Do Menstrual Problems Explain Gender Gaps in Absenteeism and Earnings? Evidence from the National Health Interview Survey

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Abstract: The health effects of menstruation are a controversial explanation for gender gaps in absenteeism and earnings. This paper provides the first evidence on this issue using data that combines labor market outcomes with information on health. We find that menstrual problems could account for some of the gender gap in illness-related absences, but menstrual problems are associated with other negative health conditions, suggesting our estimates may overstate causal effects. Nevertheless, menstrual problems explain very little of the gender gap in earnings.

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1. Introduction

There is a large literature in economics examining gender gaps in labor market outcomes (see Altonji and Blank, 1999; and Bertrand, 2011 for reviews). Early research on gender gaps largely focused on the roles of human capital accumulation (e.g., education, experience) and discrimination, but more recent work has paid increased attention to psychological factors, such as risk preferences and attitudes towards competition and negotiation (Bertrand, 2011). These studies have revealed a number of important differences between men and women, and in light of these findings, a fundamental - and provocative - question is to what extent these differences might be driven by "nature" rather than by "nurture."

Currently, there is little evidence of innate biological determinants of gender gaps. A major biological difference between the sexes is the ability to bear children, and a number of studies (e.g., Mincer and Polachek, 1974; O'Neill and Polachek, 1993) show that the career interruptions associated with child birth reduce women's wages. However, since the decisions to have and stay home with children may be endogenously determined by women's labor market prospects and social norms regarding child-rearing, child-bearing may not reflect an exogenous biological basis for gender gaps.

Seeking a source of exogenous variation, Ichino and Moretti (2009) focus on menstrual cycles, which are experienced by nearly all women of reproductive age. They develop a model of statistical discrimination to illustrate how menstrual-related health problems (e.g., premenstrual syndrome (PMS), premenstrual dysphroic disorder (PMDD)) – which are documented in the medical literature to increase work absenteeism – could generate gender gaps in earnings.[1] In

[1] PMS refers to a set of physical, behavioral, or emotional symptoms that typically occur for several days to 2 weeks before and remit during menses. These symptoms can include: abdominal bloating, breast tenderness, constipation or diarrhea, food cravings, headache, difficulty concentrating, fatigue, feelings of sadness or hopelessness, anxiety, tension, irritability, mood swings, and sleep problems (A.D.A.M. Medical Encyclopedia 2011b). PMDD is a

their model, employers cannot directly observe individual workers' productivity but can observe absenteeism, a signal of workers' propensity to shirk.[2] Because menstrual cycles make absenteeism a noisier signal of productivity for women, employers set different wage schedules for men and women as a function of absenteeism; men receive higher base pay than women but incur larger wage losses for each absence.

Ichino and Moretti's empirical support for this model, based on data from a large Italian bank, suggests a link between menstrual cycles and illness-related absenteeism at 28-day intervals.[3] In a subsequent paper (Herrmann and Rockoff 2012), we re-analyze these Italian data and show this link is not robust to small corrections in coding or changes in specification. More importantly, we show that their approach—which relies on absence timing rather than direct information on menstruation—is confounded by the fact that five day work weeks can create large differences in absence patterns between groups at multiples of 7, including 28 days. Without an additional source of identifying variation, the timing of absences is unlikely to provide conclusive evidence for or against a role for menstrual cycles in explaining gender gaps in labor market outcomes.[4]

To our knowledge, the role of menstruation in explaining gender gaps in the labor market has not been investigated with data that contains information about menstrual health problems, absenteeism, and individual earnings. Fortunately, two waves of the National Health Interview

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condition in which a woman has severe depression symptoms, irritability, and tension before menstruation (A.D.A.M. Medical Encyclopedia 2011a). For medical studies on the relationship between PMS/PMDD and absenteeism, see Dean and Borenstein (2004), Hylan et al. (1999), and Hienemann et al. (2010).

[2] Although absenteeism is simply a signal in their model, Ichino and Moretti note the model could be extended to allow for absenteeism to have a direct effect on productivity.

[3] Ichino and Moretti show that the hazard rate of the next absence spell for young women, relative to young men, spikes 28 days after the start of a previous absence spell – the same number of days as the average menstrual cycle. Reweighting the female distribution of 28-day absence spells to match the male distribution, they estimate that menstrual cycles could explain one third of the gender gap in illness-related absenteeism and 14 percent of the gender gap in earnings.

[4] This parallels a problem in the development literature, where researchers lacked appropriate data to address how menstruation affects girls' school absenteeism. Oster and Thornton (2010), who use data on both girls' menstruation and absenteeism, conclude this biological mechanism explains a tiny fraction of girls' school absences.

Survey (NHIS), a nationally representative sample of adults in the U.S., contain information on all three of these variables. We use these data to estimate the relationships between menstrual health problems, illness-related absenteeism, and earnings for women. We predict the counter-factual illness-related absences and earnings that women would have if no women had menstrual problems and use these predictions to assess the extent to which menstrual problems could explain gender gaps in illness-related absences and earnings.

We find that women with menstrual problems have significantly more illness-related absences than other women; completely eliminating menstrual problems would reduce the gender gap in illness-related absences from 0.96 days to between 0.65 and 0.46 days. Our estimates are may overstate the explanatory power of having menstrual problems; this condition is correlated with a number of other negative health indicators and is likely to be endogenously determined.

Despite the fact that menstrual problems could account for some of the gender gap in illness-related absences, they explain very little of the gender gap in earnings; specifications that include a standard set of controls (i.e., demographic characteristics, full-time work, and number of months worked) suggest that menstrual problems could account for less than 1 percent of the gender gap in earnings. We explore a number of potential explanations for this discrepancy and find that illness-related absences explain little of the gender gap in earnings.

Since the NHIS is a cross-sectional dataset, we cannot use a number of empirical strategies that would provide further supporting evidence. Ideally, if panel data were available, we would try to exploit the coincident timing of menstrual-related health problems and work absences or control for other aspects of individual heterogeneity. Nevertheless, given the lack of evidence on the effect of menstrual problems on labor market outcomes for women (and gender gaps), an observational analysis with rich cross-sectional data provides an important first step in addressing this question.

This paper continues as follows: Section 2 provides background evidence from various related literatures, Section 3 describes the data, and Section 4 presents our econometric strategy. Section 5 presents the results, and Section 6 concludes.

2. Background

It is well-known that women have higher rates of work absenteeism than men, both due to women taking responsibility for child care and having higher rates of absences for own illness (e.g., Paringer, 1983; Leigh, 1983; Johansson and Palme, 1996; Hansen, 2000). For a small fraction of women, symptoms related to menstrual cycles (e.g., fatigue, bloating, bothersome cramping, or heavy bleeding) may be severe enough to interfere with social or occupational functioning and result in increased absences from work. Around 3 to 8 percent of women of reproductive age are estimated to suffer from a severe form of PMS known as PMDD, and about 15 to 20 percent of women meet criteria for sub-threshold PMDD (Pearlstein, 2007). Dean and Borenstein (2004) and Hienemann et al. (2010) follow women over one or two menstrual cycles and find that women with PMS or PMDD are significantly more likely to be absent from work than other women. Over a one year interval, Hylan et al. (1999) finds that 14 percent of U.S. women report missing 1-7 days of work due to PMS symptoms, 1 percent report missing 8-14 days, and 1 percent report missing more than 14 days.[5]

[5] Hylan et al. (1999) only report absenteeism in the last year for the 21% of women who have ever reported missing work due to PMS symptoms, and these percentages are reported by the ranges of days above. The unconditional percentages above were calculated by multiplying the conditional percentages reported for each range of days by 0.21. Unfortunately, Hylan et al. do not report the average number of days missed. In contrast to the medical studies, an economic study of absence in Norway – where sick pay is generous – finds that menstrual pain accounts for less than 1 percent of women's minor disease absences that have been certified by a physician (Markussen et al., 2011).

Several theoretical models predict that absences due to menstrual symptoms – and absences in general – should reduce wages. For example, Allen (1981) models absences as aspects of non-pecuniary compensation in a hedonic framework, and Barmby et al. (1994) develops an efficiency wage model in which absenteeism is a form of shirking. These models suggest that employers can influence absenteeism through their compensation offers, and it is reasonable to think that workers will self-select into jobs based on their preferences for absenteeism. These channels suggest that women with menstrual problems could receive lower wages because their absences result in wage penalties (e.g., Ichino and Moretti, 2009) or because their propensity for absence causes them to select into occupations that pay lower base wages but have lower costs of absence.

Unfortunately, there is no consensus in the empirical literature about the expected magnitude of wage losses due to absence. In fact, the empirical evidence about the relationship between wages and absenteeism is largely mixed due to endogeneity issues (e.g., Brown and Sessions, 1996). A common challenge in this work has been that absenteeism and wages are equilibrium outcomes of labor supply and demand. When workers' contracted hours are inflexible, they may satisfy their preferences for leisure by taking absences. The static neo-classical model of labor supply predicts that workers' demand for leisure may increase or decrease as a function of wages, depending on whether the income or substitution effects dominate, which could contaminate the estimated relationships between absences and income. One paper that addresses this endogeneity problem is Hansen (2000), who uses a Swedish national health insurance reform to instrument for absences. He finds that one additional day of absence for own illness reduces women's wages by 0.2-0.7%, but has no significant effect on men's wages, and therefore explains only a tiny fraction of the gender wage gap.

Menstrual problems could also affect wages by reducing women's productivity while at work. For example, Chawla et al. (2002) find that women with PMDD self-report having lower work productivity during the affected portions of their cycles. However, it is also possible that women's perceptions of productivity could be affected by their mood states. Studies by Rapkin et al. (1989), Morgan et al. (1996), and Resnik et al. (1998) find that women with PMS or PMDD feel more depressed during the affected portions of their cycle but do not perform significantly worse on objective tests of cognitive function.

The potential mechanisms presented above suggest that any earnings losses associated with menstrual problems should be mostly borne by the women who suffer these health problems, since they should suffer wage penalties from absence or lower productivity. This motivates our empirical strategy of comparing the absences and earnings of women who suffer menstrual problems to those who do not. It is worth noting that there could be general equilibrium effects of menstrual problems on women's wages; for example, if productivity is unobserved, employers could pay all women lower wages because some women suffer menstrual problems. However, employers should learn about productivity over time (e.g., by observing absenteeism or noisy signals of output). We therefore test whether the correlation between earnings and menstrual problems increases with job tenure, as employer learning models would imply (Altonji and Pierret, 2001).

A key issue in our analysis is the correlation between menstrual problems and other health and behavioral factors. In the NHIS, women who experience menstrual problems are also significantly more likely to report frequent anxiety and depression, insomnia, excessive sleepiness, and pain over the last 12 months, as well as being more likely to smoke, drink heavily, and to be overweight/obese (see Strine et al. 2005 and Table 1 below). It is unclear from the medical literature whether these symptoms are endogenous to the conditions that cause menstrual problems, or menstrual problems are endogenous to the conditions that cause these other health and behavioral issues. As Freeman (2007) explains, "there are numerous conditions whose symptoms may be confused with PMS or may be exacerbated premenstrually … it can be difficult to determine whether the symptoms are an exacerbation of a comorbid condition or PMS symptoms … superimposed on another condition."[6] These comorbid medical conditions may be correlated with absences and earnings and could bias the estimated effects of menstrual problems on labor market outcomes.

Because of this concern, we present estimates from specifications that progressively add controls for individual characteristics, including some specifications that control for potentially endogenous health problems, such as anxiety, depression, insomnia, fatigue, pain, and headaches. Given the ambiguity in the medical literature, testing the sensitivity of our results to the inclusion of controls for these other health and behavioral indicators is important for the interpretation of our findings.

3. Data

The primary data used in this paper are from the NHIS, a nationwide, representative survey that provides a rich set of information on the health and demographic characteristics of the U.S. civilian, non-institutionalized population. What is crucial for our study is that the 2002 and 2007 NHIS waves included a question about menstrual problems. Specifically, women aged 18-55 were asked whether they "had any menstrual problems, such as heavy bleeding,

[6] For example, hypothyroidism in women can cause heavier periods, depression, fatigue, muscle or joint pain, and weight gain (A.D.A.M. Medical Encyclopedia 2012b). We cannot control for hypothyroidism in our sample since the NHIS only asks whether individuals have ever been diagnosed with any thyroid condition (hypothyroidism or hyperthyroidism) in the 2002 wave. In contrast to hypothyroidism, hyperthyroidism is associated with irregular periods and lack of menstrual problems in women (A.D.A.M. Medical Encyclopedia 2012a).

bothersome cramping, or premenstrual syndrome (also called PMS)" during the past 12 months. Our main explanatory variable for menstrual problems is coded as 1 for women who responded "yes" to this question and is coded 0 for women who responded "no." 21 percent of women reported having menstrual problems according to this measure.

Our two main outcomes are illness-related absenteeism and income. For absenteeism, the NHIS asked individuals the number of days of work they missed in the last year due to illness or injury, excluding maternity leave. Unfortunately, the NHIS does not collect information on other types of absence (e.g., vacation, personal days). This is an important limitation. It is reasonable to think that individuals offset absences taken for illness by taking fewer absences for other reasons, so that a relationship of menstrual problems to illness-related absences could overstate the relationship with absences overall.[7]

We focus on earnings rather than hourly wages due to two limitations of the questions in the NHIS. Income is reported categorically; individuals indicate their total earnings over the last calendar year by selecting one of 11 categories, which span $5,000 to $10,000 intervals and are top-coded at $75,000.[8] We account for this categorical reporting by using interval regressions for our analyses.[9] Meanwhile NHIS only collects the number of hours individuals worked in the last week, as opposed to the last calendar year. Individuals who worked fewer than 35 hours in the last week were asked whether they usually work full-time (i.e., 35 or more hours per week) but

[7] We find support for the idea that absences are partially substitutable in a separate study of teacher absences. We find that teachers who are absent more often due to their religious holidays falling on days when school is in session are less likely to be absent for other reasons during the school year (see Herrmann and Rockoff (2010), page 15).
[8] These are <$5000, $5000-$9999, $10000-$14999, $15000-$19999, $20000-$24999, $25000-$34999, $35000-$44999, $45000-$54999, $55000-$64999, $65000-$74999, $75000+.
[9] We estimate these regressions using maximum likelihood, assuming that the error term is normally distributed. Similar results are obtained from OLS regressions that use the midpoint of each interval or the median income of the interval (calculated from the 2002 and 2007 March Supplements to the Current Population Survey (CPS)).

were not asked how many hours they usually work. We define full-time employment as either working 35 or more hours in the last week or usually working full-time.[10]

The NHIS also contains information on other characteristics that we use in our analyses. These include additional information on employment (e.g., number of months worked in the last year, number of years the individual has worked for the employer), demographic characteristics (sex, age, race, education, marital status, number and age of children), and other health conditions and behavioral risk factors (e.g., pregnancy, smoking, exercise, and body mass index) that might be correlated with menstrual problems, absenteeism, and earnings.

Our empirical strategy compares outcomes for women who suffer from menstrual problems to those who do not, assuming that menstrual problems are sufficiently persistent to affect women's absences in the past 12 months and income during the last calendar year. The assumption of persistence is supported by medical evidence on the relative stability of PMS and PMDD.[11] We also impose restrictions on the sample to reduce measurement error due to the 12-month reference period on the question about menstrual problems; specifically, we exclude women who are currently pregnant or gave birth in the last year and drop individuals those older than 45 to avoid women whose prior menstrual problems have stopped due to menopause.[12] Based on this age restriction for women, and to focus on individuals who have completed their education, we limit the sample to individuals between the ages of 25 and 45.

Table 1 provides summary statistics for the men and women in the sample, as well as the characteristics of women who do and do not have menstrual problems. About 21 percent of

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[10] Data from the CPS – which asks both about hours in the last week and in the last year – suggest that this definition is a good approximation; over 96 percent of individuals in the CPS who worked full-time in the last week worked full-time in the last year.

[11] Wittchen et al. (2002) find that PMDD symptoms are relatively stable across 48 months, with fewer than 10% of baseline PMDD cases having complete remissions. Van der Ploeg and Lodder (1993) find more variability in the stability of PMS symptoms over a 2 year period. Roca et al. (1999) find that PMS is a stable diagnosis in a 5- to 12-year follow up on a small sample.

[12] Menopause normally occurs between the ages of 45 and 55 (A.D.A.M. Medical Encyclopedia. 2013).

women in the NHIS are classified as having menstrual problems, which falls within the range of estimates found in the medical literature (19 to 30 percent) on the prevalence of PMS (Dean et al. 2006). Since labor market outcomes, such as income and absences, are only observed for individuals who work, we report the proportions of individuals who worked in the last year. As expected, men are more likely to have worked in the last year than women, but interestingly, women with menstrual problems are just as likely to have worked as other women, though their work is more likely to be part-time. Before discussing gender gaps in income and absences, it is important to note that the NHIS has higher rates of non-response on income questions than the surveys typically used to estimate gender gaps in economic outcomes. In this sample, about 28 percent of men and 27 percent of women who reported working the last year have missing values for income. Schenker et al. (2006) finds that missing values of income in the NHIS are correlated with a number of characteristics (e.g., age, race, having health insurance, and region of residence). In these data, non-response is lower among women with menstrual problems; if non-respondents are negatively selected, we might expect the observed gaps to overestimate the difference between women with and without menstrual problems.

Among individuals who report income, women earn about 42% less than men and have 0.96 additional days of illness-related absence per year.[13] While this gender gap in earnings seems large, its size is due to the inclusion of part-time and part-year workers in the sample. As a comparison, we used data from the 2002 and 2007 March Supplements to the CPS to estimate the raw gender gap in income for a similarly selected sample, which yielded an OLS estimate of 43 log points (results available upon request)[14]. The similarity between these estimates is

[13] This income gap is based on estimates of average log income from interval regressions.
[14] The CPS sample is restricted to individuals between the ages of 25 and 45 and excludes individuals who gave birth in the last year. We cannot exclude women who are currently pregnant from the CPS sample like we do from

reassuring because the CPS has higher rates of response than the NHIS, and the CPS estimates are based on exact income measures, rather than on income categories. On the other hand, the 0.96 day gender gap in illness-related absences is very small relative to other estimates in the literature of the gender gap in absences. For example, Ichino and Moretti (2009) report a gender gap of 3.07 days of absence due to illness among full-time workers in the U.S. While part of the difference may be due to the inclusion of part-time and part-year workers in our sample, the gender gap in illness-related absences among full-time, full-year workers in our sample is still only 1.2 days.

While the gender gap in absences is relatively small in this sample, women with menstrual problems have 2.2 days of illness-related absence more on average than women that do not report having menstrual problems. This estimate is roughly consistent with the medical literature on PMS/PMDD and work absenteeism.[15] Women with menstrual problems also earn about 8 percent less than other women. Women with menstrual problems also differ on a number of other dimensions. For instance, women with menstrual problems are more likely to be white and less likely to be Hispanic, and, as mentioned above, they are more likely to smoke, be obese, or to report having experienced frequent anxiety, depression, insomnia, or fatigue in the last 12 months, and pain or headaches in the last 3 months.

4. Econometric Strategy

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the NHIS sample since the CPS does not ask about pregnancy. We trimmed the top 1% and bottom 1% of income observations and estimated the gender gap in income using OLS on the exact income measures.

[15] Estimates of the average number of days missed per year are not typically reported in the medical literature, since most studies examine women for only one or two menstrual cycles (e.g., Dean and Borenstein (2004), Hienemann et al. (2010)). Hylan et al. (1999) do ask about absences in a one-year period but only report the percentages of women who fall into the following ranges of absences: 1-7 days, 8-14, 15+. Using the lower bounds for each of these intervals – the absence distribution is likely skewed right – suggests that women with PMS miss an additional 2.36 days per year.

To examine the extent to which menstruation might contribute to gender gaps in absenteeism and earnings, we estimate the following equation separately for each gender $g \in \{m, f\}$, using Poisson regressions for absences (a count variable) and interval regressions for earnings (a categorical variable):

$$Y_{ig} = f(\alpha_g + \beta_g M_{ig} + X_i \gamma_m + \varepsilon_{ig}) \quad (1)$$

where Y_{ig} represents the outcome for individual i of gender g (i.e., number of days absent from work due to illness or log earnings) and M_{ig} is an indicator for whether the individual experienced menstrual problems in the past year, which is always 0 for men. X_{ig} is a vector of control variables, which, in the most inclusive specification, includes controls for race, region, year, education, potential experience, marital status, having children under 6, whether working full-time, number of months worked, job characteristics, and health conditions. [16] ε_{ig} is the error term, which we cluster at the level of the primary sampling unit and year. The regressions are weighted to account for individuals' probability of being sampled in the NHIS.

Since we estimate the equations separately by gender, the coefficient β_f represents the difference in outcomes between women who experience menstrual problems ($M_{if} = 1$) and those who do not ($M_{if} = 0$), once differences in other characteristics (X_{if}) have been taken into account. If menstrual problems could explain gender differences in outcomes, we would expect statistically significant differences in outcomes between women who experience these problems

[16] Specifically, we include race dummies (black, Hispanic, other), region dummies (South, Midwest, West), a year fixed effect, education dummies (less than HS Grad, Some College, College or More), a quadratic polynomial in potential experience, dummies for marriage and having children under 6, full-time dummy, number of months worked, dummies for paid sick leave, employer-provided health insurance, occupation and industry fixed effects, and health condition dummies (smoker, overweight, obese, get recommended exercise, heavy drinker, fatigue, pain, insomnia, anxiety or depression, headaches) or missing information on any of the job or health condition controls. We define potential experience as the max between 0 and age minus years of education minus 7. We construct the years of education variable from the variable for educational attainment, assigning 12 years of education to high school graduates and those with a GED, 14 years of education to those with some college or an AA degree, 16 years of education to those with a Bachelor's degree, 17 years of education to those with a Master's degree, and 19 years of education to those with a professional or doctoral degree.

and those who do not. To determine the extent to which menstrual problems explain gender gaps in outcomes, we use the female equation to predict $E_f(Y_{if} \mid M_{if} = 0, X_{if})$, which is the expected outcome for women if they had the same prevalence of menstrual problems as men (i.e., none) but otherwise had no changes in their other characteristics. We then calculate the difference $E_m(Y_{im} \mid M_{im} = 0, X_{im}) - E_f(Y_{if} \mid M_{if} = 0, X_{if})$ as the counterfactual gender gap if women did not experience menstrual problems. We do not use more standard decomposition techniques (e.g., Oaxaca-Blinder decomposition) because the male coefficient for "menstrual problems" is not identified and our estimation models are non-linear.

5. Results

5.1 Illness-Related Absenteeism

Table 2 reports regression results for the effect of menstrual problems on absenteeism due to illness. The top panel reports the Poisson regression coefficients for specifications that are estimated only on the sample of women. The bottom panel reports the observed gender gap (based on men and women with non-missing values of the control variables) and the counter-factual gender gap that would exist if women did not have menstrual problems. Recall that the counter-factual gender gap is generated by predicting women's absences assuming that their prevalence of menstrual problems were 0. Women with menstrual problems are significantly more likely to be absent for illness than women without these problems (Panel A, Column 1), and this implies that menstrual problems could account for up to 52 percent of the gender gap in illness-related absences (Panel B). However, as previously noted, women with menstrual problems have different characteristics than other women, and the remaining columns of Table 2 include additional controls. Column 2 adds controls for demographic characteristics, which slightly decrease the coefficient on menstrual problems. Adding controls for working full-time and the number of months worked (Column 3) also has a very small dampening effect, so that menstrual problems might explain 48 percent of the gender gap in illness-related absences. This suggests that a simple story about labor force attachment is not the mechanism driving the relationship of illness-related absences and menstrual problems. In Column 4 we add the (coarse) set of industry and occupation controls available in the NHIS, as well as indicators for having paid sick leave or employer-provided health insurance, which could affect workers' incentives for absence and their knowledge about and treatment of health conditions.[17] These controls have almost no additional effect on our estimate.

Column 5 adds controls for smoking, BMI, exercise, and heavy drinking. The inclusion of these behavioral risk factors and health conditions, which one might argue are not directly caused by menstrual problems, causes a significant reduction in the estimated difference in absences between women with and without menstrual problems. However, while this difference is still significant, the estimate suggests that menstrual problems could explain up to 40 percent of the gender gap in absences.

The final column adds controls for health conditions/symptoms that are possibly endogenous to having menstrual problems, such as having depression, pain, and fatigue. While the inclusion of these controls may more effectively deal with omitted variable bias from unobserved conditions (e.g., hypothyroidism, depression) that are correlated with menstrual problems, these conditions could also be endogenous and the results should be interpreted keeping this in mind. Controlling for these health conditions causes the estimated Poisson coefficient to fall in magnitude by roughly 50 percent, though it is still statistically significant at

[17] The controls for industry and occupation consist of 14 industry categories and 12 occupations. This coding was complicated by a change between years in industry and occupation codes; details on the industry/occupation groups and the matching across years can be found in the Appendix.

the 10 percent level. The new point estimate would suggest that menstruation could account for 23 percent of the gender gap in illness-related absences.

Taken together, these results suggest that menstrual problems may play a role in explaining gender gaps in illness-related absences. However, the degree to which this is the case depends heavily on our consideration of the endogeneity of menstrual problems to other health indicators. If we regard our estimates as providing a range of plausible values, then menstruation may play a role in explaining between 20 and 50 percent of the gender gap in illness-related absences, which is substantial. Nevertheless, we do not observe absences unrelated to illness, so we cannot say whether these effects translate into an increase in the overall absence gender gap.

5.2 Earnings

To examine whether menstrual problems could explain gender gaps in earnings, we estimate a similar set of specifications, but using interval regression to reflect the nature of the earnings data in the NHIS. Table 3 reports results from earnings regressions following the same format as Table 2, with the Panel A reporting the earnings coefficient on menstrual problems for women, and the Panel B reporting the counterfactual gender gaps. Column 1 reports the result of regressions with no additional controls, and shows that women with menstrual problems earn 8 percent less than other women. This raw difference suggests menstruation could account for up to 4 percent of the gender gap in earnings, but it ignores the different characteristics of women with menstrual problems and is likely upward biased. In Column 2, we add demographic controls, but this causes no noticeable difference in the coefficient. However, in Column 3 we control for working full-time and the number of months worked, which causes the earnings difference between women with menstrual problems and other women to fall to 1 percent and lose statistical significance; we can reject a coefficient above 4 log points at the 95 percent confidence level. Conditional on this set of controls, menstruation could explain only about 0.6 percent of the gender gap in earnings. Thus, we find that lower average annual earnings for women with menstrual problems is completely explained by these women working fewer months during the year and having a greater tendency to work part-time. Adding additional controls (job characteristics, risky behavior, and associated health conditions in Columns 4, 5, and 6, respectively) further erases the negative coefficient of menstrual problems on earnings. Notably, if we drop the controls for months of work and full-time work from the most inclusive specification (Column 6), the coefficient on menstrual problems is 50 percent smaller than in the specification without controls, statistically insignificant, and would imply that menstruation explains 2 percent of the gender gap in earnings (results not shown).

5.3 Explanations

The results above suggest that the significant increase in illness-related absences for women with menstrual problems does not translate into lower earnings. In this section, we examine several explanations for these results, including: measurement error attenuating effects on earnings, employers penalizing all women for the existence of menstrual problems because they do not observe productivity, and illness-related absences not affecting earnings.

5.3.1 Measurement Error

One explanation for difference in the effects of menstrual problems on absences and earnings is that our earnings estimates could be attenuated by measurement error because the reference periods for menstrual problems and earnings do not perfectly overlap. The reference period for menstrual problems is the last 12 months (the same reference period as absences), while the reference period for earnings is the last calendar year. We do not believe this is a significant problem because the medical literature suggests that PMS/PMDD diagnoses are somewhat stable over time. However, to address this concern, we examine whether menstrual problems are associated with lower earnings in the women for whom the reference periods have the greatest overlap - those who were interviewed in the first quarter of the year. For comparison purposes, Table 4 re-displays the absence and earnings results from Column 2 of Tables 2 and 3, respectively, which are the specifications that include the standard controls for demographics, working full-time, and number of months worked. Table 4 then presents the results from similar specifications for absences and earnings that add an indicator for being interviewed in the first quarter of the year and an interaction term for first quarter interview and having menstrual problems (Columns 3 and 4). The coefficient on the interaction term in Column 4 is quite small and statistically insignificant, which does not suggest that the lack of overlap between the reference periods is driving our findings.

A related explanation is that women may seek treatment for their symptoms, which could ameliorate any earnings effects over the year. There is evidence that cognitive behavioral relaxation therapy, exercise, vitamin supplementation, antidepressants, and the oral contraceptive pill can be effective at treating PMS (Rapkin 2003). We do not have any data on treatments that would allow us to examine this explanation, but if treatments are frequently sought out and are highly effective, this could explain menstrual problems not being a significant determinant of earnings gaps.

5.3.2 Unobserved Productivity

Another explanation for the lack of an effect on earnings is that if productivity is completely unobserved by employers, employers could pay all women lower wages because some women suffer from menstrual problems. This would cause us to find no earnings differences between women with menstrual problems and other women. Yet, it seems implausible that employers would not observe even a noisy signal of workers' productivity. Employers observe absences, which could provide this noisy signal, and could offer employment contracts that substantially penalize absence. This would sort workers across occupations and generate earnings differentials between women with menstrual problems and other women. Noisy signals of productivity would also allow employers to update their beliefs about workers' productivity over time, which should cause earnings to become increasingly correlated with characteristics that are unobserved at the time of hire (Altonji and Pierret, 2001). We address this concern by examining whether menstrual problems become more correlated with earnings when women have been with their employers for longer amounts of time. In Columns 5 and 6 of Table 4, we report specifications for absences and earnings that include a control for the number of years the woman has worked for the same employer (tenure), an indicator for missing information on tenure, and interactions between these controls and having menstrual problems. The coefficient on the interaction between menstrual problems and tenure in the earnings regression is very small (-0.0002) and not significant. This suggests that there is no evidence that the lack of an earnings effect is caused by employers being unable to observe initial productivity, provided that employers learn about productivity over time.

5.3.3 Are absences strongly related to earnings?

It is also possible that absences due to illness may simply have a negligible effect on earnings. As mentioned previously, the empirical literature on the income effects of absences is mixed and Hansen (2000) finds that illness-related absences have a very small effect on wages for women and no significant effect on wages for men. In Table 5, we investigate whether illness-related absences have a significant effect on earnings in this sample by running interval regressions of earnings on number of days of illness-related absences. Panels A and B present the results for women and men, respectively. Panel C presents the observed gender gap between men and women, the counterfactual gender gap that would be observed if women had the same number of days of absence as the men in the corresponding specification (approximately, 3.6 days), and the percent of the gender earnings gap that is explained by the gender gap in absences. The counterfactual gender gap is constructed by predicting the average earnings of women were they to have the same number of days of illness-related absences as men.

Table 5 shows that illness-related absences have rather small and mostly insignificant effects on earnings. They have a significant negative coefficient for both men and women when no control variables are included in the regression (Column 1); one additional absence due to illness is associated with a 0.2 percent decrease in earnings for women and a 0.4 percent decrease in earnings for men. The larger effects of absences on the earnings of men are consistent with absences being noisier signals of shirking for women than for men, although absences could be noisier signals of shirking for women for other reasons besides menstrual problems; for example, women could select occupations that have lower costs of absences if they anticipate using these absences for child care. We also do not have an exogenous source of variation in absences, so it is also possible that these effects simply reflect differences between the types of male and female workers who tend to be absent. The small effects of absences on earnings for both genders suggest that illness-related absences can explain very little of the gender gap in earnings. Panel C of Column 1 shows that closing the gender gap in absences due to illness would only reduce the gender gap in earnings by 0.4 percent. This is our most generous estimate of the effect of illness-related absences on the gender earnings gap. The inclusion of controls for demographic characteristics, full-time employment, number of months worked, job characteristics, and health conditions (Columns 2-4) causes the coefficient estimates to become statistically insignificant – with the sole exception of Column 2 for men - suggesting that the relationship between absences and earnings may be biased by selection. In fact, the coefficient on absences for women is actually positive in these specifications.

Why don't illness-related absences reduce earnings? Since we do not have an exogenous source of variation in absences, it is possible that our earnings regression is biased, e.g., high income individuals may take additional absences as leisure. Other possibilities are that workers may take absences when the costs of those absences are low, or compensate for illness-related absences by taking fewer absences for other reasons or otherwise making up time at work.[18] The raw difference in illness-related absences between women with menstrual problems and other women is only 2.2 days, could be offset by making up time.[19] We cannot examine substitution between different types of absence in these data because the NHIS only asks about absences from work due to illness. However, regardless of the explanation, the raw difference in illness-related absences between women with menstrual problems and other women is only 2.2 days,

[18] While it would be very interesting to examine the impact of absences on earnings across occupations where work is easily shifted across time (e.g. academic researchers) to those where the timing cannot be changed (e.g., teaching and nursing), we do not have detailed occupational data. A number of papers find that financial incentives affect worker absence (e.g., Winkler (1980), Jacobson (1989), Ehrenberg et al. (1991), Barmby et al. (1991), Brown and Sessions (1996), and Lindeboom and Kerkhofs (2000)), so it is reasonable to think that workers can adjust the timing and frequency of absence to some degree.

[19] Herrmann and Rockoff (2010) find that evidence that individuals substitute between absences; while school teachers who live farther away are far more likely to be absent on bad weather days, the number of bad weather days in a year is not significantly related to total annual absences, strongly suggesting that these teachers adjust by reducing other absences.

and the small effects of absences on earnings suggest that we should not expect menstrual problems to have large effects on earnings even if these problems do result in additional absences from work.

5.4 Men's Health Problems

Up until now, we have only considered the effect of a specific women's health issue - menstrual health problems – on labor market outcomes. However, given that we are interested in gender gaps, it is equally useful to examine health problems which differentially affect men. Here we examine the labor market effects of prostate trouble or impotence, which like menstruation are gender specific conditions.

The 2007 NHIS measures whether men have had prostate trouble or impotence in the last 12 months. Unfortunately, this question was only asked to men age 40 or over, so we have smaller sample sizes for this analysis; due to the age restriction on the question, we restrict the sample to prime-aged individuals between the ages of 40 and 64. About 5.4% of men between the ages of 40 and 64 in the sample suffer from prostate trouble or impotence. Their earnings are 0.15 log points lower than other men and they report 2.3 more days absent due to illness than other men.[20] Their labor force participation in the past year is 19.5 percentage points lower than that of other men (65.6% versus 85.1%).[21] Conditional on reporting income, they are also 2.4 percentage points less likely to work full-time (90.3% versus 87.9%). Importantly, men suffering from these conditions are also much more likely than other men to report other health problems

20 For comparison purposes, the difference in illness-related absences for men with various conditions, relative to other men, are: 3.13 for hypertension; 6.68 for diabetes; 5.31 for inflammatory bowel disease, irritable bowel, or severe constipation; 5.31 for fatigue, 6.59 for insomnia, and 3.32 for headaches.

21 Conditional on working in the past year, men with prostate trouble or impotence are 3.7 percentage points less likely to have missing income (28.8% versus 32.4%).

such as fatigue (22.6% vs. 7.9%), pain (48.6% vs. 30.1%), insomnia (35.2% vs. 15.4%), anxiety or depression (35.2% vs. 12.1%), and headaches (16.4% vs. 7.6%).

For this analysis we use the same estimation strategy as with our examination of menstrual problems. We include an indicator for prostate trouble or impotence as the main explanatory variable and examine the extent to which this indicator could explain gender gaps in illness-related absences and income, which, for this population, are 1.38 days and 0.48 log points, respectively.

Results from these specifications for the effect of prostate trouble or impotence on illness-related absences and income are reported in Panels A and B, respectively, of Table 6. The sample size for this analysis is less than half of the sample we had for women, so the estimates are less precise. However, the point estimates for prostate troubles or impotence for men are at least as large as the corresponding point estimates for menstrual problems for women, suggesting that this men's health problem could affect performance in the labor market.

In baseline specifications that do not include controls, the Poisson coefficient for the effect of prostate trouble or impotence on men's illness-related absences is 0.47 with a p-value of roughly 0.12, which is quite similar to the coefficient of 0.43 for the effect of menstrual problems on women's illness-related absences (Table 2, Column 1). The coefficient for the effect of prostate trouble or impotence on men's income is -0.16 with a p-value of 0.14 (Table 6, Panel B, Column 1), compared to the coefficient of -0.08 for menstrual problems for women (Table 3, Column 1). Again, like women with menstrual health problems, men with prostate trouble or impotence also experience a number of other related health issues with greater frequency, and controlling for these factors reduces the coefficient in the illness-related absence regression to 0.12 (Table 6, Panel A, Column 6), similar to the corresponding coefficient on menstrual problems of 0.17 (Table 2, Column 6). These controls also reduce the coefficient on prostate problems or impotence in the earnings regression, but not as dramatically.

Prostate problems and impotence are less frequent than menstrual problems and cannot play a large role in explaining gender gaps in illness-related absences or income. However, the results in Table 6 illustrate that when we focus on a set of individuals with an identifiable health conditions, two things occur. First, it is very likely that we find higher rates of absence and lower earnings among this group.[22] Second, it is very likely that many conditions are correlated with other health problems, making it difficult to assign a causal role and suggesting that our coefficient estimates are likely an upper bound.

6. Conclusion

Nationally representative data from the NHIS indicate that around 21 percent of women experience menstrual problems such as heavy bleeding, bothersome cramping, or PMS. Using regression analysis, we measure whether women reporting these menstrual problems also have higher rates of absenteeism and lower earnings than similar women who do not face this health condition. We find that menstrual problems could explain about 40-50 percent of the 0.96 day gender gaps in *illness-related* absenteeism—the only type of absenteeism reported in the NHIS. However, despite evidence of increased absenteeism, we find no robust evidence that menstrual problems affect the earnings of women, and our estimates suggest that menstrual problems explain less than 1 percent of the gender gap in earnings. One possible explanation for this latter result is that the additional number of illness-related absences caused by menstrual problems is relatively small, 2.2 days. We do not find illness-related absences to be significantly related to

[22] A review of the literature by Currie and Madrian (1999) finds that poor health reduces wages and labor force participation.

earnings more generally, but even the statistically significant relationship found by Hansen (2000) would imply a reduction of just 0.4 to 1.3 percent in these women's earnings and an extremely small impact on the gender wage gap. Another equally plausible explanation is that illness-related absences for women experiencing menstrual problems could be fully offset by these women reducing other types of absenteeism or compensating for taking actions such as staying extra hours on other days or working from home.

Our analysis provides new evidence on role of menstruation in explaining gender gaps in earnings and our results suggests this biological difference between men and women plays a very minor part in explaining differences in labor market success. Nevertheless, further research using other empirical strategies, particularly the use of panel data and/or information on workers' *total* work absences, would be of much use in solidifying our knowledge about this issue.

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Table 1: Summary Statistics

Variable	Men	Women	Women: No Menstrual Probs	Women: Menstrual Probs
Menstrual Problems	0.00	0.21	0.00	1.00
White	0.66	0.67	0.66	0.71
Hispanic	0.16	0.14	0.15	0.10
Black	0.12	0.14	0.13	0.15
Other Race	0.06	0.06	0.06	0.04
Less than HS	0.14	0.12	0.12	0.10
HS	0.28	0.26	0.26	0.26
Some College	0.27	0.31	0.30	0.36
College or More	0.31	0.31	0.32	0.28
Age (Years)	35.28	35.87	35.91	35.70
Potential Experience (Years)	15.77	16.24	16.31	15.98
Married	0.60	0.61	0.61	0.58
Child Under 6	0.30	0.28	0.29	0.27
Northeast	0.17	0.18	0.19	0.17
Midwest	0.24	0.24	0.23	0.26
South	0.37	0.38	0.37	0.40
West	0.22	0.20	0.21	0.17
Year 2002	0.49	0.50	0.49	0.52
Worked last year	0.94	0.80	0.80	0.80
Missing Income (if worked last year)	0.28	0.27	0.28	0.23
Conditional on reporting income				
Log Income*	10.60	10.18	10.20	10.12
Absences due to illness	3.56	4.52	4.03	6.21
Full-time	0.91	0.78	0.80	0.74
Months Worked	11.42	11.11	11.17	10.93
Tenure (Years)	5.72	5.28	5.40	4.87
Paid Sick Leave	0.61	0.66	0.66	0.65
Employer-Prov Health Ins	0.77	0.77	0.77	0.75
Health Conditions				
Smoker	0.27	0.23	0.21	0.28
Overweight	0.43	0.25	0.25	0.25
Obese	0.27	0.25	0.23	0.32
Get Recommended Exercise	0.35	0.32	0.31	0.35
Heavy Drinker	0.06	0.04	0.04	0.05
Fatigue	0.07	0.11	0.09	0.20
Pain	0.28	0.33	0.28	0.49
Insomnia	0.14	0.18	0.15	0.30
Anxiety/Depression	0.11	0.18	0.15	0.31
Headaches	0.10	0.24	0.20	0.39
N	9742	10731	8453	2278

Notes: All statistics are calculated using sample weights. The sample includes individuals between the ages of 25 and 45 and excludes women who are currently pregnant or who were pregnant in the last year. See the text for more details. *Average log income is estimated for each group using an interval regression.

Table 2: Illness-Related Absenteeism and Menstrual Problems

Panel A: Women Only	(1)	(2)	(3)	(4)	(5)	(6)
Menstrual Problems	0.4339**	0.4155**	0.3972**	0.3985**	0.3518**	0.1746+
	(0.1064)	(0.1079)	(0.1071)	(0.1053)	(0.1056)	(0.1052)
Controls						
Basic Demographic Controls		X	X	X	X	X
Full-time/Months Worked			X	X	X	X
Job Characteristics				X	X	X
Behavioral Risk Factors					X	X
Related Health Conditions						X
Number of Women	6229	6229	6229	6229	6229	6229
Panel B: Gender Gaps- Men and Women						
Observed Gender Gap (Days)	0.9625	0.9625	0.9625	0.9625	0.9625	0.9625
Counterfactual Gender Gap (Days)	0.4649	0.4820	0.4992	0.4980	0.5433	0.7361
Percent "Explained" by Menstruation	51.69%	49.93%	48.13%	48.13%	40.08%	22.62%
Number of Men and Women	12,670	12,670	12,670	12,670	12,670	12,670

Notes: All specifications use poisson regressions and are weighted by sample weights. Basic demographic controls include include race dummies (black, Hispanic, other), region dummies (South, Midwest, West), a year fixed effect, education dummies (less than HS Grad, Some College, College or More), a quadratic polynomial in potential experience, dummies for marriage and having children under 6. Full-time/Months controls includes an indicator for working full-time in the last week or usually working full-time and a control for the number of months worked. Job characteristics include include industry and occupation dummies and indicators for having paid sick leave and employer-provided health insurance and indicators for mising any of those characteristics. Behavior risk factors include indicators for smoker, overweight, obese, and get recommended exercise, heavy drinker, and related health conditions include indicators for fatigue, pain, insomnia, anxiety or depression, and headaches. Standard errors are clustered by the strata by primary sampling unit by year level. Significance levels are +0.10, *0.05, **0.01.

Table 3: Income and Menstrual Problems

Panel A: Women Only	(1)	(2)	(3)	(4)	(5)	(6)
Menstrual Probs	-0.0751**	-0.0786**	-0.0115	-0.0111	-0.0060	-0.0004
	(0.0284)	(0.0248)	(0.0208)	(0.0194)	(0.0194)	(0.0197)
Controls						
Basic Demographic Controls		X	X	X	X	X
Full-time/Months Worked			X	X	X	X
Job Characteristics				X	X	X
Behavioral Risk Factors					X	X
Related Health Conditions						X
Number of women	6229	6229	6229	6229	6229	6229
Panel B: Gender Gaps - Men and Women						
Observed Gender Gap (log points)	-0.4115	-0.4120	-0.4102	-0.4090	-0.4089	-0.4089
Counterfactual Gender Gap (log points)	-0.3944	-0.3941	-0.4076	-0.4065	-0.4075	-0.4088
Percent "Explained" by Menstruation	4.15%	4.34%	0.64%	0.62%	0.33%	0.02%
Number of Men and Women	12,670	12,670	12,670	12,670	12,670	12,670

Notes: All specifications use interval regressions and are weighted by sample weights. Basic demographic controls include include race dummies (black, Hispanic, other), region dummies (South, Midwest, West), a year fixed effect, education dummies (less than HS Grad, Some College, College or More), a quadratic polynomial in potential experience, dummies for marriage and having children under 6. Full-time/Months controls includes an indicator for working full-time in the last week or usually working full-time and a control for the number of months worked. Job characteristics include include industry and occupation dummies and indicators for having paid sick leave and employer-provided health insurance and indicators for mising any of those characteristics. Behavior risk factors include indicators for smoker, overweight, obese, and get recommended exercise, heavy drinker, and related health conditions include indicators for fatigue, pain, insomnia, anxiety or depression, and headaches. Standard errors are clustered by the strata by primary sampling unit by year level. Significance levels are +0.10, *0.05, **0.01.

Table 4: Robustness Checks - Women Only

	Baseline Results		1st Survey Quarter		Tenure	
	Absences	Income	Absences	Income	Absences	Income
	(1)	(2)	(3)	(4)	(5)	(6)
Menstrual Probs (MP)	0.3972**	-0.0115	0.4118**	-0.0090	0.4097**	-0.0024
	(0.1064)	(0.0208)	(0.1241)	(0.0247)	(0.1201)	(0.0283)
1st Quarter			0.1605	0.0188		
			(0.1352)	(0.0216)		
1st Quarter*MP			-0.0658	-0.0113		
			(0.2347)	(0.0473)		
Tenure					0.0129	0.0236**
					(0.0114)	(0.0019)
Missing Tenure					0.7101**	0.2521**
					(0.2712)	(0.0562)
Tenure*MP					0.0051	-0.0002
					(0.0157)	(0.0035)
Missing Tenure*MP					-0.4060	-0.0459
					(0.4453)	(0.1083)
N	6229	6229	6229	6229	6229	6229

Notes: All specifications use either Poisson or interval regressions and are weighted by sample weights. All specifications include demographic characteristics (i.e., race, education, potential experience), region/year controls, full-time/months controls, Standard errors are clustered by the strata by primary sampling unit by year level. Significance levels are +0.10, *0.05, **0.01.

Table 5: Income and Absences

Panel A: Women Only	(1)	(2)	(3)	(4)	(5)
Absences	-0.0016+	-0.0008	0.0006	0.0003	0.0005
	(0.0009)	(0.0008)	(0.0006)	(0.0006)	(0.0006)
Number of women	6229	6229	6229	6229	6229
Panel B: Men					
Absences	-0.0036**	-0.0027**	-0.0003	-0.0006	-0.0005
	(0.0006)	(0.0007)	(0.0006)	(0.0005)	(0.0005)
Number of men	6441	6441	6441	6441	6441
Panel C: Gender Gaps - Men and Women					
Observed gender gap (log points)	-0.4115	-0.4119	-0.4102	-0.4091	-0.4089
Counterfactual gender gap (log points)	-0.4099	-0.4112	-0.4108	-0.4093	-0.4094
Percent of observed gap "explained" by absences	0.39%	0.19%	-0.15%	-0.06%	-0.12%
Controls					
Basic Demographic Controls		X	X	X	X
Full-time/Months Worked			X	X	X
Job Characteristics				X	X
Behavioral Risk Factors/ Related Health Conditions					X

Notes: All specifications use interval regressions and are weighted by sample weights. Basic demographic controls include include race dummies (black, Hispanic, other), region dummies (South, Midwest, West), a year fixed effect, education dummies (less than HS Grad, Some College, College or More), a quadratic polynomial in potential experience, dummies for marriage and having children under 6. Full-time/Months controls includes an indicator for working full-time in the last week or usually working full-time and a control for the number of months worked. Job characteristics include include industry and occupation dummies and indicators for having paid sick leave and employer-provided health insurance and indicators for mising any of those characteristics. Behavior risk factors include indicators for smoker, overweight, obese, and get recommended exercise, heavy drinker, and related health conditions include indicators for fatigue, pain, insomnia, anxiety or depression, and headaches. Standard errors are clustered by the strata by primary sampling unit by year level. Significance levels are +0.10, *0.05, **0.01.

Table 6: Income, Absences, and Prostate Trouble or Impotence

Panel A: Illness-Related Absences	(1)	(2)	(3)	(4)	(5)	(6)
Prostate Trouble or Impotence	0.4702	0.4493	0.3616	0.3831	0.3799	0.1180
	(0.3046)	(0.3172)	(0.3384)	(0.3123)	(0.2852)	(0.3217)
Percent of observed gender gap "explained" by prostate trouble or impotence	-7.39%	-7.13%	-5.98%	-6.27%	-6.22%	-2.19%
Panel B: Income						
Prostate Trouble or Impotence	-0.1633	-0.1169	-0.0981	-0.0828	-0.0844	-0.0672
	(0.1124)	(0.0924)	(0.0759)	(0.0700)	(0.0703)	(0.0721)
Percent of observed gender gap "explained" by prostate trouble or impotence	-1.54%	-1.09%	-0.92%	-0.78%	-0.80%	-0.63%
Controls						
Basic Demographic Controls		X	X	X	X	X
Full-time/Months Worked			X	X	X	X
Job Characteristics				X	X	X
Behavioral Risk Factors					X	X
Other Health Conditions						X
Number of men	2586	2586	2586	2586	2586	2586
Number of men and women	5020	5020	5020	5020	5020	5020

Notes: Sample includes individuals between the ages of 40 and 64. All specifications use poisson or interval regressions and are weighted by sample weights. Basic demographic controls include include race dummies (black, Hispanic, other), region dummies (South, Midwest, West), a year fixed effect, education dummies (less than HS Grad, Some College, College or More), a quadratic polynomial in potential experience, dummies for marriage and having children under 6. Full-time/Months controls includes an indicator for working full-time in the last week or usually working full-time and a control for the number of months worked. Job characteristics include include industry and occupation dummies and indicators for having paid sick leave and employer-provided health insurance and indicators for mising any of those characteristics. Behavior risk factors include indicators for smoker, overweight, obese, and get recommended exercise, heavy drinker, and related health conditions include indicators for fatigue, pain, insomnia, anxiety or depression, and headaches. Standard errors are clustered by the strata by primary sampling unit by year level. Significance levels are +0.10, *0.05, **0.01.

Appendix Table A1: Crosswalk between 2002 and 2007 Simple Industry and Occupation Codes

2002 Occupation		2007 Occupation	
Code	Label	Code	Label
1	Executive, Administrative, and Managerial	1	Management
2	Professional Specialty	2,3,4, 5,7,8, 9,10	Business and Financial Operations, Computer and Mathematical, Architecture and Engineering, Life, Physical and Social Science, Legal, Education, Training, and Library Occupations, Arts, Design, Entertainment, Sports, and Media, Health Care Practitioners and Technical
3	Technicians and Related Support	11	Healthcare Support
4	Sales	16	Sales and Related
5	Administrative Support, Including Clerical	17	Office and Administrative Support
6,8	Private Household/Service, Except Protective and Household	13, 14,15	Food Preparation and Serving, Building and Grounds Cleaning and Maintenance, Personal Care and Service
7	Protective Service	6,12	Community and Social Service, Protective Service
9	Farming, Forestry, and Fishing	18	Farming, Fishing, and Forestry
10, 11, 13	Precision Production, Craft and Repair/Operators, Fabricators, and Laborers/Handlers, Equipment Cleaners, Helpers, and Laborers	19,20 ,21	Construction and Extraction, Installation, Maintenance, and Repair, Production
12	Transportation and Material Moving Occupations	22	Transportation and Material Moving
16	Military	23	Military Specific
97, 98, 99	Refused, Classified, Etc./Not Ascertained/Don't Know	97, 98, 99	Refused, Classified, Etc./Not Ascertained/Don't Know