disorders, using data from a 2001–2002 US nationally representative survey of 22,581 working adults ages 30–65. Using established Oaxaca-Blinder decomposition methods to account for gender differences in individual-level productivity, our models reduced the wage gap in our sample by 13.5%, from 54% of men's pay to 67.5% of men's pay. We created a propensity-score matched sample of productivity indicators to test if the direction of the wage gap moderated the effects of gender on depression or anxiety. Where female income was less than the matched male counterpart, odds of both disorders were significantly higher among women versus men (major depressive disorder OR: 2.43, 95% CI: 1.95–3.04; generalized anxiety disorder OR: 4.11, 95% CI: 2.80–6.02). Where female income was greater than the matched male, the higher odds ratios for women for both disorders were significantly attenuated (Major Depressive Disorder OR: 1.20; 95% CI: 0.96–1.52) (Generalized Anxiety Disorder OR: 1.5; 95% CI: 1.04–2.29). The test for effect modification by sex and wage gap direction was statistically significant for both disorders. Structural forms of discrimination may explain mental health disparities at the population level. Beyond prohibiting overt gender discrimination, policies must be created to address embedded inequalities in procedures surrounding labor markets and compensation in the workplace.

1. Introduction

1.1. Gender disparities in depression and anxiety

The prevalence of depression and anxiety is approximately twice as high among women as compared with men in the United States (Kessler et al., 2005). This marked gender disparity in these disorders begins in early adolescence and is evident throughout the entire life course (Vesga-Lopez et al., 2008). Proposed explanations for this pattern include biological factors, such as sex hormone changes during puberty (Brooks-Gunn and Warren, 1989); gender differences in psychological factors such as stress reactivity, and coping styles (Kessler et al., 1985); and environmental factors such as exposure to interpersonal violence, and child abuse, (Nolen-Hoeksema, 1990). None of these factors fully explain the disparities (Piccinelli and Wilkinson, 2000).

Ample empirical evidence and insights from social stress theory (Folkman, 1984) indicate that structural inequality and, specifically, discrimination, are important upstream determinants of the population patterning in mood disorders (Corrigan et al., 2004). Although limited (McLaughlin et al., 2011), this evidence extends to gender-specific forms of inequality and discrimination to explain gender disparities in depression (Earls, 1987). For example, unfair treatment in the workplace on the basis of gender, has been shown to account for more variance in depressive and somatic symptoms among women than standard measures of life events and daily hassles (Klonoff et al., 2000). However, large epidemiologic surveys rarely measure gender-specific, stress-inducing forms of discrimination (Pavalko et al., 2003), including sexual harassment and

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unequal treatment.

The United States has passed legislation to address the most overt forms of sex discrimination in the workplace (e.g. Title VII of the 1964 Civil Rights Act). While these have been somewhat effective in reducing gender discrimination in its most explicit forms (Neumark and Stock, 2001), less conspicuous forms of structural discrimination persist, in the form of social and economic devaluation and workplace marginalization and negative events (e.g., with respect to promotion, task allocation). Empirical tests of whether such factors explain gendered health disparities can be methodologically challenging (Link and Phelan, 2001; Meyer, 2003), because culpable parties or polices are often ambiguous (Klonoff et al., 2000), negative events may not necessarily be perceived as discriminatory, or such forms of structural discrimination are social processes that may not be reducible to a single event at all (Krieger, 2014).

Nevertheless, because structural discrimination can result in gender differences in status, power, opportunities, and resources (Bird and Rieker, 2008) it merits greater attention as an upstream driver of gendered patterns in health outcomes. In the present study, we empirically examine the gender wage gap as one form of structural gender discrimination and test the extent to which it can explain gender disparities in mood disorders in the US. The wage gap is a complex construct that reflects processes at multiple levels of social organization, including gender segregation in training and the labor market, differential penalties and rewards for "non-productive" roles (e.g., parenthood (Budig and England, 2001)), and institutional and interpersonal discrimination in the workplace. All of these have material and psychosocial implications for the risk of mood disorders (Piccinelli and Wilkinson, 2000).

1.2. The gender wage gap

The gender wage gap refers to the persistent disparity in income that women receive for their labor relative to men. In 1963, a woman made 59 cents for every dollar paid to her male counterpart. By 2013 it was 82 cents on the dollar (BLS, 2014). Even as the wage gap appears to narrow, there are several robust trends that persist.

First, the gap increases as a woman's absolute wage increases. In 2014, the 95th percentile of women made 79 cents for every $1 earned by men in the 95th percentile, while women in the lowest 10th percentile made 91 cents for each $1 earned by their male counterparts (Davis, 2015). Second, the gap increases as a woman's level of education increases (Vincent-Lancrin, 2008), even as women are increasingly overrepresented among Americans with higher education (Goldin et al., 2006). Finally, men earn more than women even in traditionally female occupations: for example, male registered nurses have historically out-earned female registered nurses by an average of $5100 per year across most specialties (Muench et al., 2015).

While a complete review of different theories explaining the gender wage gap is beyond the scope of this study, it is important to note that such theories focus on both structural- and individual-level explanations (Altonji and Blank, 1999; Goldin, 1990). Structural theories emphasize that gender relations are one of the key social processes that fundamentally shape wages by influencing the relative power of employers and workers and the balance of power between labor and capital (Marx, 1865/1996). Gender relations affect both the bargaining power differentials between gender groups and cultural norms and values concerning the relative worth of female and male labor power (Beechey, 1977; Figart et al., 2005). Feminist economists have divided the function of gender in the wage setting process into three elements: factors that determine intra- and inter-industry wage differentials among male and female workers with similar levels of skill and education; factors that determine the occupational wage structure within industries; and factors that determine deviations of individual wages from average wages within occupations (Karamessini and Ioakimoglou, 2007).

Individual-level theories have focused on the latter of these three elements, separating the part of the wage gap that can be explained by gender segregation across industries and occupations from the differences in individual characteristics of workers, such as accumulated skills, knowledge, and other traits conducive to productivity (Sweetland, 1996). Indicators of these characteristics include education, years of work experience, geographic region, occupation, and industry (Sweetland, 1996). As a way to explain the wage gap as a function of observed gender differences, economists regress income on these individual factors and quantify the income differential in unadjusted and adjusted estimates. Previous research has attributed between 20 and 75% of the income gap to individual-level characteristics using these methods, depending on the age, population subset, and quality/availability of variables (e.g., Blau and Kahn, 2007; Wood et al., 1993). However, a focus on individual measures of productivity minimizes the structural causes of the wage differences, such as labor structure (Bowles and Gintis, 1975).

Recognizing the importance of structural-, institutional-, and individual-level influences on the wage-setting process, researchers have sought ways to quantify gender differences. Oaxaca and Blinder described a counterfactual decomposition technique to study mean outcome differences between groups (Blinder, 1973; Oaxaca, 1973), which has frequently been applied to the gender wage gap (e.g., Bertrand and Hallock, 2001; Blau and Kahn, 2007). Their model is a linear regression comparing the difference in male and female wages as a function of two additive components. First, the *explained* part of the wage gap is due to group differences in the predictors, assuming that the counterfactual female gap has the same slope and intercept of males. The residual wage gap that is unaccounted for by individual measures is the difference between what women should earn, given they are compensated for their productivity and potential for advancement, and their actual wage. This difference in these amounts is usually attributed to gender discrimination. Linear models used to estimate the residual wage gap can be found in Supplementary Table 2.

This residual wage gap is understood as the result of two types of non-mutually exclusive discriminatory processes: the *distribution* effect, which is the structuring of women into certain occupations, which are then implicitly viewed as secondary or inferior to those occupied by men (Bergman, 1974), and the *undervaluation* effect, which is the process by which women are paid less for the same work or work of equal value, driven by the lower valuation of the jobs that women do within all fields (Horrell et al., 1989).

In sum, there are robust and long-standing gender disparities in depression and anxiety disorders, in addition to persistent gender disparities in wages. Although the latter are somewhat reflective of differential individual-level attainment of characteristics conducive to productivity, a large proportion of this gap remains after accounting for these factors and is likely the result of discriminatory processes operating at structural, institutional, and individual levels. This 'unexplained' portion appears to be increasing (Blau and Kahn, 2007). We believe the macro-social processes of gender segregation of employment are an equally or more powerful determinant of gender earnings differentials than strict productivity-related personal attributes. The aim of this study is to quantify and understand how the wage gap may function as a risk factor for disparities in mood and anxiety disorders, guided by the following two goals. First, we seek to measure the extent of the wage gap, after accounting for gender differences in individual-

level productivity indicators. Second, assuming that we find a wage gap residual, we seek to leverage that residual to explain the gender disparity in depression and anxiety disorders. Our goal is to estimate the effect of gender discrimination, as reflected through income differences, on mood disorders. To achieve these goals, we employ propensity score methods to construct a sample of men and women comparable on observed individual-level characteristics that influence wages (e.g. education, occupation, age, children in the home, marital status), and test a potential mechanism to explain why women experience greater depressive and anxiety disorders than men among a nationally-representative sample of adults in the US.

2. Methods

2.1. Data source and study population

Study data were drawn from the baseline survey of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), which assessed psychiatric and substance use disorders, risk factors, and related comorbidity and disability, in a representative sample of the adult U.S. population based on the 2000 census. Interviews took place from 2001 to 2002 and included 43,093 U.S. civilian non-institutionalized adult respondents. The study design and administration has been described in detail elsewhere (Grant et al., 2003b). In order to capture a population of adults whose income was most representative of the factors that determine position in the workforce, our analytic sample was limited to those who were age 30–65, with full or part-time employment, in non-military occupations (n = 22,581; 52.4% of the Wave 1 sample).

2.2. Measures

2.2.1. Income

Individual income was self-reported by respondents as a continuous variable. Among the analytic sample, 1183 (5.2%) men and 1548 (6.9%) women did not self-report their income. Among those, income was imputed using hot-deck methods (National Institute of Alcohol Abuse and Alcoholism, 2008). There was no statistically significant difference in the proportion of imputed income between the two groups (p = 0.299).

2.2.2. Individual indicators of productivity

In order to account for individual-level characteristics that may affect wage differentials, we created a sample of men and women with a similar distribution of individual-level measures of productivity using propensity-matching techniques, described below. These measures were assumed to explain the part of the wage gap due to directly observable individual differences. These included age, age entered the workforce, 7 categories of educational attainment, whether the respondent was US-born, 14 occupation categories (e.g., executive, administrative, and managerial), 14 industry categories (e.g., manufacturing), 8 employer types (e.g., private for-profit company, business, or individual), a binary indicator of full-time and part-time employment, marital status, and number of children in the home. All covariates were categorical, except age, age at workforce entry, and number of children in the home, which were continuous. Due to the survey design of the NESARC, we also included the complex survey weights in our propensity-score estimation, following previously established guidance (Little and Vartivarian, 2003). All included covariates are listed in Supplementary Table 1.

2.2.3. Major depressive and generalized anxiety disorder

Study outcomes were past-year and lifetime major depressive disorder (MDD) and generalized anxiety disorder (GAD). MDD and GAD cases were assessed at baseline according to criteria in the Diagnostic and Statistical Manual, version IV (DSM-IV), using the Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS-IV) version 4, a fully-structured diagnostic interview for use by experienced interviewers without clinical training (Grant et al., 2003a). The scale has demonstrated good test-retest reliability and internal consistency in previous analyses (Grant et al., 2003a).

The presence of major depressive disorder was coded if a respondent reported a persistent depressed mood and five or more of the nine DSM-IV symptoms of major depression for at least 2 weeks (Hasin et al., 2005). Participants were categorized as having GAD if they reported feeling excessively worried about any events in their life, and met at least three of six DSM-IV GAD somatic symptoms for at least 2 weeks (First et al., 1995). Respondents were classified with past-year MDD or GAD if they reported at least 1 episode of either disorder, in the year preceding the interview. Lifetime DSM-IV MDD and GAD were defined as ever having at least one episode of major depression or generalized anxiety.

2.3. Statistical analysis

2.3.1. Propensity score estimation and matching

Propensity score estimates provide a way to summarize covariate information into a single scalar value, which is the conditional probability of assignment to a particular treatment or exposure given the vector of observed covariates (Rosenbaum and Rubin, 1983). They also illustrate the distribution of treated and untreated individuals among all covariate levels (Hernán and Robins, 2006). This approach is beneficial in the case of the present analysis where the distributional overlap of individual-level characteristics between males and females may be limited. Thus, we matched men and women who are balanced on all measured individual-level characteristics of productivity, and did not match individuals for whom there was no adequate counterpart with the same propensity score.

To create propensity-score-matched risk sets of male and female workers we first created a list of observable individual-level characteristics associated with workplace participation and position, and regressed gender on these covariates. Thus, we estimated the probability that an individual with a specific set of covariates was a woman in the workforce. Next, we matched men and women, based on their estimated propensity scores. Men were resampled with replacement, while women were sampled with no replacement. The purpose of this was to preserve the sample distribution of covariates among women, avoiding the bias that would be introduced by resampling women with the highest propensity scores. Our final matched sample comprised 7155 women and 10,622 men; 4804 women had no matched male counterpart. Finally, using this trimmed sample, we estimated the personal income differences between men and women, using linear regression models.

The residual wage gap in the matched and trimmed sample was considered to be the unexplained portion of the gap, likely due a combination of factors including unmeasured individual-level characteristics, measurement error in the measured individual-level characteristics, and, we contend, the effects of unmeasured structural forces behind gender relations, including but not limited to invisible forms of discrimination.

2.3.2. Estimating the effects of the residual wage gap on major depression and generalized anxiety disorder

Next, we tested the extent to which the wage gap within our propensity score-matched sample explained gender disparities in

MDD and GAD. To accomplish this, odds ratios were calculated using a conditional logistic regression model stratified by propensity score matched pairs, adjusted for the income differences of those pairs and respondents' reported income. We compared these estimates to those calculated using a logistic regression model adjusted for each covariate used to create propensity-scores in part one. Also, we created dichotomous indicators of whether the income difference favored women or their matched male counterparts to test if the direction of the wage gap moderated the effects of gender on depression or anxiety. To determine if our findings were driven by the most extreme income differences between matched pairs, we also created four income difference categories dichotomized at the median values in each group. Results from both models are presented using adjusted odds ratios (ORs) and 95% confidence intervals (CIs).

2.3.3. Sensitivity analyses

We completed five sensitivity analyses to validate our results. First, we restricted the sample to those with income < $1,000,000 to test if study results were due only to those with the largest incomes, and thus the greatest matched pair income differences. Second, we restricted our sample to exclude imputed income, to test if imputed data (i.e. hot deck imputation) could explain our findings. We also restricted our sample to those in executive, administrative, managerial occupations as a way to test a more narrowly defined workforce population. We included spousal income in the propensity score estimation and matching to test the explanation that high earning women were more likely to be married and/or live in a two-income household, and therefore generally less likely to develop mood disorders (Williams, 2003). Lastly, because broadly defined occupation and industry categories might be driving some of the heterogeneity in income differences, despite matching, we performed an additional sensitivity analysis, excluding education level from the propensity score estimation, and then stratifying by three levels of education (some high school, high school diploma/GED through some college, and a college degree or more).

All analyses were completed in Stata SE version 13 (Stata, 2011) using weighted analysis to account for nonresponse and sample attrition. Propensity scores were calculated using the psmatch2 module (Leuven and Sianesi, 2014).

3. Results

Table 1 shows the mean values and tests for differences for all individual covariates among the unmatched and matched sample. Among the unmatched sample, men and women had significantly different mean values for all of the included covariates, while the matched sample was not significantly different for any covariates. As a result, the difference in propensity score distribution was statistically significant in the unmatched sample ($p < 0.0001$), and was not statistically significant among the matched sample ($p = 0.99$). Table 2 shows the decomposition model results, comparing the income difference between unmatched and matched groups. The ratio of female to male income in unmatched and matched groups decreased from 0.54 to 0.68. In other words, by using propensity score matching methods we were able to explain 25% of the wage gap.

The odds of depression and anxiety in women using a fully adjusted logistic regression model, compared to the model estimates using a conditional logistic regression model stratified by matched pairs are shown in Table 3. Compared to men, the odds of past-year major depression among women were 1.96 (95% CI: 1.64–2.33) in the adjusted logistic regression model, and 1.74 (95% CI: 1.52–1.99) in the conditional logistic regression model. The odds of past year generalized anxiety disorder were 2.58 (95% CI: 1.83–3.64) and 2.31 (95% CI: 1.80–2.98) in the logistic regression and conditional logistic regression models, respectively. Overall, effect estimates were slightly attenuated, but the odds of depression and anxiety were still significant in the propensity score matched and trimmed sample.

Among matched pairs, the female income was less than her male counterpart in 9176 pairs. The median income difference in this group was $-26,000 (range −274,000 to −1000). Conversely, there were 5134 pairs in which the female income was equal to or greater than the male. The median income difference was $13,000 in this group (range 0–142,000).

Among the pairs where female income was lower than that of her male matched counterparts, odds of MDD among women were 2.43 (95% CI: 1.95–3.04) times higher than those among men, after adjusting for reported income. Among the pairs where female income equaled or exceeded her male matched counterpart, the odds of depression for women vs. men were non-significant (OR: 1.20; 95% CI: 0.96–1.52). The test for effect modification by sex and dichotomous wage gap direction was statistically significant (parameter estimate = 0.73; $p < 0.0001$), demonstrating that, between these two groups, the odds of depression were statistically significantly greater among women whose income was lower than their male matched counterpart.

Similar results were found for GAD. Among the pairs where female income was lower than that of her male matched counterparts, odds of GAD among women were 4.11 (95% CI: 2.80–6.02) times higher than those among men. Among the pairs where female income equaled or exceeded her male matched counterparts, the odds of GAD were decreased but statistically significant (OR: 1.5; 95% CI: 1.04–2.29). Nevertheless, there was statistically significant effect modification by sex and dichotomous wage gap direction (parameter estimate = 0.95; $p = 0.001$). Full model results are presented in Table 4.

Additionally, we dichotomized groups at the median values on each side of the wage gap to create four income difference categories. Where the female wage gap was the greatest (Range: $-26,000–$-274,000), the female odds of MDD were 3.45 (95% CI = 2.36–5.04) times greater than her matched male counterpart. As the female wage gap decreased (Range: $0–$-25,999), the odds of MDD decreased (OR = 2.17; 95% CI = 1.39–3.39). Among the two groups where female income equaled or exceeded that of the matched male counterpart, the odds of MDD were both non-significant (OR = 1.03, 95% CI = 0.72–1.46; Range: $142,000–$16,500; OR = 1.09, 95% CI = 0.63–1.89; Range: $16,499–$0).

A similar association was found for GAD. Where the female wage gap was the greatest, the female odds of GAD were 4.42 (95% CI = 2.56–7.63) times greater than males. As the female gap decreased, the odds of MDD were similar (OR = 5.43; 95% CI = 1.79–16.41). Among the two groups where female income was greater than the matched male income, the odds of GAD were both non-significant (OR = 1.15; 95% CI = 0.44–3.02; OR = 1.45; 95% CI = 0.81–2.60, respectively). It appears that the association was not solely driven by the most extreme income differences in our sample. Results of this analysis can be found in Table 5.

3.1. Sensitivity analyses

For both MDD and GAD, associations were robust to all sensitivity analyses. Full results can be found in Supplementary Table 3. While the association between female gender and both MDD and GAD decreased as education level increased, the significance of relative income and MDD and GAD disparities remained at all levels, only among matched pairs for whom women reported a

Table 1
Mean distributions and tests for differences among unmatched and matched characteristics of individual productivity.

Individual productivity characteristics	Unmatched (U) matched (M)	Mean (women)	Mean (men)	p
Age	U	6.64	6.65	0.11
	M	6.66	6.65	0.56
Age entered the workforce	U	19.77	18.38	0.000
	M	18.91	18.89	0.73
Education	U	10	9.93	0.02
	M	10.09	10.12	0.60
US born	U	1.17	1.19	0.000
	M	1.17	1.18	0.68
Occupation	U	4.59	5.96	0.000
	M	5.01	4.97	0.48
Industry	U	9.27	7.32	0.000
	M	8.49	8.5	0.97
Employer type	U	2.31	2.17	0.000
	M	2.23	2.23	0.84
Full-time	U	0.81	0.94	0.000
	M	0.92	0.92	1.0
Part-time	U	0.2	0.06	0.000
	M	0.09	0.09	0.57
Marital status	U	1.6	1.5	0.000
	M	1.57	1.56	0.39
Number of children in the household	U	0.93	0.83	0.000
	M	0.83	0.84	0.47

Note. U = unmatched, M = matched.

Table 2
Median income difference between unmatched and matched groups.

Median income	Women	Men	Difference	% Explained
Unmatched	19,000	35,000	−16,000	25%[a]
Ratio of female to male income	0.54			
Matched	26,000	38,500	−12,500	
Ratio of female to male income	0.675			

[a] (0.54−0.675)/0.54 = 25%.

Table 3
Odds ratios of past-year major depression and generalized anxiety disorder among women, comparing adjusted logistic regression and matched pair conditional logistic regression estimates.

	Model 1. Adjusted logistic regression[a]			Model 2. Matched and trimmed conditional logistic regression[b]		
	OR (women)	95% CI		OR (women)	95% CI	
Past-year MDD	1.96	1.64	2.33	1.74	1.52	1.99
Past-year GAD	2.58	1.83	3.64	2.31	1.80	2.98

Note. MDD = Major Depressive Disorder. GAD = Generalized Anxiety Disorder.
[a] Adjusted for age, age entered the workforce, education level, birthplace, occupation, industry, employer type, full-time and part-time employment, marital status, and number of children in the home.
[b] Matched on propensity score estimates, calculated using the model covariates in model 1.

lower income than men. These results can be found in Supplementary Table 4.

4. Discussion

Using a sample of men and women matched on education, occupation, age, and other factors related to wages, we observed increased odds of major depressive disorder and generalize anxiety disorder among women relative to men. These results, better accounting for important signifiers of potential gender differences in productivity, are attenuated but consistent with those generated by conventional conditional logistic regression models. In addition, the gender disparity in depression and anxiety disorders observed is significantly greater when women make less than male counterparts in the workforce. Among matched pairs in which the women reported greater income than the male, there was no significant difference in depression, and substantially reduced disparity in anxiety. Overall, these results suggest that gender discrimination may be prominent explanation for gendered mental health disparities at the population level.

In this analysis, we used propensity score methods to measure the gender wage gap and gender disparities in MDD and GAD. As a result, we have demonstrated that the gender wage gap is substantial, and cannot be fully explained by differences in individual-level measures of productivity. Rather, we conclude that it is due to unobserved structural and discriminatory processes. By trimming and matching the sample, we created a population of men and women that was minimally confounded by individual differences in characteristics of workplace productivity. Further, by examining the gender wage gap distribution in the matched sample, we demonstrated that the relative income difference between women and men explained much of the disparities in past-year MDD and GAD.

The assignment of gender as the treatment variable in propensity score estimation methods has been adapted in recent analyses, which have shown how decomposition methods can provide unbiased estimates of wage inequalities (Frölich, 2007; Yamaguchi, 2015). We believe that these methods to study the wage gap can be instructive in documenting the structural mechanisms of discrimination, and examining the effects of those

Table 4
Odds ratios of past-year major depression and generalized anxiety disorder among women versus men, dichotomized by the direction of the matched pair income difference.

Dichotomous wage gap	Past-year MDD				Past-year GAD			
	OR	95% CI		n	OR	95% CI		n
Female ≥ male income	1.20	0.96	1.52	674	1.54	1.04	2.29	236
Female < male income	2.43	1.95	3.04	1352	4.11	2.80	6.02	410
Interaction by gender and dichotomized matched pair income difference	p < 0.0001				p = 0.001			

Note. MDD = Major Depressive Disorder. GAD = Generalized Anxiety Disorder.

Table 5
Odds ratios of past-year major depression and generalized anxiety disorder among women in four categories of income differential, dichotomized by the direction of the matched pair income difference.

Matched pair income difference	MDD				GAD			
	OR	95% CI		n	OR	95% CI		n
Female ≥ male income								
$142,000 ≤ 16,500	1.03	0.72	1.46	340	1.45	0.81	2.60	120
$16,499 ≤ 0	1.09	0.63	1.89	334	1.15	0.44	3.02	116
Female < male income								
$0 ≥ −26,000	2.17	1.39	3.39	654	5.43	1.79	16.41	178
$-25,999 > −274,000	3.45	2.36	5.04	698	4.42	2.56	7.63	232

Note. MDD = Major Depressive Disorder. GAD = Generalized Anxiety Disorder.

mechanisms, such as health disparities.

The labor market and the workplace are each key sites for exposure to discrimination and gendered inequality. Focusing our inquiry on this context allows for exploration of the effects of discrimination beyond interpersonally mediated events perceptible to the victim, into fundamental structural differences in how men and women are affected by labor markets and wage setting processes. When embedded as gender-neutral elements of an institutional structure, policies and procedures surrounding wages become legitimized and act to formalize men's privilege in the workplace (Ridgeway and England, 2007). These discriminatory policies and practices may negatively impact women's mental health through gendered material conditions and psychosocial stress.

The devaluation of women's work means women are paid less for commensurate work and do not enjoy the same returns to investments in human capital compared to men. Lower income has long been associated with poorer mental health (Dohrenwend and Dohrenwend, 1969). Furthermore, lower relative income has implications for household labor division and role burden for heterosexual married women. The gendered nature of the household economy means women take on childrearing and other household labor disproportionately. Married women are more likely to relocate for their husband's work, and are thus more likely to be out of the workforce for periods of time, or to work in positions for which they are overqualified and thus underpaid (Boyle et al., 2001). Although men and women may not report working substantially different hours per week, women report far more time spent on daily domestic roles, which are not often considered in investigations of the wage gap (Dzaja et al., 2005). Also, women are often more subjected to the consequences of inflexible workday schedules in seeking to accommodate childcare. The resulting time and energy demands of holding multiple social roles, mean that women are more likely to experience role overload, which has been shown to increase stress, sleep loss, and subsequent mood and anxiety symptoms (Gjerdingen et al., 2001). Role overload may explain why mood and anxiety disorder disparities remain even when matching on spousal income, if married women are constrained by multiple roles more than their male counterparts. Further research directions might incorporate job strain theory (Karasek Jr., 1979; Karasek and Theorell, 1992) and specific measures of job security as a supplemental investigation of the consequences of competing demands that women face in the home and workplace economy (Grönlund, 2007).

In addition to material consequences, inequalities in the workplace may increase the psychosocial stress of women, even if they are not perceived as unjust. Perceived discrimination has been shown to increase symptoms of depression and anxiety, however, what is perceived likely represents only a small proportion of instances of unfair treatment by women in the workplace (Roos and Reskin, 1984). Gendered wage inequality may be a proxy for other forms of bias operating in a workplace. For example, women who are denied promotions or lucrative and prestigious work assignments may perceive this as an act of discrimination, and thus face increased psychosocial stress. Conversely, to the extent that these barriers to upward mobility are prevalent and perceptible, but the mechanisms of gender discrimination are not, the impact of such experiences may also be affected by attributional responses (Schmitt and Branscombe, 2002). If women are more likely to internalize negative workplace experiences as reflective of inferior merit, rather than the result of discrimination, they may be at increased risk. The accumulation of experiences like these may have lasting effects on the gender disparities in mood and anxiety disorders (Crocker and Major, 1989). Notions of traditional gender roles are changing (Barnett and Hyde, 2001), however, the aforementioned structural mechanisms may persist in workplace settings, where, even in the presence of nominal gender parity in job titles and responsibilities, the expectations that inform policy and management decisions are still likely to reflect the traditional gender hierarchy where the male worker remains superior (Eagly et al., 2000). A key strength of this study is the use of the gender wage gap in order to measure the effects of those structural mechanisms without reliance on individual perceptions and self-reports.

There are several limitations to note in the interpretation of decomposition methods, and the assumptions made in order to operationalize a dichotomous measure of causes of income difference. In addition to capturing the effects of discrimination, the residual in wage decomposition models will also capture any measurement error in calculating the explained part of the wage gap. Some of the individual-level characteristics were categorized broadly and likely still contain heterogeneous individuals (e.g., occupation), which may have resulted in unmeasured confounding in the propensity scores. However, our findings were robust to several sensitivity analyses, which suggests that any bias was likely minimal. Also, many of the differences in current individual-level characteristics may themselves be the results of more distal sources of gender discrimination prior to entry in the workplace (Eagan et al., 2014). If so, our estimate of the wage gap may in fact be underestimated, if the individual-level characteristics we included are partially a result of structural discrimination. An additional investigation into the impact of structural discrimination on adolescent girls could prove a valuable extension of the current analysis, in order to investigate the causes of gender disparities in MDD and GAD incidence in adolescence, prior to entry into the workplace. While power to detect statistically significant effects was greater than 90% in most models, it was only 51% in the model estimating the odds of GAD among the group where the female income was greater than or equal to the male income, likely because the prevalence of GAD in this group was quite low and relatively similar in men and women (1.4% and 2.2%, respectively). We suggest this estimate be interpreted cautiously, but still have

confidence in the model results because the stratum-specific estimates are substantially different.

As our study used cross-sectional data, one additional limitation is the issue of unmeasured social selection. While future replications of our methods using longitudinal data would be helpful to test selection bias, previous investigations have concluded that social selection is not the primary process behind these associations (Chandola et al., 2003).

Finally, though the goal of this study was to explain the well-documented disparities in major depression and generalized anxiety disorders, according to DSM-IV criteria, additional research that focuses on broader mechanisms and non-dichotomous affective outcomes is needed to inform equally broad social interventions (Dohrenwend et al., 1980; Kendler, 2012). The inclusion of multiple measures of gender-based discrimination in population health research would also help elucidate mechanisms and further clarify the extent to which perceived discrimination can explain the observed disparities in affective disorders. Another important analysis would investigate mental disorders that are more prevalent among men compared to women (e.g., alcohol use disorders) (Eaton et al., 2012). Also, future investigations using more recent data would provide valuable insight into how these disparities may have changed in response to the 2008 recession and the recent employment and economic environment (Jenkins et al., 2012).

This study gives further support to the notion that gender discrimination is a multi-level process that extends beyond what can be directly perceived by an individual. Though inter-individual gender discrimination like sexual harassment certainly is a significant risk, the cumulative effect of internalized responses to institutional discrimination may explain the disparity in mood and anxiety disorders. It is important to prioritize methods to measure the fundamental mechanisms that perpetuate wage disparities for their own sake, but also so that we may understand and intervene to reduce subsequent health risks and disparities.

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.socscimed.2015.11.056.

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