Overworked and underslept?

The changing sleep patterns of men and women in Sweden (1990-2010).

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Abstract

Have working men's and women's weekday sleep patterns changed between 1990 and 2010 in Sweden? Three nationally-representative time use surveys from 1990/91, 2000/01, and 2010/11 (N=6,414) offer the unique opportunity to investigate both quantitative and qualitative aspects of sleep simultaneously, asking four questions currently debated internationally and within Sweden; (1) Has the quantity of sleep declined post-1990 for working men and women?; (2) Do women sleep less than men and do mothers sleep less than fathers?; (3) Are working parents at greater risk of short sleep (<6.5 hours/day) than non-parents? (4) Have night disruptions increased post-1990? Multivariate results find working women sleep more minutes than men, and mothers sleep more than fathers. Men are more likely to be short sleepers than women, but working mothers are at greater odds of short sleep than non-mothers, which is not the case for working fathers. The likelihood of reporting night disruptions are greater for those with children compared to those without, but increase post-1990 for men and women with and without children. No evidence suggests men or women are sleeping any less post-1990, but the increase in disruptions suggests sleep quality has deteriorated.

Keywords: parenthood, sleep, Sweden, time use, work-life balance

1. Introduction

Overworked and underslept is a popular modern depiction of working life at the turn of the 21st century, but whether working men's and women's weekday sleep patterns have changed in Sweden between 1990 and 2010 is an open question. Since sleep duration and hours of paid work are highly and inversely correlated (Basner et al., 2007; Biddle & Hamermesh, 1990; Kalil, Dunifon, Crosby & Su, 2014), and the proportion of women working full- relative to part-time has increased steadily from the 1970s in Sweden[1], there's reason to believe sleep patterns may have changed, especially for women. The *Swedish Time Use Surveys* (SWETUS), repeated cross-sections from 1990/91, 2000/01 and 2010/11 offer a unique perspective to analyze both quantitative and qualitative aspects of sleep across a 20-year period, whereas most studies usually focus on one aspect independently. Somewhat surprisingly, no studies on the sleep patterns of a nationally-representative sample of workers exists for Sweden covering the period 1990 to 2010.

Some have argued that increasing sleep deprivation is likely during this period, due to the 24-hour demands and productivity needs of the globalized economy, with increasingly long working and commuting hours, and non-standard work schedules as primary culprits (Basner et al., 2007; Chatzitheochari & Arber, 2009; see also Derickson, 2014; Presser, 2003). Despite arguments that workers are more time-pressed and sleep-deprived than in the past, time use researchers have not found empirical evidence that average sleep minutes have declined in the U.S. (Robinson & Godbey, 1997; Robinson & Michelson, 2010), in Denmark (Bonke, 2015), or internationally in the late 20th century (Gershuny, 2000), nor have epidemiologists' literature reviews and unique studies across a multitude of countries uncovered any evidence of secular sleep declines in recent decades (Bin, Marshall, & Glozier, 2012; Bin, Marshall, & Glozier, 2013).

Most time use studies do however find a persistent gender gap in daily sleep minutes favoring women over men across most national contexts (Basner et al., 2007; Robinson & Godbey, 1997; Robinson & Michelson, 2010). Few studies have examined this gap over the life cycle, but recent research finds it persists (Burgard & Ailshire, 2013). This gap is somewhat puzzling, since in recent decades women and working mothers have increased labour force participation while continuing to devote as much or even more time to their

[1] OECD statistical database. Labour, Full-time part-time employment, Incidence of FTPT employment. Accessed Sept. 19, 2014

children (Bianchi, Robinson & Milkie, 2006; Neilson & Stanfors on Sweden, unpublished). The sleep duration gender gap usually comes from contexts where full-time and maternal employment rates are lower than in Sweden however. A society with high proportions of full-time working mothers could however have very different gendered sleep patterns in the aggregate, since mothers have been found to tradeoff leisure and sleep to enable more time with their children (Bianchi, 2000; Sayer, 2005; Stewart, 2010). Whether working mothers sleep less than working fathers is an open question in Sweden, but the question is debated internationally, with some arguing that working mothers of pre-schoolers are more sleep deprived than their partners and "talked about sleep the way a hungry person talks about food (Hochschild, 1989, p.10)", a claim which some time use researchers suggest the data doesn't support (Milkie, Raley, & Bianchi, 2009). Mothers' increased work hours have been associated with their own reduced sleep and that of their children (Hofferth & Sandberg, 2001; Kalil, Dunifon, Crosby & Su, 2014; Stewart, 2010), meaning a better understanding of women's sleep in Sweden is of the utmost importance, due to its direct and spillover health implications. Studies on the association between parenthood and sleep duration are surprisingly rare and inconclusive, but parents of young children have been found to sleep less minutes on average than similar non-parents, with the odds of short sleep increasing specifically for working parents with children aged 2-5 (Hagen, Mirer, Palta & Peppard, 2013). Again, whether this pattern holds for working men and women in Sweden specifically is unknown.

This paper aims to contribute to international debates within existing literature, while answering the following four research questions that currently require empirical inputs within Sweden: (1) Has the *quantity* of sleep declined between 1990/91, 2000/01 and 2010/11 for working men and women in Sweden?; (2) Do working women sleep less daily minutes than working men, and do working women with children sleep less daily minutes than men with children?; (3) Are working parents at greater risk of weekday short sleep (<6.5 hours/day) than non-parents?; (4) Have the prevalence of night disruptions changed between 1990/91, 2000/01 and 2010/11 for working men and women? This paper will use several multivariate analytical methods to shed some light on the overarching question of whether people in Sweden are increasingly overworked and underslept.

2. Background

This paper is concerned with the reconciliation of work and family, more specifically how men's and women's sleep patterns may have changed between 1990 and 2010 in Sweden, an interesting case study since dual-earner couples are the norm, mothers work more hours than non-mothers, and the gender gap in work hours has become negligible[2]. Increasingly busy work lives may influence sleep patterns by reducing the discretionary time available for rest and reducing sleep *quantity*, while increased work stressors may lead to greater proportions of night awakenings, impacting sleep *quality*. The National Sleep Foundation (U.S.) recommends appropriate daily sleep durations for healthy individuals between 7 to 9 hours for adults aged 18-64, with less than 6 hours not recommended (Hirshkowitz et al. 2015)[3]. Quantitative enquiries into sleep-related health are often concerned with the proportions not meeting these recommended sleep durations. Most empirical work by epidemiologists and medical professionals define unhealthy sleep durations as 6 hours or less daily, but the time diary methodology clearly overstates time spent asleep because diarists record the time they went to bed (as opposed to falling asleep), so 6.5 hours has also been used (Basner et al, 2007; Chatzitheochari & Arber, 2009). Qualitative investigations into sleep are often concerned with sleep disruptions, which actigraphy studies find can result in increased fatigue, depression, confusion and reduce vigor not unlike the effects of sleeping 4 hours a night (Kahn et al., 2014). Disturbed sleep has also been linked to mortality through occupational fatalities using register data in Sweden, where those reporting difficulty sleeping were nearly twice as likely to die in a work-related accident (Åkerstedt et al., 2002a). Sleep disruptions upset individual's endogenous circadian rhythms, which optimize physiological functions to match daily patterns of behavior such as eating, activity and sleep; they are sub-optimally aligned for those who perform shift work and may contribute to numerous adverse health effects such as fatigue, poor sleep, detrimental metabolic changes and increased risk of developing obesity and diabetes (Buxton et al. 2012).

In Sweden, annual hours worked per worker has risen roughly 60 hours between 1990 and 2010, a unique development for OECD countries, the majority of which have declining

[2] In fact, maternal employment levels in 1990 Sweden were higher than 2010 U.S. levels.
[3] Recommendations at other ages include 5-9 hours for ≥65 years, 8 to 10 hours for children aged 14-17, 9 to 11 hours for children aged 6-13, 10 to 13 for children aged 3-5, and 11-14 for children aged 1-2.

trends over this period (Figure 1).[4] Part of this increase is explained by women's continual shift from part- to full-time employment, with greater proportions of men and women reporting not working and working longer weekly hours (see Table, 1), suggesting work intensity may have increased. Increased working hours for women could be considered a positive development in economic and egalitarian respects, but may alternatively have negative health implications if sleep durations have declined in tandem. Furthermore, the rise of dual-earners couples, coupled with women's increased work orientation and transitions into more cognitively-demanding occupations, place further pressures on time and create the assumption that sleep is at risk, raising health concerns since poor sleep is associated with all-cause mortality and morbidity (Bin, Marshall & Glozier, 2013). Total hours and the scheduling of those hours are important, as both long and short work hours and irregular work schedules are associated with worsened health outcomes (cf. Spurgeon, Harrington & Cooper, 1997; Presser, 2003). In Sweden, a standard workweek is considered 35-40 hours, Monday to Friday, 9am to 5pm, yet in actuality a multitude of work-time arrangements exist, including shift work, flexible hours, evening or night work, or taking a day off work to care for a sick child. Two temporal characteristics, shift work (defined as working outside normal daytime hours of 0600-1800 or 0700-1900), and very long hours, have higher probability of linkages with fatigue and sleep, and are looked at speculatively (Bellavia & Frone, 2005; Presser, 2003). Although no consensus exists on the definition of long hours, they are generally associated with greater work-family conflict (Bellavia & Frone, 2005). Work hours are generally accounted for when sleep is researched, but the variation in work-day scheduling is often overlooked empirically, a shortcoming this paper addresses.

Figure 1 about here

Table 1 about here

Individuals' sleep durations, unless purely biologically determined, should be considered within an economic model of time allocation; otherwise, a population's aggregated waking time would be independent of economic shocks (Biddle & Hamermesh, 1990). Thought of in economic incentives, women's increased educational levels and greater work hours in recent decades increase the opportunity cost of discretionary time, which could

[4] OECD statistical database. http://stats.oecd.org . Accessed December 2, 2014.

reduce sleep allocations. Sleep may be considered an increasingly flexible commodity which in a 24-hour, zero-sum day can be traded for activities of perceived greater utility, such as work, leisure, or spending time with one's children (Basner et al., 2007). Which activities are traded-off matter in relation to sleep, because activities such as childcare are more emotionally intensive than leisure (Becker, 1985), and women continue to perform more childcare than men (even in highly gender-converged Sweden). Parents of young children also have less autonomy over their sleep because their children may awaken them. Sleep differs somewhat from other non-market activities since it's energy producing, not consuming, as opposed to caring for children or performing your job (cf. Becker, 1993, pp. 64-73). The relationship between work intensity, sleep and opportunity costs is however not straightforward considering effort, because higher earners may forfeit sleep to work more hours, or alternatively may engage in sleep to energize themselves, enabling them to work more efficiently or productively. Sleep is somewhat unique from many other forms of time use because it cannot be outsourced, although it can to some degree be transferred between partners, dependent on the household division of labor. The forces of specialization within households may be comparatively low in Sweden, a forerunner concerning gender convergence in time use across life cycle stages (Anxo et al., 2011; Dribe & Stanfors, 2009; Kan, Sullivan & Gersuny, 2011).

Thus time allocation theory suggests women's sleep may have declined in this period due to increased work orientation, but alternatively, certain institutional and labour market characteristics may have protected workers' sleep while reconciling work and family obligations. In a European perspective, the prevalence of shift-work and holding multiple jobs is uncommon, while individuals have greater autonomy over their working time than in most other countries (Parent-Thirion et al., 2007). Working time policy in Sweden enables individuals to manage paid work time over the life cycle with greater flexibility than in most national contexts, and has shifted towards decentralized decision-making down to industry or even plant level, suggesting that hours worked by individuals are on a case by case basis (Anxo, 2009). This influence over work hours is beneficial to parents, who have the statutory right to work reduced hours until their children become 12 years old, thus many part-time workers in Sweden actually hold full-time positions, but are exercising their right to work reduced hours. The parental leave system is job-protected and has included men since 1974, whose uptake share has gradually increased to 24.8 percent in 2013 (Swedish Social

Insurance Agency, 2014). Between 1990 and 2010, the system has targeted men's behavior via economic incentives, while becoming increasingly flexible and culturally-embedded, which may reconcile work-family tensions and in turn protect time for sleep.

A within-country gender-gap in sleep minutes favoring women exists throughout most time use research in recent decades (Basner et al., 2007; Burgard & Ailshire, 2013; Robinson & Godbey, 1997; Robinson & Michelson, 2010). Some researchers find women's sleep was affected by both work and family roles, whereas men's sleep was affected solely by their work role (Cha & Eun, 2013), while others find men have shorter sleep and longer leisure, while women have the opposite (Burgard & Ailshire, 2013). Men's longer leisure could in itself be a contributing factor to gender sleep differences, as cross-sectional evidence suggests positive associations between self-reported exercise levels and self-reported sleep (cf. Youngstedt & Kline, 2006). The gender gap in sleep minutes may be a good thing relating to health, since the association between poor sleep and the increased risk of heart disease, diabetes, stress, depression and anxiety is stronger for women than men (Suarez, 2008).

An investigation into workers' sleep in Sweden should consider the impacts of parenthood on women and men independently, since maternal employment levels are comparably high and men take active roles as parents (Dribe & Stanfors, 2009). Some challenge the notion that parents get less sleep than non-parents, where little difference in sleep minutes exists by parental status, and mothers of young children actually sleep more than non-mothers, "perhaps due to fatigue or time management" (Robinson & Godbey, 1997, p.113). Rare longitudinal sleep research has found that parents of very young children sleep less minutes than those without children, but as their children age, these parents sleep more (Hagen, Mirer, Palta and Peppard, 2013). Comparing sleep-parenthood studies across countries is challenging, since large inter-country differences in maternal employment and the degrees of gender specialization exist, and due to inconsistent definitions of short sleep, which can vary from less than 6 hours (Hagen et al. 2013), 6.5 hours (Basner et al., 2007) or 7 hours (Kalil et al., 2014).

Women report higher levels of sleep problems than men in many contexts, and some argue that biological and physiological sex differences don't fully explain these differences, implying that sleep is embedded in social roles (Arber, Hislop, Bote & Meadows, 2007). Women, regardless of their employment status, have been found to experience greater night disruptions for caregiving than men, in research using U.S. time use data (Burgard, 2011), one week audio-diaries (Maume et al., 2009) and retrospective surveys (Venn, Arber, Meadows & Hislop, 2008). In addition to caregiving, work roles can also spillover into the nights, and results from the *Swedish Work Environment Study* show that in 1989 14 percent of men and women reported having trouble sleeping due to thoughts about work, which had increased to 18 and 23 percent of men and women in 2011[5]. These increasing proportions have been associated to developments in the 1990s with widespread staff cuts, and increased work pace and workloads (Stenbeck & Persson, 2006). The inability to stop thinking about work during free time predicts increased odds of disturbed sleep in Sweden (Åkerstedt et al., 2002b). Disturbed sleep can increase fatigue (Kahn et al., 2014), and mothers in Sweden have reported greater fatigue than women without children, the odds of which increase with the number of children (Floderus et al., 2008). These self-reports of increased sleep disruptions and fatigue are suggestive that sleep *quality* may have declined in this period. This paper will take a multi-faceted approach using an unexplored source of sleep data to contribute valuable inputs into this discussion, investigating night disruptions from all causes, in tandem with average and short sleep durations in the preceding analysis.

3.1 Data & Methods

This paper analyzes three weighted samples of the *Swedish Time Use Surveys* (1990/91, 2000/01, and 2010/11), conducted by Statistics Sweden, focusing on a sub-sample of employed individuals aged 20-64. Students, retirees, those with a disability, and those on sick or 100 percent parental leave have been omitted. 87 observations are dropped due to missing education information, 24 because their partner status is unclear, and 7 are excluded because they reported zero sleep minutes on the diary day. Total observations is 16,242, with Monday to Thursday observations totaling 6,414 (2,559 in 1990/91, 2,262 in 2000/01, and 1,593 in 2010/11). Each survey is nationally-representative by providing individual sample weights to correct for survey design (stratified random sample) and for over- and under-sampling of individuals by age/sex and employment status. Nearly all sampled individuals completed one weekday and one weekend day diary[6], which were reported in 10-minute

[5] The Work Environment Surveys in Sweden (Arbetsmilöundesökningen) bi-annually asks workers: "*Do you have a hard time sleeping due to thoughts about work?*" 2011 figures are part of an increasing trend since 1989 for men and women.

[6] N=220 completed only one survey day. In 1990 it was 99 individuals, 35 in 2000 & 86 in 2010.

episodes and included information on how, where and with whom respondents allocated their time across more than 100 possible activities. The surveys were undertaken on an individual basis but include a small sample of true couples in 2000/01 and 2010/11, thus standard errors are clustered at the household level. Survey dates were randomly assigned throughout the year and balanced per day of the week.

SWETUS data possess several advantages for studying sleep at the societal level. First, the measure of sleep duration, including night sleep and any naps, is embedded within the 24-hour time dairy and is not the surveys' primary focus, which should reduce socially-desirable response bias problematic in topic-specific studies. This embeddedness may reduce heaping on commonly-used daily sleep intervals like 7 or 8 hours, as the most common responses of 7:00, 7:30, and 8:00 were reported by only 6.3, 6.0 and 5.9 percent of the weekday sample, which differed little from 7:10 (5.8 percent) or 7:20 (5.6 percent) proportions. The time diary also encapsulates the entire day's activities, facilitating some disentangling of the interplay between the timing and scheduling of sleep and work. For example, the identification of work starting times, night disruptions and naps, and their impact on sleep duration can be assessed. Time use surveys are a relatively unexplored source of sleep data (Bin, Marshall & Glozier, 2012), and to the best of my knowledge, SWETUS are the only nationally-representative data that include a consistent measurement of sleep duration for both men and women in Sweden from this time period.

3.2 Dependent variables

This study uses three main dependent variables in its analyses. OLS estimations use *total daily sleep minutes,* calculated by summing all primary activity episodes of sleep, including naps. Since time diaries begin at 4:00 in the morning and end at 4:00 the next morning, respondents' total sleep minutes are a synthetic of two separate days. This construct, in a society where the Monday-Friday 9-5 workweek is highly normative, means Friday observations are not representative of a typical working day, if individuals wake as usual Friday morning but go to bed late because they do not work Saturday. Logistic estimations use *short sleep duration,* defined as <6.5 hours to compensate for the time use survey's methodology and tested for robustness at ≤6 hours per night to conform to epidemiological and medical studies. Short sleep durations are examined due to their association with negative health outcomes, since average figures can obscure the extreme ends of the distribution.

Except for those reporting zero sleep, individuals at the tails of the sleep distribution are not discarded, as their identification is of primary interest. A third dependent variable is *night sleep disruption*, which takes the value of one if the diarist's night sleep episode was disrupted by another episode of 10 minutes or more and they later returned to sleep (most common post-disruption activities include caring for children, watching tv, restlessness, phone calls, and eating). This identification strategy under-estimates the true prevalence of night disruptions, because certain individuals' night sleep likely ended pre-maturely due to an interruption, and disruptive episodes of less than 10 minutes may not be reported. Alternatively identifying night disruptions as anyone with 3 or more daily sleep episodes would over-estimate disruptions because many higher parity episodes record a change in who is present (a partner entering or leaving the bed), and it is ambiguous whether the respondent was wakened by this change.

3.3 Independent variables

The main variables of interest are a dichotomous variable for gender (male ref.) and a categorical variable for wave (1990/91 ref., 2000/2001, 2010/11). Other explanatory covariates are included stepwise in an attempt to better explain any gender gaps observed, which include life cycle stage, weekly paid work hours, work-scheduling, night disruptions, and napped on the diary day. *Life cycle* is proxied by a construct of the age of youngest child in the home, and number of children in the home, with no children (reference category), 1 child under age 6, 2+ children where the youngest is under 6, 1 child aged 6 or older, and 2+ children 6 or older. Since the entire sample is in paid work at the time of survey and the bulk of parental leave in Sweden occurs during the child's first year of life, the somewhat broad children under-6 categorization should not be influenced by the effects of having a newborn or infant in the home. *Paid work hours* are the respondent's stated weekly work hours performed during the past week, categorized as 1-34 hours/week (reference category), 35-40 hours/week, and 41+ hours/week. *Work schedule* is a categorical variable designed to adjust for the variation between men and women and over the waves in when people work and to control for those who didn't work on the diary day for whatever reason (i.e. sick day or caring for sick child[7]). It is calculated by determining what period of the day at least half of the

[7] This adjustment is necessary because women take roughly 63 percent (and men 37 percent) of all temporary parental benefit days to care for sick children (Swedish Social Insurance Agency, 2014).

diarists' work minutes on the diary day were performed. The reference category is day work (half the hours fell between 0700-1700hours), day work with pre-7am start (same as reference category but started work before 0700 hours), evening work (half the hours fell between 1600-midnight), night work (half the hours between midnight-0800), and did not work on diary day. This variable is extrapolated from the weekday diary episodes because respondents were not asked a consistent work-scheduling question across the waves, and categorizing workers by their shift orientation is challenging because self-reports are not explicitly defined (what one calls an evening shift, another may call a night shift) and people's shifts may vary throughout the week (Presser, 2003). Two dummy variables to indicate whether the person experienced a *night sleep disruption* (as previously described) or if they *napped* (defined by primary activity code for napping) on the diary day are also included. Finally, a categorical variable for total housework (including cooking, food preparation, cleaning, laundry, pet care, and home maintenance, but excluding child care) is created using quartiles (lowest quartile (ref.), second, third, highest) to determine if housework level differences explain any portion of the gender gap in sleep minutes. Quartiles are calculated within-wave to account for the inter-wave changes in the amount of housework performed.

3.4 Control variables

Baseline covariates in each model include: *age* and *age squared* to capture age-related sleep differences; *education* (primary ref. cat., middle, and higher); *partner status* (no partner ref. cat., part-time 1-35 hours/week, and full-time 36+ hours/week) since those with and without partners may have different constraints on their time; *region* (urban centres ref., medium-sized cities, small cities and rural areas); *day of week* (Monday ref. Tuesday, Wednesday, Thursday), and holidays. SWETUS provide no information on prior health conditions such as BMI, diet, smoking or caffeine consumption, know lifestyle determinants of sleep duration. In their absence, I construct a proxy variable measuring time spent engaged in physical activity[8] on the individual's weekend diary day (ref. 0 minutes, 10-40 min., 50-80 min. and 90+ minutes).

3.5 Methods

Ordinary least squares (OLS) regression models are estimated on pooled and gender-

[8] These activities include walking, hiking, biking, hunting, indoor and outdoor sports, and other sport activities)

stratified samples to assess whether gender differences in sleep minutes exist, and to determine if the total daily sleep minutes of men and women in Sweden has changed between waves. Independent variables of interest are introduced in a stepwise manner, and the implications of their inclusion in the model are discussed. This analysis is then repeated for those with children only, to determine if wave changes are robust for working parents. Logistic regressions are then used to assess whether working parents are at greater odds of short sleep than non-parents. Examining both mean minutes and short sleep has been used in related research (Bonke, 2015; Hagen et al., 2013), which overcomes the shortcoming that mean levels remain similar while the proportions of short sleepers change, and short sleep durations may be of greater concern for public health (Bin, Marshall & Glozier, 2012). Finally, night disruptions are examined using a dummy variable in the OLS and logistic analyses, and also as the outcome variable in logistic regressions on the pooled sample.

4. Results

Table 2 provides sample descriptives stratified by men and women, including variable means, total daily sleep minutes and proportions experiencing short sleep durations. Within-variable gender differences in mean daily sleep minutes are assessed using t-tests, with statistically significant differences at the 10 percent level indicated by asterisks. Mean weekday sleep minutes are 445 (7hr 25min) for men and 461 (7hr 41min) for women, a statistically significant gender gap of 16 minutes. Considering only those who worked on the diary day reduces means to 432 (7hr 12 min) for men and 445 (7hr 25 min) for women, figures in the lower spectrum of daily sleep recommendations of 7-9 hours. Statistically significant within-variable gender differences are prevalent throughout, with one exception being the life cycle variable, which only finds gender differences for individuals without children, with 2+ young children, and with one older child. The only indicator where men sleep more than women is the small sample of night workers. The baseline proportion of short sleepers (<6.5 daily hours) are 17.2 percent of the weighted sample; 19.5 percent of men and 15.0 percent of women. If short sleep is instead defined as ≤6 hours, these proportions decreased to 13.2 percent for men and 10.6 percent for women. Relative to baseline proportions, work times starting pre-0700hrs and night workers are associated with the highest proportions of short sleepers for both men and women. Year categories indicate little change in mean minutes between waves, while unadjusted short sleep proportions are highest for men in 1990, and women in 2010. Those reporting a night disruption are 6.7 percent of the sample; by gender and parent status, the figures are 5.2 percent of men with kids and 3.7 percent without, and for women with kids 10.5 compared to 7.3 percent without. Women are also more likely to report parities higher than 1 compared with men. Those with 1 or more night disruptions have higher mean variance, with above-baseline within-gender mean sleep minutes, while also being above-baseline for short sleep, indicating that disruptions can both increase and decrease sleep minutes. 4.5 percent of the sample napped on the diary day. Hypothetically speaking, had these individuals not napped, their short sleep prevalence would have increased from 15 to 34 percent for men, and 10 to 22 percent for women.

Table 2 about here

To address whether women in Sweden sleep more than men, and to assess whether daily sleep minutes changed between waves, OLS multivariate regressions are performed on the pooled (men and women) sample for Monday-Thursday observations (Table 3). Independent variables of interest are added stepwise across models 3-8, and baseline covariates of age, age-squared, education level, partner status, region, weekend exercise, day of the week and holiday are included in all but model 1. The baseline gender gap favoring women of 17 minutes per day is reduced to 13 minutes once life cycle and work hours are accounted for, and is reduced further still to 8.4 minutes once work scheduling, disruptions and napping are included (Model 5). The gender gap is never fully eliminated, and the gap is robust and highly consistent in magnitude when each wave is estimated independently (results not shown). The pooled model also suggests that compared with 1990, net of base covariates and after including all independent variables, workers in Sweden are sleeping more minutes in 2000 and 2010 compared with 1990. The interaction term for gender and wave indicate no statistically significant difference in 2000 or 2010, compared with 1990, providing no indication that women are increasingly sleeping less between the waves. Table 3 results are robust when each model is re-estimated on prime-aged (25-54) workers only.

Table 3 about here

To assess whether mothers sleep less than fathers, the same pooled OLS regressions are performed on men and women with children living in the household (Table 4). The gender coefficient is near-identical across all models compared to the pooled analysis including the full sample. Once again, part of the gender gap is controlled away across models, but it never disappears and remains robust when each wave is estimated independently. What differs for those living with children only is the positive 2010 wave coefficient (from Table 3) loses statistical significance, suggesting the increase in sleep minutes in 2010 compared with 1990 is driven by those without children. The interaction term for gender and wave indicate no statistically significant difference in 2000 or 2010, compared with 1990, providing no indication that working mothers sleep less minutes post-1990, net of coontrols. To ensure these results aren't driven by a single-parent effect, single parents are excluded from a re-estimation, which finds the gender gap and wave coefficients do not change (results not shown).

Table 4 about here

The previous OLS models are then estimated on men and women independently (Table 5), to determine if the changes between waves are robust for men and women, and to uncover any differentiating pattern in the determinants of sleep minutes. Net of base covariates and after including independent variables stepwise, a clear pattern seems to emerge that men are sleeping more minutes post-1990, a result that holds when estimating men living with and without children separately. This is not clearly the case for women in 2010, where in models 1-3 the 2010 wave coefficient is not significant, but once work scheduling is accounted for (Model 4), the results are consistent with men. Re-estimating Model 4 for women with children only indicates the 2010 coefficient of 9.2 minutes is entirely driven by women without children. These gains relative to 1990 means, however small, should be considered in light of the general assumption that sleep duration has declined in this period. The coefficients for the child category variable can be interpreted as the minute difference between the child category and those without children in the home, and should be considered bearing in mind the "healthy mother effect," where those with and without children may have different uncontrolled characteristics. The presence of one young child does not lead to any statistical difference in sleep minutes compared to those without children for men or women, as others have found (Robinson & Godbey, 1997; Burgard & Ailshire, 2013). Having two or more children where the youngest is under 6 is however associated with reductions in men's and women's sleep compared to men and women without children. Having one older child is associated with less sleep for men with children compared with childless men, and having two or more older children reduces mothers compared to non-mothers. Why having 2 or more older children is negatively associated with women's sleep but not men's could be due to women's primary caregiver role, which comes with greater time commitments when more children are present. That men and women working 41+hours sleep less than their part-time working counterparts isn't surprising, but the difference between part- and full-time workers is comparatively small for women, and re-estimating these regressions on parents and non-parents separately reveal that the difference between part- and full-time (35-40hours) workers are driven entirely by workers without children, for men and women. Including the work-scheduling variable improves model fit and indicates considerable differences between those performing day work and other scheduling characteristics, including those who didn't work on the diary day. Night disruptions seem to indicate no effect on sleep minutes for men or women, but napping on the diary day is associated with 35 additional minutes of sleep for men and 44 additional minutes for women (Models 4), compared to not napping.

Table 5 about here

Due to their linkage to societal health and to provide additional context to the OLS results, short sleep durations are examined by applying logistic regression models to the pooled (men and women) sample. Table 6 results are reported in terms of odds ratios, and coefficients can be interpreted as the estimated increase in the log odds of the outcome per unit increase in the value of the exposure. The binary outcome variable equals 1 if total daily sleep <6.5 hours. Odds ratios of 1.00 mean the groups being compared are equally likely to experience the event in question (short sleep on diary day), and ratios greater than one mean higher odds than the reference group. Results indicate that women have lower odds of short sleeping than men across each model, in line with OLS results. The wave category coefficients offer no indication that the prevalence of short sleep has increased post-1990. Of note, there is no difference between part- and full-time workers, although those working 41+ weekly hours are at greater odds of short sleep compared to those working less. The work-scheduling coefficients indicate starting work before 7am and working at night increases the odds of short sleeping, compared to those working daytime hours, while those not working on the diary day have reduced odds compared to regular day workers. Quite importantly, night disruptions increase the odds of short sleep, but they didn't reduce sleep minutes in the OLS analyses, indicating that for some disruptions lead to short sleep, but for others they lead to increased sleep. Quite expectedly napping reduces the odds of short sleeping.

Table 6 here

The previous logistic analyses are then estimated on men and women independently (Table 7), to uncover any differentiating pattern in the determinants of short sleep for men and women. Two relevant differences between men and women emerge. Firstly, I find no differential odds in short sleeping comparing childless men with any child category. This differs from the pattern for women, where compared to childless women, those in each child category, except one young child, are at increased odd of short sleep. Since this study only considers working men and women, this in some way suggests men, regardless of the number and age of their children, are at similar odds of sleeping less than 6.5 hours a night, but this is not the case for working mothers, who are more likely to short sleep than their childless counterparts. Secondly, experiencing a night disruption increases the odds of short sleep for women only, further evidence that night disruptions impact women's sleep more than men.

Table 7 about here

Finally, night sleep disruptions are examined by applying logistic regression models to the pooled (men and women) sample. Table 8 coefficients are odds ratios, with the binary outcome variable equalling 1 if the individual reported at least one 10-minute disruption in their night sleep on the diary day, which identified almost 7 percent of the sample. Results present a clear pattern, where women are roughly twice as likely as men to report night disruptions, the odds of which increase for men and women post-1990. Those with younger children are more than twice as likely to experience a disruption, and even those with two or more older children are at increased odds compared to those without children. That the wave coefficient results remain robust when estimating men and women with and without children independently, suggests the post-1990 increase in disruptions is a wider societal phenomenon than something due to parenting changes more specifically. Those with children are more likely to be disrupted than those without, which in part explains the gender differences, but the increase post-1990 impacts men and women with and without children. The odds of being disrupted are higher for those working evenings, and those not working on the diary day, compared to those working daytime hours. Those who napped on the diary day are at increased odds of being disrupted, an intuitive finding.

Table 8 about here

5. Discussion

This paper provides an initial account of the sleep durations of working men and women in Sweden in the period from 1990 to 2010, while contributing to several discussions in related literature. Considering the overarching hypothesis that these are increasingly sleep-deprived times, this paper uncovers no evidence to suggest that working men and women are sleeping any less daily minutes, or are more likely to be short sleepers, between 1990 and 2010 in Sweden. In fact, the evidence seems to point in the other direction, at least for those without children, while those with children are sleeping no minute per day difference comparing 1990 and 2010. The second hypothesis was whether working women in Sweden sleep less than men, but a gender gap favoring women emerges throughout the study, which remains after work scheduling, napping and night disruptions are accounted for. The gender gap in sleep minutes also exists when comparing men and women with children in the home only. The third hypothesis of whether working men and women with children are at greater odds of short sleep than non-parents reveals differences between men and women, where men are more likely than women to be short sleepers, but no differences are uncovered between men with and without children, suggesting their short sleep is determined more so by their roles as workers. For working women however, those in all but the youngest child category are at greater odds of short sleep relative to women without children. So while men are more likely to be short sleepers than women in Sweden, the relative sleep deprivation between those with and without children is greater for women.

These sleep duration results should be considered in combination with night disruption findings, which found that women are more likely to be disrupted than men, those with young children more likely than those without, but the odds of being disrupted increase post-1990 for all men and women. So while the average sleep minutes of men and women with children don’t change between 1990 and 2010, sleep in the latter period is twice as likely to be disrupted in the night, suggesting a seven or eight hour sleep in 1990 is not qualitatively equivalent to one in 2010, given the impact disruptions can have on fatigue (Kahn et al., 2014). The method used to identify night disruptions likely under-estimates their true prevalence for three reasons; under-reporting of episodes less than 10-minutes, night sleeps which are terminated prematurely cannot be differentiated from desired waking times, and the time required to fall asleep post-disruption cannot be accounted for in the survey design, meaning time diaries understate fatigue. Thus a latent and gendered prevalence of fatigue probably explains some portion of the gender gap in sleep minutes found in most time use studies. The small gender gap in sleep minutes favoring women raises the question of whether this gap is enough to compensate for women’s lesser sleep quality.

There are several possible explanations why sleep durations have not declined in this period for women, as theorized. Increasingly busy working lives coupled with family obligations may have an exhaustive effect, so while discretionary time for sleep reduces, sleep is not traded-off to the same degree as say leisure. It is also possible that the increasingly flexible, gender-neutral and culturally-embedded institutional setting serve to better enable juggling work and family obligations over the life cycle, which may explain why those with young children don’t sleep substantially less than other working adults, and why no short sleep differences are found between part- and full-time workers. As mentioned, night disruptions cause fatigue and increase post-1990 across all groups, thus it’s alternatively possible that an increasingly fatigued society should in fact sleep more in the aggregate, not less.

The investigation into the associations between children and sleep uncovered several findings worth mentioning. At the means, having 2 or more young children reduces men’s and women’s sleep compared to those without children, but this doesn’t increase the odds of short sleep for men, although it does for women, except those with 1 young child. This suggests that children reduce the sleep minutes of men and women, but the impact is more nuanced, reducing sleep minutes marginally for men and women at the mean, but for women, pushing many into the short sleep category. The life cycle results should be interpreted with two caveats. Firstly, differences between parents and non-parents are complicated by the possible existence of a health mother and possibly healthy father effect, which would bias coefficients if those living with children sleep differently than those who do not due to unobservable characteristics. Secondly, this paper uses rather crude child categories, which means the result that those with two or more young children sleep less than other could in fact be driven by those with a 1 year old, thus the broad categorization may overgeneralize the true impact. Regardless, findings here offer no support that working mothers sleep less than working fathers, but they do experience greater interruptions than men, and sleep less than comparable women without children.

The number of work hours and the scheduling of those hours have strong associations with short sleep duration in this study. At the descriptive level, they are more closely associated with increased short sleep proportions for men and women than life cycle stage. Men and women who work longer weekly hours have less discretionary time, so this is an expected finding. The non-standard work hour variables show beginning work early, and especially night work, increases the odds of short sleep for men and women. It is interesting to note that those who didn't work on the diary day are twice as likely to experience a night disruption compared to regular day workers. That many fatigued workers did not in fact work on the diary day should be a positive finding, given the known association between fatigue and work-related accidents (Åkerstedt, 2002a).

This study comes with limitations. Firstly, the SWETUS data contain three cross-sections between 1990 and 2010, limiting any causal investigations, as short sleepers may obviously work more because they sleep less and vice versa. In the absence of longitudinal data on sleep durations for men and women however in Sweden, the SWETUS data are to my knowledge the only nationally-representative data set available for this period that include men and women. Sleep is a complex phenomenon, and numerous confounders and omitted variables (such as prior health conditions) exist that this paper cannot account for. Because none of the empirical models fully explain the variation in sleep minutes, results should be considered given that unobserved heterogeneity may vary between men and women and waves in this study. Despite these shortcomings, this paper has aimed to contribute to several discussions surrounding the relationship between sleep, work and parenthood which hopefully future research can build upon.

Returning to the overarching question of whether overworked and underslept is an emerging phenomenon in Sweden, for women, work intensity may have increased and weekly work hours are likely high by international comparison, but the amount of time dedicated to sleep has not declined, although it could be argued that mean levels are near the lower bound of the daily recommended 7-9 hours. For men, they continue to work more hours and sleep less than women, but their sleep is less disrupted, so it may have better restorative properties. This paper uncovered no evidence that in the aggregate men are sleeping less post-1990. However, a more nuanced answer is that certain groups of individuals sleep less than others, such as those working longer weekly hours and non-standard work times, which many combine with raising children. Future research investigating whether the proportion of men and women working long weekly hours is in fact increasing in this period, combined with results here, could together illustrate whether overworked and underslept is gaining in prevalence in Sweden. The results here may illuminate the more acute problem that disruptions have become increasingly prevalent post-1990, suggesting how much we sleep has changed less over time relative to its quality.

7. References

Åkerstedt, T. & Fredlund, P. & Gillberg, M. & Jansson, B. (2002a). A prospective study of fatal occupational accidents–relationship to sleeping difficulties and occupational factors. *Journal of Sleep Research*. *11(1)*, 69–71.

Åkerstedt, T. & Knutsson, A. & Westerholm, P & Theorell, T. & Alfredsson, L. & Kecklund, G. (2002b). Sleep disturbances, work stress and work hours. A cross-sectional study. *Journal of Psychosomatic Research, 53*, 741-748.

Anxo, D. (2009. Working Time Policy in Sweden; 2009 JILPT International Seminar on Working Time, Working Time – In Search of New Research Territories Beyond Flexibility Debate, (http://www.jil.go.jp/english/reports/documents/jilpt-reports/no.7_anxo.pdf)

Arber, S. & Hislop, J. & Bote, M. & Meadows, R. (2007). Gender roles and women's sleep in mid and later life: a quantitative approach, *Sociological Research Online*, *12(5)*, 3.

Basner M., & Fomberstein K., & Razavi F., et al. (2007). American Time Use Survey: Sleep time and its relationship to waking activities. *Sleep*, *30*, 1085–95.

Becker, G. (1993), *Treatise on the Family* (enlarged edition) Boston: Harvard University Press.

Bellavia, G., & Frone, M. (2005). Work-family conflict. In J. Barling, E. K. Kelloway, & M. Frone (Eds.), *Handbook of work stress* (pp. 185-221). Thousand Oaks, California: Sage Publications.

Bianchi, S. M. (2000). Maternal employment and time with children: Dramatic change or surprising continuity? *Demography, 37*, 410-414.

Biddle, J.E. and Hamermesh, D.S. (1990). Sleep and the allocation of time, *Journal of Political Economy, 98(5)*, 922–43.

Bianchi, S. M., Robinson, R. P. & Milkie, M. A. (2006). *Changing rhythms of American family life*. Russell Sage Foundation.

Bin, Y., Marshall, N & Glozier, N. (2012). Secular trends in adult sleep duration: A systematic review. *Sleep Medicine Reviews*, *16*, 223-230.

Bin, Y., Marshall, N., & Glozier, N. (2013). Sleeping at the limits: The changing prevalence of short and long sleep durations in 10 countries. *American Journal of Epidemiology,177*, *8*, 826-833.

Burgard, S. (2011). The needs of others: Gender and sleep interruptions for caregiving. *Social Forces, 89*, 1189–1215.

Buxton OM, Cain SW, O'Connor SP, et al.(2012). Adverse metabolic consequences in humans of prolonged sleep restriction combined with circadian disruption. *Sci Transl Med*. 2012;4(129):ra43

Burgard, S. & Ailshire, J.(2013). Gender and time for sleep among U.S. adults, *American Sociological Review*, *78(1)*, 51-69.

Cha, S.E. & Eun, K.S. 2013. Gender difference in sleep problems: Focused on time use in daily life of Korea, *Social Indicators Research, 119(3*), 1447-1465.

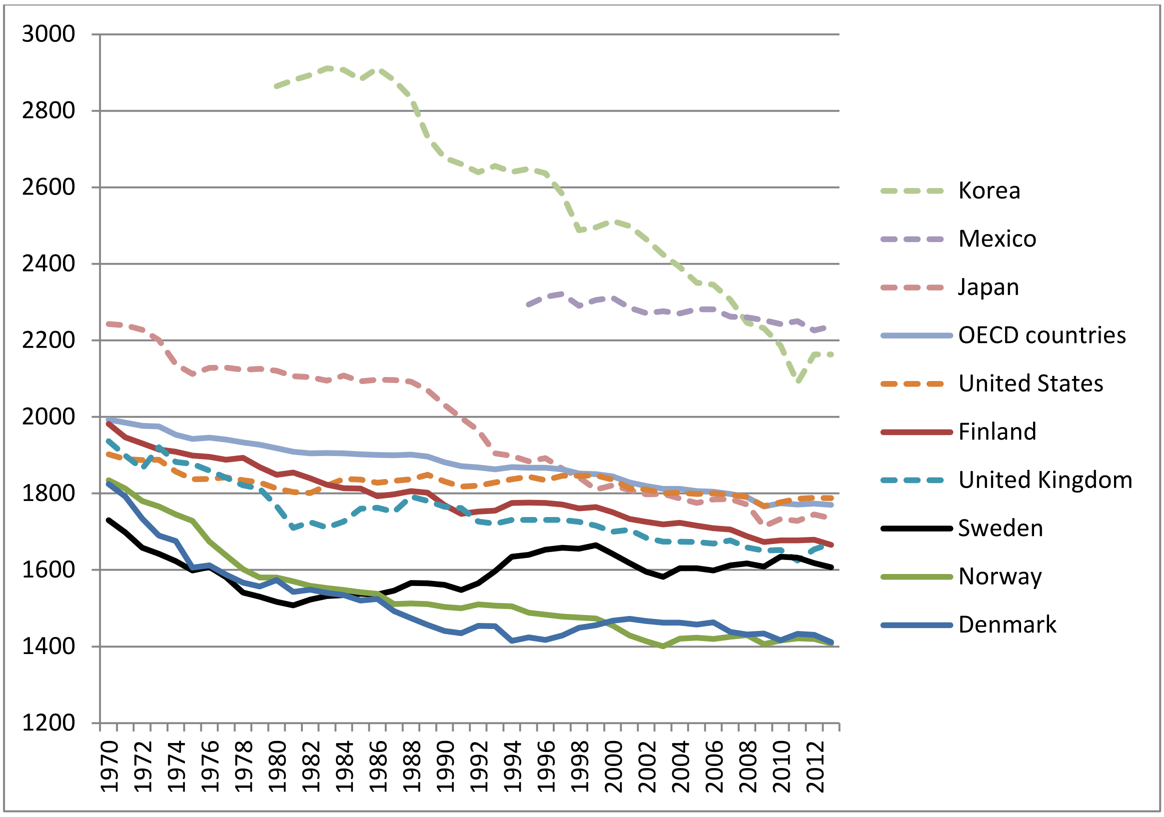
Chatzitheochari, S. & Arber, S. (2009). Lack of sleep, work and the long hours culture: Evidence from the UK Time Use Survey. *Work, Employment & Society*, *23(1)*, 30-48.

Derickson, A. (2013) *Dangerously Sleepy: Overworked Americans and the Cult of Manly Wakefulness*. University of Pennsylvania Press. ISBN 978-0-8122-4553-0

Dribe, M., & Stanfors, M. (2009). Does parenthood strengthen a traditional household division of labor? Evidence from Sweden. *Journal of Marriage and Family*, *71*, 33-45.
Floderus, B. & Hagman, M. & Aronsson, G. & Marklund, S. & Wikman, A.(2008). Self-reported health in mothers: The impact of ge, and socioeconomic conditions, *Women & Health*, *47(2),* 63-86, DOI: 10.1080/03630240802092308
Gershuny, J. (2000). *Changing times: Work and leisure in postindustrial society*. Oxford, UK: Oxford University Press.
Hagen, E. & Mirer, A. & Palta, M., & Peppard, P.(2013). The sleep-time cost of parenting: Sleep duration and sleepiness among employed parents in the Wisconsin Sleep Cohort Study, *American Journal of Epidemiology*, *177(5)*, 394-401.
Hirshkowitz, M. et al.,(2015) National Sleep Foundation’s sleep time duration recommendations: methodology and results summary, *Sleep Health*, http://dx.doi.org/10.1016/j.sleh.2014.12.010
Hochschild, A. (1989). *The second shift: Working parents and the revolution at home*. New York: Viking Penguin
Hofferth, S. & Sandberg, J.(2001). How American children spend their time. *Journal of Marriage and Family*, *63*, 295-308.
Kahn, M., & Fridenson, S. & Lerer, R. & Bar-Haim, Y. & Sadeh, A.(2014). Effects of one night of induced night-wakings versus sleep restriction on sustained attention and mood: a pilot study, *Sleep Medicine*, *15*, 825-832.
Kalil, A. & Dunifon, R. & Crosby, D. & Su, J.(2014). Work hours, schedules, and insufficient sleep among mothers and their young children, *Journal of Marriage and Family, 76*, 891-904.
Kan, M., Sullivan, O., & Gershuny, J. (2011). Gender convergence in domestic work: Discerning the effects of interactional and institutional barriers from large-scale data. *Sociology*, *45*, 234-251.
Maume, D. & Sebastian, R. & Bardo, A. (2009). Gender differences in sleep disruption among retail food workers. *American Sociological Review, 74*, 989-1007.
Milkie, M. A., Raley, S., & Bianchi, S. M. (2009).Taking on the second shift: Time allocations and time pressures of U.S. parents of preschoolers. *Social Forces*, *88*, 487 – 517.
Neilson, J. & Stanfors, M.(2015). Time alone or time together? Time allocation among working couples in Sweden 1990-2010. Unpublished paper. Centre for Economic Demography at Lund University.
Parent-Thirion, A. & Fernández Macías, E. & Hurley, J. & Vermeylen, G. (2007). *Fourth European Working Conditions Survey*. Dublin: European Foundation for the Improvement of Living and Working Conditions.
Presser, H. B. (2003). *Working in a 24/7 economy*. New York: Russell Sage Foundation.
Robinson, J. & Godbey, G.(1997). *Time for life: The surprising ways Americans use their time*. Pennsylvania State University Press.
Robinson, J. & Michelson, P. (2010). Sleep as a victim of the “time crunch” – A multinational analysis. *Electronic International Journal of Time Use Research*, *7(1)*, 61-72.
Sayer, L.(2005). Gender, time and inequality: Trends in Women's and Men's paid work, unpaid work and free time, *Social Forces*, *84(1)*, 285-303.
Swedish Social Insurance Agency (Försäkringskassan) (2014). *Social Insurance in Figures 2014*. ISSN: 2000-1703. ISBN: 978-91-7500-380-1.

http://www.forsakringskassan.se/omfk/publikationer/publications_in_english
Spurgeon, A. & Harrington, J. & Cooper, C.(1997). Health and safety problems associated with long working hours: a review of the current position. *Occupational and Environmental Medicine*, *54,* 367-375.
Stenbeck, M. & Persson, G.(2006). Chapter 10: Working life, work environment and health, *Scandinavian Journal of Public Health*, *34(67)*, 229–245.
Statistics Sweden, Living Conditions Report 126, *Working hours and work environment 2010–2011*.
Stewart, J. (2010). The timing of maternal work and time with children. *Industrial & Labor Relations Review, 64,* 181–200.
Suarez, E. (2008). Self-reported symptoms of sleep disturbance and inflammation, coagulation, insulin resistance and psychosocial distress: Evidence for gender disparity, *Brain, Behavior, and Immunity*, *22(6)*, 960–968.
Venn, S. & Arber, S. & Meadows, R. & Hislop, J. (2008). The fourth Shift: Exploring the gendered nature of sleep disruption among couples with children. *British Journal of Sociology*, *59*, 79–97.
Youngstedt, S. & Kline, C.(2006). Epidemiology of exercise and sleep, *Sleep and Biological Rhythms*, *4(3*), 215–221.

Figure 1. *Hours worked per worker, select OECD countries*



Note: OECD statistical Database (http://stats.oecd.org), accessed 01 October, 2014.

Table 1. *Self-reported hours of paid work (last week) for those aged 20-64, Sweden time use surveys 1990/91, 2000/01 and 2010/11, by gender and year*

	*Mean weekly hours, reported**	*Mean weekly hours if t>0**	*% working zero*	*% working 1-34 hours*	*% working 35-40 hours*	*% working 41+ hours*
Men with children in home						
1990/91	37.3	42.0	2.7	2.4	66.4	28.5
2000/01	36.9	42.3	5.6	4.4	51.4	38.5
2010/11	35.3	42.3	6.2	5.1	51.4	37.3
Men without children in home						
1990/91	34.3	41.2	16.8	5.6	58.8	18.9
2000/01	34.0	41.2	17.4	8.8	49.5	24.4
2010/11	31.9	41.5	22.2	8.8	44.4	24.6
Women with children in home						
1990/91	30.0	35.1	10.8	35.8	46.8	6.7
2000/01	29.2	36.1	13.8	32.8	43.3	10.1
2010/11	28.9	37.3	19.3	26.8	42.9	11.1
Women without children in home						
1990/91	28.2	35.2	19.9	27.5	46.1	6.5
2000/01	28.1	36.7	23.5	20.6	42.4	13.5
2010/11	28.4	37.8	24.0	16.7	44.5	14.8

Note: *Author's own calculations from SWETUS. *Mean weekly hours are based on self-reported survey question asking number of hours in paid work last week.*

Table 2. *Weighted pooled (Monday to Thurdsday) means and proportions of variables.*

	Pooled (Men/Women)			Men			Women		
	Var. Mean	Mean sleep mins. (95% CI)	Prop. Sleep <6.5 hours	Var. Mean	Mean sleep mins. (95% CI)	Prop. Sleep <6.5 hours	Var. Mean	Mean sleep mins. (95% CI)	Prop. Sleep <6.5 hours
Men (ref.)	0.490	445 (441-448)	19.5%		445* (441-448)	19.5%			
Women	0.510	461 (458-465)	15.0%					461* (458-465)	15.0%
Year									
1990 (ref.)	0.367	448 (444-452)	17.6%	0.330	438* (432-443)	20.5%	0.403	457* (451-462)	15.3%
2000	0.308	460 (456-464)	16.5%	0.323	452* (446-458)	19.6%	0.294	469* (463-474)	13.2%
2010	0.325	452 (448-457)	17.5%	0.348	445* (438-451)	18.5%	0.303	460* (454-467)	16.3%
# & age of youngest child									
No children (ref.)	0.525	458 (455-462)	16.2%	0.567	450 * (445-455)	18.7%	0.484	468* (463-472)	13.4%
1 child aged <6	0.060	466 (457-476)	14.8%	0.058	460 (446-474)	17.4%	0.061	472 (459-486)	12.4%
2+ child yngst. <6	0.131	447 (441-453)	19.0%	0.141	437* (429-445)	22.0%	0.122	459* (450-467)	15.7%
1 child aged. 6+	0.143	444 (438-451)	19.3%	0.115	428* (419-438)	21.9%	0.170	455* (446-463)	17.6%
2+ child yngst. 6+	0.141	443 (437-449)	18.1%	0.118	438 (429-447)	18.9%	0.164	446 (438-454)	17.5%
Weekly Work Hours									
1-34/week (ref.)	0.199	470 (465-476)	13.8%	0.066	486* (468-503)	13.1%	0.326	467* (461-473)	14.0%
35-40/week	0.578	452 (449-455)	16.9%	0.615	445* (441-450)	19.0%	0.543	460* (455-464)	14.7%
41+/week	0.223	440 (435-445)	20.9%	0.319	435* (430-441)	21.7%	0.131	452* (443-461)	19.0%
Dummy indicators, night disruption and napped on diary day									
Night disruption (any activity)	0.067	467 (457-477)	19.7%	0.043	462 (442-481)	19.9%	0.090	469 (457-482)	19.6%
Napped on diary day	0.045	459 (440-478)	12.5%	0.047	481* (463-498)	15.0%	0.044	508* (488-528)	9.9%
Work schedule									
Day work (ref.)	0.683	440 (437-442)	17.8%	0.708	433* (429-436)	20.0%	0.660	447* (444-450)	15.5%
Day work, start time <0700hrs	0.054	406 (399-413)	30.5%	0.076	405 (396-414)	30.7%	0.033	408 (397-420)	30.0%
Evening work	0.050	469 (455-482)	17.7%	0.048	461 (440-482)	21.7%	0.052	476 (458-494)	14.2%
Night work	0.020	401 (369-433)	47.8%	0.017	443 * (397-488)	37.8%	0.022	370* (327-412)	55.3%
Did not work on diary day	0.193	515 (509-521)	8.2%	0.152	516 (506-526)	8.7%	0.234	514 (507-522)	7.9%
Age									
age 20-29	0.177	477 (470-483)	13.9%	0.185	465* (456-475)	16.5%	0.170	489* (481-498)	11.1%
age 30-39	0.255	451 (447-456)	17.3%	0.251	445* (438-451)	19.9%	0.260	457* (451-463)	14.8%

age 40-49	0.274	444 (440-449)	18.3%	0.264	436* (430-442)	20.2%	0.284	452* (446-458)	16.7%
age 50-64	0.294	449 (445-453)	18.1%	0.301	440* (434-446)	20.3%	0.287	458* (452-463)	15.8%
Education									
Primary (ref.)	0.199	451 (447-456)	16.6%	0.210	446* (439-453)	18.2%	0.189	457* (451-463)	14.8%
Secondary	0.447	455 (451-458)	17.9%	0.463	444* (439-449)	21.0%	0.431	466* (460-471)	14.7%
Higher	0.354	452 (448-456)	16.7%	0.327	445* (440-451)	18.1%	0.381	458* (453-463)	15.5%
Partner Status									
No partner (ref.)	0.497	456 (452-459)	17.7%	0.488	452* (447-457)	19.4%	0.507	460* (455-465)	16.2%
1-35hrs	0.117	442 (436-448)	17.4%	0.210	439* (432-445)	18.3%	0.028	466* (448-484)	11.2%
36+ hours	0.386	453 (450-457)	16.5%	0.302	438* (432-444)	20.5%	0.466	463* (458-467)	13.9%
Region									
Urban centres (ref.)	0.347	456 (452 - 460)	16.8%	0.329	450* (444-457)	19.3%	0.362	461* (455-466)	14.7%
Large cities	0.362	453 (449 - 457)	16.8%	0.376	444* (439-449)	19.0%	0.348	463* (457-468)	14.6%
Med. Size towns	0.184	450 (445 - 455)	17.5%	0.189	437* (430-445)	20.1%	0.179	462* (455-470)	14.9%
Small town/rural	0.108	451 (443 - 458)	19.0%	0.106	445* (434- 455)	20.9%	0.111	456* (446-467)	17.3%
Exercise minutes on weekend									
No exercise	0.603	453 (450-456)	17.5%	0.622	444* (440-449)	20.2%	0.585	461* (457-465)	14.9%
1-40 mins.	0.089	453 (446-461)	15.7%	0.073	446* (435-457)	16.6%	0.104	458* (448-468)	15.1%
41-80 mins	0.141	452 (446-459)	18.0%	0.127	444* (435-454)	21.5%	0.153	459* (450-468)	15.2%
81+ mins.	0.153	456 (450-461)	16.0%	0.164	443* (436-451)	17.7%	0.142	469* (461-478)	14.2%
Day of week[b]									
Monday (ref.)	0.102	458 (453-463)	16.2%	0.245	451* (444-457)	18.3%	0.249	465* (458-472)	14.2%
Tuesday	0.103	451 (447-456)	17.7%	0.101	441* (435- 448)	20.8%	0.102	461* (455-468)	14.5%
Wednesday	0.098	453 (448-458)	17.1%	0.106	443* (436-450)	18.8%	0.099	461* (454-468)	15.6%
Thursday	0.099	451 (446-456)	17.8%	0.095	444* (437-451)	19.9%	0.100	457* (451-463)	15.7%
Friday[b]	0.101	423 (418-428)	33.1%	0.097	418 (410-426)	35.4%	0.101	428 (421-436)	30.8%
Saturday[b]	0.251	491 (487-494)	15.2%	0.102	488 (483- 493)	16.2%	0.099	493 (488-498)	14.3%
Sunday[b]	0.247	563 (560 - 567)	5.1%	0.254	564 (559-570)	6.3%	0.249	562 (558-567)	3.9%
N (Mon-Thurs)	6,414			2,968			3,446		

Note: Estimates account for survey design using sampling weights. [a]Age categories for illustrative purposes, while age and age^2 are used in regression analyses. [b]Column figures are based on Monday-Thursday observations, with the exception of *day of week*, which are day-specific. *T-tests denote within-variable statistically significant gender differences in means at p<.10.

Table 3. OLS *Weighted regression, pooled men and women, total daily sleep minutes (Mon-Thur)*

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Female (male ref.)	17.0*** (2.373)	18.1*** (2.473)	18.8*** (2.47)	12.9*** (2.706)	8.4*** (2.563)	11.9*** (2.344)	7.8** (3.903)	10.2*** (2.609)
1990 wave (ref.)								
2000 wave	13.2*** (2.815)	13.7*** (2.936)	13.4*** (2.912)	14.6*** (2.938)	10.9*** (2.792)	9.9*** (2.758)	10.7*** (3.809)	10.9*** (2.783)
2010 wave	5.5* (2.994)	8.3** (3.225)	7.8** (3.218)	9.2*** (3.234)	9.3*** (3.057)	8.3*** (3.030)	8.4** (4.132)	9.4*** (3.048)
No children (ref.)								
1 child <6yrs old			2.6 (5.577)	2.2 (5.608)	-1.8 (5.477)	-1.6 (5.456)	-1.8 (5.474)	-1.2 (5.465)
2+ children yngst. <6			-10.9*** (3.961)	-13.7*** (4.009)	-17.2*** (3.758)	-15.8*** (3.709)	-17.2*** (3.759)	-16.1*** (3.751)
1 child >5 years old			-7.3* (3.951)	-7.5* (3.914)	-8.3** (3.690)	-8.3** (3.718)	-8.3** (3.688)	-8.3** (3.703)
2+ children >5 years old			-11.1*** (3.883)	-12.6*** (3.908)	-11.8*** (3.748)	-11.2*** (3.715)	-11.8*** (3.732)	-11.2*** (3.741)
1-34 hrs/week (ref.)								
35-40 hrs/week				-16.3*** (3.55)	-8.6** (3.373)		-8.7** (3.399)	-9.6*** (3.391)
41+ hrs/week				-25.5*** (4.286)	-16.3*** (4.074)		-16.3*** (4.083)	-17.4*** (4.110)
Work schedule (day work ref. cat)								
Day work, start time <0700hrs					-33.6*** (3.933)	-34.0*** (3.933)	-33.6*** (3.935)	-33.4*** (3.933)
Evening work					24.6*** (6.835)	25.7*** (6.897)	24.6*** (6.835)	25.3*** (6.834)
Night work					-43.7*** (16.173)	-41.7** (16.173)	-43.8*** (16.179)	-41.6** (16.070)
Did not work diary day					68.7*** (3.445)	70.0*** (3.417)	68.8*** (3.441)	73.3*** (3.718)
Dichotomous indicators								
Night sleep disruption					-2.6 (5.283)	-2.2 (5.259)	-2.6 (5.289)	-2.8 (5.249)
Napped diary day					28.7*** (6.155)	28.8*** (6.172)	28.7*** (6.158)	29.0*** (6.147)
Total housework (lower quartile ref.)								
Second quartile								-3.9 (2.956)
Third quartile								-2.3 (3.288)
Highest quartile								-15.2*** (3.596)
Interactions								
Interact 2000 wave*female							0.1 (5.106)	
Interact 2010 wave*female							1.9 (5.458)	
Covariates included[a]		X	X	X	X	X	X	X
R^2	0.012	0.048	0.051	0.058	0.173	0.170	0.173	0.177
N	6414	6414	6414	6414	6414	6414	6414	6414

Note: *** $p < .01$, ** $p < .05$, * $p < .10$. [a]Covariates include age, age^2, education, region, day of week, holiday, partner status and weekend exercise.

Table 4. OLS *Weighted regression, pooled men and women with children, total daily sleep minutes (Mon-Thur)*

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Female (male ref.)	18.0*** (3.341)	18.6*** (3.701)	19.0*** (3.750)	13.7*** (4.075)	8.8** (3.906)	11.9*** (3.561)	9.1 (5.949)	9.6** (4.079)
1990 wave (ref.)								
2000 wave	12.0*** (3.947)	12.5*** (4.158)	12.6*** (4.13)	13.7*** (4.155)	8.5 (4.033)	7.5* (4.003)	7.5 (5.524)	8.2** (4.038)
2010 wave	2.5 (4.317)	4.4 (4.630)	3.9 (4.643)	4.9 (4.649)	5.6 (4.424)	4.7 (4.409)	6.9 (6.222)	5.4 (4.395)
1 child <6yrs old (ref.)								
2+ children yngst. <6			-15.1** (6.071)	-16.2*** (6.098)	-16.6*** (5.855)	-16.4*** (5.852)	-16.6*** (5.855)	-15.9*** (5.838)
1 child >5 years old			-10.6 (7.307)	-10.5 (7.287)	-9.1 (7.065)	-9.5 (7.117)	-9.2 (7.074)	-9.3 (7.086)
2+ children >5 years old			-15.8** (6.815)	-16.0** (6.848)	-13.2** (6.686)	-13.6** (6.684)	-13.2** (6.674)	-12.9* (6.672)
1-34 hrs/week (ref.)								
35-40 hrs/week				-5.8 (4.636)	-0.7 (4.448)		-0.6 (4.490)	-1.4 (4.471)
41+ hrs/week				-18.8*** (5.805)	-12.2** (5.544)		-12.2** (5.553)	-12.7** (5.570)
Work schedule (day work ref. cat)								
Day work, start time <0700hrs					-32.9*** (5.726)	-32.4*** (5.721)	-33.0*** (5.741)	-32.9*** (5.730)
Evening work					9.8 (9.962)	10.2 (10.007)	9.8 (9.957)	10.9 (9.991)
Night work					-37.4 (23.852)	-36.3 (23.879)	-37.2 (23.836)	-35.6 (23.752)
Did not work diary day					64.5*** (5.043)	65.2*** (5.000)	64.4*** (5.038)	68.7*** (5.475)
Dichotomous indicators								
Night disruption (any activity)					-4.3 (6.608)	-4.0 (6.584)	-4.3 (6.618)	-4.6 (6.597)
Napped diary day					21.8** (8.904)	21.4** (8.957)	21.9** (8.902)	21.8** (8.944)
Total housework (lower quartile ref.)								
Second quartile								0.0 (4.570)
Third quartile								2.7 (4.811)
Highest quartile								-10.6** (5.275)
Interact 2000 wave*female							2.0 (7.166)	
Interact 2010 wave*female							-2.7 (7.986)	
Covariates included		X	X	X	X	X	X	X
R^2	0.013	0.044	0.047	0.052	0.153	0.151	0.154	0.156
N	3194	3194	3194	3194	3194	3194	3194	3194

Note: *** $p < .01$, ** $p < .05$, * $p < .10$. Covariates include age, age^2, education, region, day of week, holiday, partner status and weekend exercise.

Table 5. OLS *Weighted regression, men and women, total daily sleep minutes (Mon-Thur)*

	Men					**Women**				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
1990 wave (ref.)										
2000 wave	14.9*** (4.135)	14.9*** (4.151)	15.1*** (4.143)	10.1** (3.940)	9.8** (3.929)	11.4*** (4.036)	10.7*** (3.974)	11.9*** (4.043)	9.8** (3.792)	10.0*** (3.803)
2010 wave	10.8** (4.650)	10.8** (4.666)	10.9** (4.582)	7.7* (4.355)	7.8* (4.332)	5.1 (4.435)	4.1 (4.381)	5.5 (4.443)	9.2** (4.136)	9.4** (4.145)
No children (ref.)										
1 child <6yrs old		7.8 (8.063)	9.2 (8.031)	8.3 (7.545)	8.5 (7.564)		-2.4 (7.565)	-3.7 (7.614)	-10.6 (7.669)	-10.5 (7.724)
2+ children yngst. <6		-9.2* (5.374)	-10.0* (5.404)	-12.9*** (4.951)	-13.9*** (4.888)		-13.3** (5.714)	-16.7*** (5.783)	-20.8*** (5.580)	-19.6*** (5.566)
1 child >5 years old		-10.4* (5.721)	-10.0* (5.621)	-9.3* (5.296)	-9.9* (5.275)		-5.5 (5.363)	-6.2 (5.322)	-8.2 (5.060)	-7.6 (5.038)
2+ children >5 years old		-2.8 (5.736)	-3.1 (5.737)	-4.6 (5.521)	-4.4 (5.554)		-17.0*** (5.281)	-19.0*** (5.308)	-17.2*** (5.036)	-16.7*** (5.006)
1-34 hrs/week (ref.)										
35-40 hrs/week			-37.0*** (9.302)	-27.1*** (8.880)	-26.2*** (8.870)			-9.8 (3.807)	-4.2 (3.628)	-3.9 (3.612)
41+ hrs/week			-47.4*** (9.431)	-33.0*** (9.004)	-32.8*** (8.976)			-17.4* (5.798)	-13.2** (5.561)	-12.7** (5.557)
Work schedule (day work ref. cat)										
Day work, start time <0700hrs				-26.0*** (4.980)	-27.1*** (4.919)				-40.2*** (6.630)	-41.3*** (6.623)
Evening work				23.0** (10.198)	23.4** (10.146)				24.7*** (8.886)	24.7*** (8.891)
Night work				3.4 (23.015)	3.0 (23.097)				-77.2*** (21.143)	-78.8*** (21.201)
Did not work diary day				78.6*** (5.563)	77.3*** (5.569)				64.0*** (4.311)	62.4*** (4.285)
Dichotomous indicators										
Night disruption (all cause)					3.1 (9.605)					-4.9 (6.142)
Napped diary day					28.1*** (8.246)					30.0*** (9.182)
R^2	0.045	0.048	0.063	0.172	0.176	0.047	0.051	0.055	0.175	0.179
N	2968	2968	2968	2968	2968	3446	3446	3446	3446	3446

Note: *** $p < .01$, ** $p < .05$, * $p < .10$. All models include covariates age, age^2, education, region, day of week, holiday, partner status and weekend exercise.

Table 6. *Weighted logistic regression (men and women pooled), total daily sleep <6.5hours (Mon-Thur)*

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)
Female (male ref.)	0.726*** (0.631-0.835)	0.695*** (0.600-0.806)	0.686*** (0.592-0.796)	0.753*** (0.643-0.881)	0.778*** (0.661-0.914)	0.761** (0.595-0.973)
1990 (ref.)						
2000 wave	0.917 (0.781-1.077)	0.850* (0.717-1.007)	0.853** (0.719-1.012)	0.831** (0.700-0.987)	0.854* (0.715-1.019)	0.895 (0.708-1.133)
2010 wave	0.974 (0.816-1.163)	0.912 (0.754-1.102)	0.916 (0.757-1.109)	0.889 (0.733-1.079)	0.879 (0.723-1.068)	0.816 (0.626-1.062)
No children (ref.)						
1 child <6yrs old			1.016 (0.714-1.445)	1.018 (0.715-1.449)	1.062 (0.737-1.529)	1.063 (0.738-1.530)
2+ children yngst. <6			1.293** (1.015-1.645)	1.333** (1.045-1.700)	1.387** (1.083-1.778)	1.388*** (1.083-1.779)
1 child >5 years old			1.190 (0.950-1.492)	1.184 (0.945-1.483)	1.237* (0.983-1.558)	1.243* (0.987-1.565)
2+ children >5 years old			1.150 (0.910-1.452)	1.160 (0.918-1.467)	1.139 (0.895-1.449)	1.142 (0.897-1.453)
1-34 hrs/week (ref.)						
35-40 hrs/week				1.205 (0.984-1.475)	1.168 (0.948-1.441)	1.161 (0.940-1.434)
41+ hrs/week				1.522*** (1.199-1.933)	1.473*** (1.151-1.885)	1.468*** (1.147-1.880)
Work schedule (day work ref. cat)						
Day work, start time <0700hrs					2.043*** (1.566-2.663)	2.050*** (1.572-2.673)
Evening work					1.030 (0.730-1.453)	1.029 (0.728-1.453)
Night work					4.791*** (3.198-7.176)	4.744*** (3.165-7.109)
Did not work diary day					0.428*** (0.334-0.548)	0.430*** (0.336-0.551)
Dichotomous indicators						
Night disruption (any activity)					1.510*** (1.133-2.013)	1.514*** (1.136-2.017)
Napped diary day					0.706* (0.478-1.041)	0.703* (0.476-1.037)
Interact 2000 wave*female						0.889 (0.635-1.244)
Interact 2010 wave*female						1.184 (0.825-1.700)
Covariates included		x	x	x	x	x
N	6414	6414	6414	6414	6414	6414

Note: *** $p < .01$, ** $p < .05$, * $p < .10$. Figures are odds ratios with 95% confidence intervals in brackets. Covariates include age, age^2, education, region, day of week, holiday, partner status and weekend exercise.

Table 7. *Weighted logistic regression, total daily sleep <6.5 (Mon-Thur), men and women*

	Men					Women				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)
1990 wave (ref.)										
2000 wave	0.878 (0.696-1.107)	0.875 (0.693-1.105)	0.861 (0.680-1.090)	0.914 (0.718-1.164)	0.915 (0.718-1.165)	0.812 (0.630-1.046)	0.841 (0.652-1.085)	0.815 (0.630-1.055)	0.827 (0.635-1.077)	0.795* (0.610-1.036)
2010 wave	0.810 (0.623-1.053)	0.804 (0.617-1.047)	0.789 (0.603-1.032)	0.827 (0.631-1.084)	0.825 (0.629-1.081)	1.055 (0.803-1.386)	1.099 (0.834-1.449)	1.061 (0.800-1.407)	0.997 (0.750-1.326)	0.971 (0.731-1.292)
Life cycle (no kids ref.)										
1 child <6yrs old		0.966 (0.606-1.539)	0.945 (0.593-1.506)	0.982 (0.614-1.571)	0.970 (0.606-1.555)		1.102 (0.638-1.905)	1.140 (0.659-1.970)	1.245 (0.702-2.208)	1.195 (0.672-2.125)
2+ children yngst. <6		1.206 (0.873-1.666)	1.216 (0.879-1.681)	1.283 (0.924-1.781)	1.283 (0.926-1.778)		1.466** (1.011-2.126)	1.539** (1.056-2.241)	1.636** (1.109-2.414)	1.536** (1.042-2.264)
1 child >5 years old		1.076 (0.776-1.491)	1.060 (0.767-1.465)	1.074 (0.774-1.490)	1.079 (0.778-1.496)		1.378* (0.988-1.921)	1.385* (0.995-1.928)	1.469** (1.041-2.073)	1.470** (1.041-2.076)
2+ children >5 years old		0.910 (0.643-1.289)	0.900 (0.636-1.275)	0.914 (0.643-1.299)	0.909 (0.638-1.295)		1.472** (1.054-2.056)	1.513** (1.083-2.116)	1.445** (1.022-2.041)	1.440** (1.017-2.039)
Weekly work hours (1-35 ref.)										
35-40 hrs/week			1.441 (0.907-2.288)	1.379 (0.856-2.224)	1.379 (0.856-2.224)			1.103 (0.869-1.400)	1.083 (0.844-1.390)	1.082 (0.844-1.389)
41+ hrs/week			1.801** (1.121-2.894)	1.661** (1.018-2.709)	1.671** (1.025-2.723)			1.506** (1.081-2.100)	1.547** (1.097-2.182)	1.549** (1.097-2.186)
Work schedule (day work ref. cat)										
Day work, start time <0700hrs				1.757*** (1.276-2.419)	1.787*** (1.296-2.463)				2.493*** (1.574-3.951)	2.567*** (1.614-4.083)
Evening work				1.150 (0.724-1.829)	1.144 (0.719-1.820)				0.937 (0.558-1.572)	0.913 (0.539-1.546)
Night work				2.697*** (1.436-5.068)	2.702*** (1.431-5.103)				7.060*** (4.130-12.069)	7.203*** (4.203-12.343)
Did not work diary day				0.380*** (0.258-0.558)	0.382*** (0.259-0.563)				0.484*** (0.351-0.668)	0.471*** (0.341-0.649)
Dichotomous indicators										
Night disruption (any activity)					1.214 (0.729-2.023)					1.767*** (1.252-2.494)
Napped diary day					0.731 (0.435-1.228)					0.659 (0.356-1.218)
N	2968					3446				

Note: *** $p < .01$, ** $p < .05$, * $p < .10$. Figures are odds ratios with 95% confidence intervals in brackets. All models include covariates age, age^2, education, region, day of week, holiday, partner status and weekend exercise

Table 8. *Weighted logistic regression(men and women pooled), experienced at least 1 night disruption(Mon-Thur)*

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)
Female (male ref.)	2.279*** (1.806-2.877)	2.228*** (1.739-2.853)	2.246*** (1.746-2.888)	2.061*** (1.570-2.706)	1.950*** (1.489-2.554)	1.960*** (1.497-2.567)	1.568* (0.970-2.534)
1990 wave (ref.)							
2000 wave	2.233** (1.724-2.893)	2.218*** (1.693-2.906)	2.157*** (1.639-2.838)	2.187*** (1.660-2.882)	2.113*** (1.601-2.788)	2.101*** (1.591-2.773)	1.622** (1.020-2.578)
2010 wave	1.935*** (1.450-2.583)	1.829*** (1.331-2.514)	1.769*** (1.281-2.442)	1.796*** (1.301-2.480)	1.822*** (1.314-2.528)	1.820*** (1.311-2.526)	1.584* (0.931-2.697)
No children (ref.)							
1 child <6yrs old			2.670*** (1.785-3.993)	2.642*** (1.766-3.954)	2.537*** (1.689-3.813)	2.529*** (1.682-3.804)	2.553*** (1.697-3.840)
2+ children yngst. <6			3.026*** (2.143-4.272)	2.875*** (2.033-4.066)	2.776*** (1.955-3.942)	2.785*** (1.962-3.953)	2.802*** (1.976-3.974)
1 child >5 years old			1.032 (0.698-1.525)	1.025 (0.694-1.512)	1.016 (0.688-1.501)	1.021 (0.692-1.507)	1.034 (0.701-1.525)
2+ children >5 years old			1.414* (0.954-2.094)	1.375 (0.927-2.040)	1.374 (0.925-2.040)	1.383 (0.932-2.053)	1.398 (0.944-2.072)
1-34 hrs/week (ref.)							
35-40 hrs/week				0.795* (0.612-1.034)	0.875 (0.670-1.142)	0.884 (0.678-1.153)	0.878 (0.672-1.148)
41+ hrs/week				0.717* (0.498-1.034)	0.798 (0.552-1.154)	0.799 (0.553-1.155)	0.798 (0.552-1.153)
Work schedule (day work ref. cat)							
Day work, start time <0700hrs					0.491* (0.217-1.111)	0.483* (0.213-1.093)	0.477* (0.211-1.080)
Evening work					1.601** (1.012-2.532)	1.599** (1.012-2.526)	1.603** (1.014-2.533)
Night work					1.407 (0.679-2.919)	1.373 (0.664-2.839)	1.368 (0.661-2.829)
Did not work diary day					2.093** (1.635-2.679)	2.015*** (1.565-2.594)	2.015*** (1.563-2.597)
Dichotomous indicators							
Napped diary day						1.659** (1.080-2.547)	1.668** (1.085-2.562)
Interactions							
Interact 2000 wave*female							1.447 (0.826-2.534)
Interact 2010 wave*female							1.207 (0.648-2.251)
Covariates included		x	x	x	x	x	x
N	6414	6414	6414	6414	6414	6414	6414

Note: *** $p < .01$, ** $p < .05$, * $p < .10$. Figures are odds ratios with 95% confidence intervals in brackets. Covariates include age, age^2, education, region, day of week, holiday, partner status and weekend exercise.