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Published in *Work, Employment and Society,* 2009, 23(1): 30-48

Lack of Sleep, Work and the Long Hours Culture: Evidence from the UK Time Use Survey

Abstract

Sleep is functional for individual and societal well-being, with partial sleep deprivation associated with adverse health and safety consequences. Surprisingly, sleep is absent from work-life balance debates and has remained largely under-researched by sociologists. This paper examines the relationship of insufficient sleep duration with occupational circumstances and family responsibilities, providing a contribution to the examination of the health consequences of working patterns in the UK. We analyze time use data from 2000, focusing on a subsample of workers aged 20-60 years (n=2882). Nested logistic regression modeling is used to identify the segments of the working population getting a short sleep duration that if sustained may have negative health outcomes. An inverse relationship between working hours and sleep duration is found, which is stronger for men than women. Shiftwork and social class are also significant predictors of short sleep for men.

Keywords: long hours culture; occupational health and safety; sleep duration; working time; work-life balance

Introduction: Time Poverty and Work-Life Balance in Contemporary Britain

Contrary to the optimism of earlier sociological literature that predicted a 'leisure revolution' driven by economic progress and technological automation in the work place and household, societies where the majority of individuals experience a 'glut of free time' have not yet eventuated (Putnam 1997; Wajcman 2008). Phrases such as 'time poverty' and 'time famine', which are used to describe a shortage of time and an overwhelming acceleration of the rhythms of daily life, currently abound in popular discourse. Time and its allocations have become a matter of high politics in Britain and a lively debate over issues of work-life balance is currently unfolding in policy and academic circles.

The most common amongst competing explanations regarding 'time poverty' has linked the phenomenon with the temporal operation of the labour market in post-industrial societies. Indeed, substantial transformations concerning working time arrangements have shifted the boundaries of work and social life over the last twenty years in the UK. In the mid-1980s, a series of economic and political circumstances, such as increased competition in the globalized economy, the neoliberal shift in governmental policies and weakened trade unions, halted the long-term trend of reduction in full-time working hours (Kodz et al. 1998; Green 2001). An ever-increasing deregulation of working time started, turning working time into a private arrangement

made between employers and employees rather than a matter to be settled through governmental policies or collective agreements.

At present, the UK maintains minimal legislation to protect employees from working long hours. It is the only member of the European Community to retain the right for an exemption from the 1993 European Working Time Directive that set a weekly limit of 48 hours of paid work to protect employees. Strongly related to the paid work ethic that underpinned successive UK governments' social and economic policies, a controversial opt-out agreement can be signed by British employees allowing more than 48 hours of weekly paid employment. An increasing number of employees sign this agreement either because of pressures to work long hours exerted by their employer and the competitive workplace or to earn more money in order to respond to economic burdens. As a result, Britain is currently renowned for its long hours culture and Europe's longest working hours, with over a quarter of employees working over 48 hours a week (Kodz et al. 2003). This increase in working time is particularly manifest in certain sectors of the economy, with the longest hours worked by men at both ends of the occupational spectrum, namely in manual and higher professional and managerial occupations (Warren 2002).

However, working time is not the only factor affecting employees' work-life balance. The workload associated with domestic work and childcare activities leaves employed individuals with less free time for other pursuits. Despite recent expansions of government funding of childcare, the provision of childcare services in the UK remains inadequate and lower than in other European countries. While the 'dual full-time arrangement' is becoming more common among couples (Rubery et al. 1999), women's move into the workplace has not been

matched by an equivalent rise in men's domestic work in the home (Bryson 2007: 146). Thus while men's work-life balance is more affected by trends in working time, it is working women that are affected by what has been termed the 'second shift' of childcare and domestic work regardless of their living arrangements (Hochschild and Machung 1997).

The issue of work-life balance has been recently addressed by high profile government initiatives that encourage companies to offer work-life balance friendly practices on a voluntary basis. However, the voluntary nature of such initiatives does not guarantee an even distribution of policies, and a large number of employees in Britain may experience a 'time squeeze' from both working long hours and demanding family responsibilities.

Time Poverty and Sleep Deprivation

While there has been extensive research on the impact of working time arrangements and family responsibilities on employees' leisure time, sociological studies have neglected the impact these may have on individuals' sleep duration. Social scientists have tended to assume that sleep is an activity that is largely unaffected by social context, thus excluding it from analyses of time allocation. However, sleep loss may reflect a 'cultural imperative for wakefulness' in contemporary society (Basner et al. 2007). Both the long work hours and family responsibilities of working people may compress the time left for sleep and demote sleep to an activity to be traded with other activities considered of a greater value (Biddle and Hamermesh 1990). The omission within sociology of examining the social determinants of sleep duration is important

because sleep is functional for individual and societal well-being and its duration is strongly correlated with individuals' health and safety.

Our paper examines the links between sleep duration and both working time and family responsibilities and whether these differ by gender. Our aim is to contribute to debates on the health consequences of the British labour market and place sleep as a novel ingredient in the work-life balance agenda**.** The next section outlines the consequences of sleep restriction at the individual and the societal level. We then review the existing sociological analyses of time use data addressing the socio-economic determinants of sleep duration.

Effects of Sleep Deprivation on Health, Performance and Safety

Over a 1000 studies have examined the health consequences of partial sleep restriction[i] and the resulting knowledge database has been remarkably consistent (Bonnet 2000). Short sleep durations are associated with age-related chronic disorders (Spiegel et al. 1999), diabetes, cardiovascular diseases and hypertension (Ayas et al. 2003), weaker immune responses (Irwin et al. 1996) and self-rated poor health (Steptoe et al. 2006). A considerable number of epidemiological studies have found a strong relationship between shorter than average self-reported sleep durations (<7 hours) and higher all-cause mortality and morbidity (Basner et al 2007; Heslop et al. 2002).

Laboratory experiments have corroborated a strong link between short sleep duration and sleepiness and fatigue (Dinges et al. 1997), both of which are related to performance and

productivity deficits (Bonnet 2000: 53) and are a major cause of workplace accidents (Akerstedt et al. 2002), as well as sleep-related vehicle accidents which are more likely to result in death (Horne and Reyner 1999: 289). According to the Driving and Vehicle Licensing Agency, 20% of motorway accidents are due to excessive sleepiness, and each year 300 people are killed because of falling asleep while driving (Home Office 2007).

Furthermore, major public catastrophes, such as the oil spill of the Exxon Valdez and the nuclear Chernobyl accident, have been associated with sleep deficit of the employees involved, revealing the magnitude and severity the issue may take (Coren 1998). The financial cost of sleep deprivation in the US has been estimated at $41 billion a year in lost productivity and health-care bills (Home Office 2007). However, exact estimates are not available for the UK.

Time Use Analyses of Sleep Duration

Sleep has been largely ignored by sociologists and as a result very few sociological studies have examined the relationship between sleep duration and socio-economic or lifestyle factors. The absence of data on sleep habits in large-scale social surveys renders the study of sleep particularly difficult. However, a useful source of data that can provide insight into the social determinants of sleep duration is time use surveys. Time use surveys measure the amount of time people spend in daily activities utilizing time diaries completed by participants, providing more reliable time estimates of everyday activities than conventional surveys (Robinson and Godbey 1997). Despite the fact that sleep constitutes the lengthiest daily activity for most people, very few studies of sleep duration utilize time use data.

An early paper analyzing sleep duration using both US and international time use data demonstrated that at least part of sleep time is a reserve on which people can draw when economic incentives make other uses of time more attractive (Biddle and Hamermesh 1990). The authors present the socio-economic correlates of sleep time allocation and demonstrate a relationship between sleep duration and time spent working. Szalontai's (2006) replication of this study lends further support to this inverse relationship, providing international evidence on higher aggregate work time and significantly lower sleep duration in developed countries. However, both papers treat sleep duration as a continuous variable and do not identify the characteristics of workers that are more likely to experience sleep deprivation and its adverse health consequences.

From another perspective, Basner et al. (2007) analyze US time use data to examine the relationship of sleep duration with other waking activities, reporting that the duration of work, commuting, socializing, relaxing and leisure are the primary activities related to sleep time of Americans. Apart from working time, the study does not examine other occupational characteristics that may influence individuals' sleep duration, such as social class or work schedules.

Our paper aims to identify which segments of the British working population are likely to experience partial sleep deprivation and thereby potentially its adverse health and safety consequences, while also taking into account time spent in paid employment and in unpaid work.

Methods

1 Data

We analyze data from the 2000 UK Time Use Survey (UKTUS), a large household survey conducted by the Office for National Statistics between June 2000 and September 2001 (2000 TUS Technical Report). The UKTUS used a multi-stage sampling design to achieve a probability sample of households and individuals in the UK in order to measure the amount of time spent in daily activities by the population.

The major data collection instrument was a 24-hour time diary that participants filled in for two days: a weekday and a weekend day. Each time diary consisted of 144 ten minute slots and individuals recorded their main and secondary activities for each slot. Participants completed the diaries with their own descriptions of activities which were subsequently coded into approximately 250 activity categories.

A total of 19,898 diaries were completed by 11,677 individuals aged 8 years old and over. The UKTUS achieved a response rate of 62% and 73% at the household level and the diary level respectively, resulting in a net diary response rate of 45%. Such a response rate is common for time use surveys due to the burdens of diary completion (Sturgis and Jackson 2004: 8). However, non-response is only a source of bias to the extent that those who respond are different

from those who do not with respect to characteristics of interest (Abraham et al. 2006). Several studies have shown that non-responders in time use surveys cannot be identifiable according to any socio-demographic factor (Abraham et al. 2006; Gershuny 2002; Robinson and Godbey 1997), indicating that any biases introduced by non-response are not strongly related to commonly used explanatory variables (Sullivan 2006: 44).

We analyze a subsample of 1551 male and 1331 female workers aged 20-60 who reported at least one episode of paid employment on their weekday diary. For methodological reasons, our definition of weekdays excludes Friday. We employ the individual level ungrossed-weight which corrects for non-response.

2 Variables and Measures

Dependent Variable: Insufficient Daily Sleep Duration

Since findings of epidemiological and biological research do not show a consistent linear relation between length of sleep and health outcomes, we construct a conservative threshold of sleep duration of less than 6.5 hours that has been suggested as potentially harmful to individuals' health if sustained for a considerable period of time (Ayas et al. 2003; Heslop et al. 2002; Spiegel et al. 2005).

Two limitations should be borne in mind regarding our dependent variable of sleep duration. First, the diary estimates of sleep duration are likely to over-estimate the duration of

respondents' actual sleep. This is because during the coding of participants' textual diary descriptions, diary slots where 'transitions' or 'states' were described (e.g. 'lying in bed but unable to sleep', 'waiting for sleep to come') were coded as 'sleep'. Therefore this definition of 'sleep' is somewhat 'liberal' and includes time in bed before and after the individuals' sleep episode leading to partial over-estimation, which can be assumed to be constant across the population.

The second limitation is that the time diary started at 4.00 in the morning and finished at 3.59am the next day. Therefore to obtain a daily sleep duration estimate we added two different sleep episodes, the first from 4.00am until the time the person reports waking up and the second from the time the person reports going to bed at night until 3.59 the next morning. We make the assumption that any errors in total sleep time at the individual level are self-canceling in the aggregate. However, an artefact of this methodology is that diaries completed on weekend days and Fridays may provide incorrect estimations of night time sleep duration. For example, mean sleep duration for Friday when a person wakes up early to go to work but goes to sleep later, as Saturday is non-working day, is likely to be underestimated with the calculation procedure described above. For this reason, we analyze only diaries completed from Monday to Thursday to examine how work characteristic influence sleep duration.

Independent Variables

Our models examine the relationship of insufficient daily sleep duration (<6.5 hours) with hours worked, age, occupational class, shift work, time spent commuting, time spent in childcare and time spent undertaking housework.

The working time variable refers to the hours individuals reported spending in paid employment on the diary day. This item includes activity codes referring to time worked in the main and/or second job, as well as time spent in other activities at the workplace such as coffee and lunch breaks.

The commuting variable was created by combining two diary activity codes, namely 'travel in the course of work' and 'travel to and from work'. The former category includes all work-related journeys of people without a usual place of work or who work from home, but excludes journeys during working hours unconnected with the person's job. 'Travel to and from work' includes journeys to or from the usual place of work where the starting place is the respondent's home.

The two aforementioned items and the estimates for time spent in housework are derived exclusively from primary activity codes. However, this is not the case for childcare, which is mostly reported as a secondary activity (Craig 2007). In this analysis we used two time estimates of childcare, one consisting solely of primary activities and the other including secondary activities as well, in order to examine the impact of both 'active' and 'passive' childcare on sleep duration. The models presented in Tables 1 and 2 include the former (primary-'active' childcare) but both sets of results are discussed in the analysis section. Number of children and marital

status were entered into the models prior to including the childcare and housework time estimates, but no significance was found, therefore these variables are not included in our models.

Shiftwork was defined as two or more distinct periods of work between which employees are regularly rotated, i.e. regularly working two or more different shifts. We analyse a dichotomous variable of whether the person identifies themself as a shiftworker.

Social class is measured by the 8-category National Statistics Socio-Economic Classification (NS-SEC) which measures employment relations and occupational conditions. The 8 categories were collapsed into 6 by combining ‘routine’ with ‘semi routine’ occupations and ‘large employers and higher managerial’ with ‘lower managerial’ occupations. In the former case, the decision was made because ‘routine’ and ‘semi-routine’ occupational groups have very similar labour contracts. In the latter case, the two occupational groups were grouped together because of their common ‘managerial’ aspect.

3 Analytical Technique

Our analysis uses logistic regression, which is widely employed for modeling binary outcomes and for predicting the probability of an event. Our dependent dichotomous variable is *daily insufficient sleep duration* and the binary response is *yes (i.e. under 6.5 hours)/no (i.e. 6.5 hours*

or more). The logistic models predict the probability of workers obtaining insufficient sleep, i.e. under 6.5 hours of daily sleep duration.

We specify separate nested logistic regression models for male and female workers in order to examine the differential effects of occupational and family circumstances on men's and women's sleep duration. In nested models, independent variables are successively added to the model in sequential blocks, which allows observation of changes in the predictors' relationship to the outcome variable and assessment of the relative importance of each predictor in the model. A joint nested model for both sexes is also specified where we test for interactions between gender and all the other predictors. Statistical tests enable assessment of the significance of the inclusion of an explanatory variable in the model.

Results

1 Descriptives

This section provides descriptive information on the characteristics of workers obtaining short sleep duration. On a typical working day, twelve percent (12%) reported a sleep duration of under 6.5 hours in the time use diary, 15% of men and 8.5% of women.

There is a negative association between sleep duration and working hours (Figure 1a). The increase in short sleepers is dramatic among those reporting more than 10 hours of work, with 21% of men and 22% of women reporting under 6.5 hours of sleep. However, 23% of men work over 10 hours per day, compared with only 6% of women (Tables 1 and 2).

[FIGURE 1 HERE]

Shift work was reported by 18% of men and 16% of women, reflecting the deregulation and flexibilization of British working patterns. Shift work was strongly associated with short sleep duration. Twenty four percent of male shift workers reported under 6.5 hours of sleep compared with 13% of men not working shifts (Figure 1b). The pattern is almost as pronounced for women with 13% of women shift workers reporting less than 6.5 hours of sleep compared with 7% of women not working shifts.

There is a negative correlation between sleep duration and the time workers spend commuting to and from the workplace (Figure 1c) which is near-linear. While only 6% of men that did not report any commuting in their diaries are short sleepers, the increase is dramatic for men commuting more than 2 hours on the diary day, with 22% obtaining insufficient sleep. The association between sleep duration and time spent commuting is also negative for female workers but not as pronounced as for men, with only 12% of women that reported more than 2 hours of commuting obtaining a short sleep duration.

Overall, Figure 1 illustrates that a considerable proportion of both men and women who work long hours, have lengthy commutes and undertake shiftwork are obtaining insufficient sleep.

2 Nested Logistic Regression Models

Separate nested logistic regression models are specified in order to examine the differential effects of occupational and family circumstances on men's and women's sleep duration (Tables 1 and 2). For each predictor variable, the category with the lowest probability for getting short sleep in bivariate analyses is defined as the reference category.

[TABLES 1 AND 2 HERE]

Model 1 includes solely self-reported working hours. Men working more than 10 hours per day present higher risks of obtaining under 6.5 hours of sleep (OR=1.79, $p<0.001$) than men working up to 8 hours (the reference category) (Table 1). The odds ratio is even higher for women working more than 10 hours a day (OR=3.5, $p<0.001$) than those working up to 8 hours (Table 2).

In Model 2 which adds age, there is no significant age effect among men, while age is significant ($p=0.013$) in the model for women. Young women (age 20-29) are much less likely to obtain under 6.5 hours of sleep per day than women above 30. The inclusion of age significantly improves the female model as shown by the significance of the difference in the Log-Likelihood Ratio (Table 2), but not the male model.

Model 3 adds occupational class, which is highly significant for men (see change in Log-Likelihood ratio, Table 1). Men in lower supervisory and technical occupations are less likely to get short sleep duration than other occupational groups. With an odds ratio of 1.34 (NS), self employed men (i.e. small employers and own accountant workers) appear to have more control

over their sleep time allocation, compared with most other contracted categories, except the lower supervisory group. The risk for getting short sleep is great at both the high and low end of the occupational spectrum, with odds ratios of 2.3 ($p<0.01$) and 2.71 ($p<0.001$) for managerial occupations and routine/semi-routine occupations respectively. Intermediate occupations present the highest risk for short sleep (OR=3.1, $p<0.001$).

The inclusion of social class in Model 3 increases the effect of working long hours on short sleep duration, i.e. the odds ratio of short sleep among men working longer than 10 hours becomes greater (Table 1). This suppression effect indicates the complex interrelationship of the predictor variables in determining sleep duration. These findings suggest that short sleep duration is not only a function of working long hours but also of other characteristics that are particular among certain occupational classes. In addition, when controlling for social class, a significant age effect emerges with older men (50-59 years old) more likely to sleep less that 6.5 hours. In contrast, among women, occupational class in Model 3 is not a significant predictor of sleep (Table 2). Women most likely to obtain insufficient sleep are employed in lower supervisory and technical occupations and higher and lower managerial occupations.

Model 4 adds shift work and time spent commuting, with both variables having a significant effect for men. Shift work increases the odds of short sleep duration (OR=2.1, $p<0.001$). All men who report commuting have significantly higher odds of short sleep than workers reporting no commuting in their diaries. Men reporting more than 2 hours of commuting have a dramatic increase in odds of short sleep (OR=5, $p<0.001$).

The inclusion of shift work and commuting time in Model 4 does not change the odd ratios for men in managerial, intermediate and semi routine occupations, indicating that short sleep durations of workers in these occupational categories cannot be explained by either shift work or commuting time. Among women, shift work is marginally significant ($p<0.05$) while time spent in commuting is insignificant, although women reporting commuting for more than 50 minutes per day present higher risks of short sleep than women not commuting.

Model 5 adds time reported undertaking housework and childcare as a primary activity to examine how family constraints impinge upon working individuals' sleep duration. Time spent on housework was grouped differently and in more categories for women than men, because of the variability by gender. Among men spending time in both childcare and housework increased their risks of short sleep. Men spending more than 30 minutes on housework present a higher odds (OR=2.13, $p<0.001$) for short sleep than men who do not engage in domestic chores. Similarly, the effect of childcare is also significant for men (OR=1.83, $p<0.01$).

In contrast, for women time spent on childcare was insignificant and housework had only a marginally significant additional effect in Model 5. These findings were contrary to our expectations that the 'dual burden' and time constraints imposed on working mothers (Hochschild and Machung 1997) would curtail their sleep duration. Including estimates of childcare as both primary and secondary activities did not make any difference; time spent in childcare remained insignificant for women's sleep duration while its significance for predicting men's sleep was reduced to a p-value of 0.04.

A joint model to examine the effect of gender and to test for any interactions between gender and each of the variables was also specified. In this model, sex was a significant predictor of short sleep duration with women presenting a significantly lower risk (OR=0.46, $p<0.001$) than men. The only significant interaction was between gender and occupational class ($p<0.01$). Table 3 presents the odd ratios of the sex and occupational class interaction with men in lower supervisory and technical occupations as the reference category.

[TABLE 3 HERE]

Overall, the odd ratios for the interaction in Table 3 reinforce the results of the two separate models (Tables 1 and 2), namely that men's sleep is more strongly affected by occupational circumstances. Women in most occupational categories have a lower risk of short sleep duration than men. In most categories there is a gender difference in likelihood of short sleep. For example, there is a striking difference between the odd ratios of men and women in intermediate occupations (3.38 and 0.73 respectively) and for men and women in higher professional occupations (2.32 and 0.47 respectively). These gender differences may reflect the differential nature of occupations of men and women in the same occupational class groups.

Discussion and Conclusions

Taking into account that time spent in paid employment, unpaid work and in activities associated with caring set an upper limit to the time available for individuals' sleep, this paper has identified which segments of the British working population are likely to suffer from partial sleep

deprivation and its adverse health and safety consequences. Our analysis examined whether the sleep duration of workers that appear to be temporally disadvantaged in the 'new economy' is more likely to be adversely compressed. This approach is in accordance with the proposition of Fuchs and Kalleberg (2004: 7) who highlight that 'there is a need to abandon the search for an overarching trend in favour of theoretical examinations that examine how economic transformations have created varied time constraints for workers'.

Our findings illustrate that sleep duration exhibits substantial variation within the working population with certain segments of workers facing higher risk of short sleep duration that may have adverse health consequences if sustained for a considerable period of time. We provide evidence on the socio-economic correlates of sleep duration, and thereby add to previous literature indicating that recent transformations have created varied time constraints for different socio-economic groups of workers in the UK.

Our results highlight a gender difference in the risk of obtaining insufficient sleep with working men more likely than women to obtain under 6.5 hours of sleep on a typical working day. All the covariates included in our model had more explanatory power in the case of men. Men's sleep duration appears to be more strongly influenced by the temporal operation of the labour market which may reflect gender differences in the nature of occupations within classes, occupational responsibility and commitment, as well as the higher proportion of women employed in part-time jobs. Our analysis provided evidence of the inverse relationship between working hours and sleep duration for both sexes and indicated that women working very long hours were also likely to receive short sleep duration.

Occupational class was a strong predictor of short sleep for men. Men working at both ends of the occupational spectrum, as well as intermediate workers, had higher risks of obtaining insufficient sleep. Previous research has found that managerial and routine occupations are particularly affected by the long hours culture, although there are differential reasons behind this trend. While people in semi-routine and routine occupations are more likely to work long hours to be paid overtime or to meet the requirements of their labour contract, those in managerial occupations usually work overtime as a result of high volumes of work or norms of the working environment where being constantly present is regarded as a commitment to work (ONS 2004: 56). This last point accords with recent theoretical propositions that regard busyness as 'a badge of honour' and an affirmation of identity in contemporary society (Darier 1998; Gershuny 2005). Our findings illustrate the impact that a demanding managerial career may have on sleep duration, providing support for what has been previously termed as 'an imperative for wakefulness' in modern society (Basner et al. 2007), which regards sleep as indicative of lack of moral fibre (Meadows et al. 2008). The significance of occupational class also illustrates other aspects relevant to certain occupational categories such as work intensification, stress, as well as continuation of work after individuals leave their working place. These aspects, which have been previously described as characteristics of the deregulated British labour market, may be affecting the time individuals' spend sleeping.

Our results indicate that time spent on housework and childcare are predictors of insufficient sleep for male workers. Men that engage in housework and actively spend time with their children have more risk of obtaining short sleep even in cases where these activities are not

lengthy. Women workers that report lengthy periods of unpaid work also present greater risk of short sleep, but duration of housework was not as strong predictor as for men. The weak association for women between time spent on housework and sleep duration, as well as the insignificance of time spent on childcare, were unexpected results, and do not demonstrate that the 'dual burden' and motherhood roles influence women's sleep duration. However, it is possible that housework and childcare are not reported in time diaries by women in the same way as by men, making time estimates of these activities less accurate for women. Completing a diary involves identifying certain activities as important and assumptions about the importance of activities are context dependent (Bryson 2007). It is possible that women may view being at home with their children as a 'natural' thing that does not deserve to be reported in their diary. On the other hand, a man for whom looking after a child is not so common may report the activity in his diary.

We acknowledge that family responsibilities may impinge on women's sleep *quality* as found in previous studies (Venn et al. 2008), rather than their sleep duration, but sleep quality could not be examined with time use survey data which only provide information on individuals' sleep duration. In addition, the time constraints of employed women with a 'dual burden' may affect their time spent on other activities, such as leisure, whereas men may choose to cut down more on sleep.

Sleep is a physiological activity that is partly adaptable to social context. Individuals cannot do without sleep for lengthy periods of time, but they can compress sleep duration as a result of a demanding working and/or family life. Our study highlights the dynamics of sleep

duration in contemporary Britain and underlines the fact that people in occupations which are more affected by temporal restructuring and other recent transformations concerning the nature of work experience a higher risk of being partially sleep deprived. We also provide evidence that domestic and family responsibilities may influence workers' sleep duration. The potential long-term consequences of short sleep duration in a modern society are not visible yet, but a considerable body of research suggests that these effects can be detrimental for individual and societal well-being. Given its importance for physical and psychological health, sleep should be understood as a fundamental aspect of work-life balance and considered by researchers and policy makers.

Endnotes

i. Sustained sleep restriction of the habitual sleeping time of humans that ranges from 7 to 8 hours per day in the majority of the population.

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Tables and Figures

Figure 1: Percentages of workers obtaining < 6.5 hours of sleep by Gender

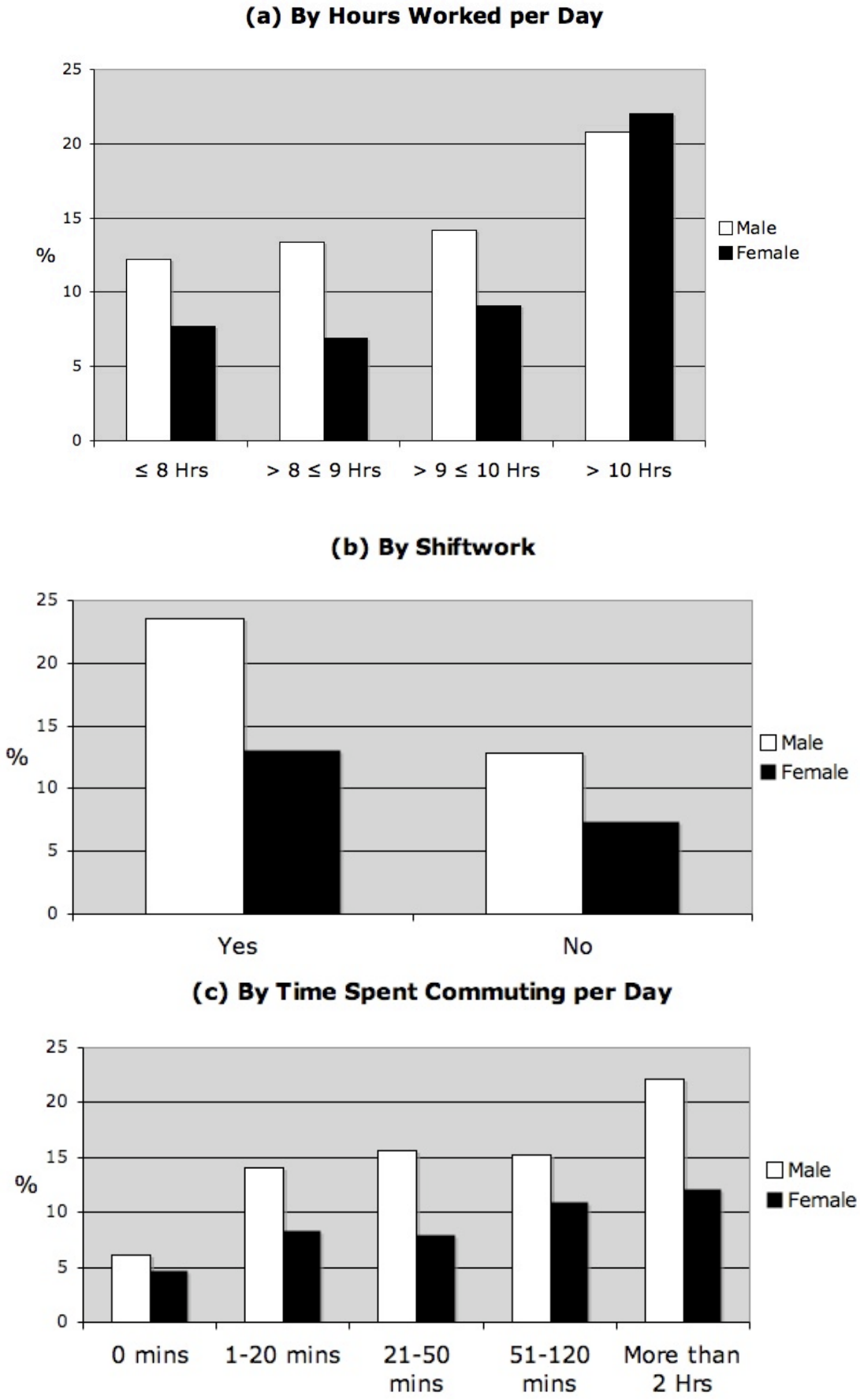

Table 1. Nested Logistic Regression Models Predicting Less than 6.5 Hours of Sleep for Male Workers

	n= (%)	Odd Ratios				
		Model 1	Model 2	Model 3	Model 4	Model 5
Hours Worked on the Diary Day		**	**	**	***	***
≤ 8 Hrs	529 (34.1)	1	1	1	1	1
> 8 ≤ 9 Hrs	379 (24.4)	1.02	1.02	1.07	1.03	1.08
> 9 ≤ 10 Hrs	284 (18.3)	1.11	1.12	1.15	1.20 .	1.34
> 10 Hrs	359 (23.2)	1.79***	1.85***	1.92***	1.96***	2.50***
Age Groups			NS	*	*	*
20-29 Years	272 (17.6)		1	1	1	1
30-39 Years	476 (30.7)		0.85	0.95	0.98	0.85
40-49 Years	406 (26.2)		1.13	1.25	1.32	1.18
50-59 Years	397 (25.5)		1.41	1.57**	1.68*	1.55
Social Class (NS-SEC)				***	**	**
Large Employers. Higher and Lower Managerial Occupations	474 (30.5)			2.30**	2.53***	2.52***
Higher Professional Occupations	177 (11.5)			1.86	2.30*	2.32*
Intermediate Occupations	114 (7.4)			3.10***	3.13***	3.20***
Small Employers and Own accountant workers	192 (12.4)			1.34	1.88	2.01
Lower Supervisory and Technical Occupations	215 (13.8)			1	1	1
Semi Routine and Routine Occupations	379 (24.4)			2.71***	2.77***	2.90***
Shift Worker					***	***
Yes	281 (18.1)				2.10***	2.04***
No	1270 (81.9)				1	1
Time Spent Commuting					***	***
No Commuting Reported	172(11.1)				1	1
1-20 min	276(17.8)				2.40**	2.19*
21-50 min	475(30.6)				2.88**	2.74**
51-120 min	481(31)				2.80**	2.76**
> 2 hrs	147(9.5)				5.00***	5.52***
Time Spent on HouseWork						***
No HouseCare Reported	481(31)					1
10-30 min	525(33.8)					1.72**
> 30 min	545(35.1)					2.13***
Time Spent on Childcare †						**
≤ 30 min	1364(87.9)					1
> 30 min	187(12.1)					1.83**
Δdf		3	3	5	4	3
-2 LLR		1360.9	1353.5	1331.6	1292.1	1266.8
Δ-2LRR			7	21.9	39.5	25.3
Significance of Δ-2LRR			NS	**	***	***

Source:2000 UK Time Use Survey; N=1551; weighted;
Significance of difference from reference category * p<0.05, ** p<0.01, *** p<0.001
† As a primary activity

Table 2. Nested Logistic Regression Models Predicting Less than 6.5 Hours of Sleep for Women Workers

	n= (%)	Odd Ratios				
		Model 1	Model 2	Model 3	Model 4	Model 5
Hours Worked on the Diary Day		***	***	**	**	***
$\leq$ 8 Hrs	881(66.1)	1	1	1	1	1
$>$ 8 $\leq$ 9 Hrs	260(19.6)	0.90	0.93	0.86	0.78	0.98
$>$ 9 $\leq$ 10 Hrs	105(7.8)	1.32	1.48	1.30	1.10	1.42
$>$ 10 Hrs	85(6.4)	3.50***	3.77***	3.16***	2.99**	3.93***
Age Groups			*	*	*	NS
20-29 Years	274(20.6)		1	1	1	1
30-39 Years	387(29.1)		3.06*	2.87**	3.09*	2.81*
40-49 Years	376(28.2)		3.38*	3.09**	3.33**	2.72*
50-59 Years	294(22.1)		3.25*	3.18**	4.46**	2.90*
Social Class (NS-SEC)				NS	NS	NS
Large Employers, Higher and Lower Managerial Occupations	428(32.1)			1.01	1.09	1.25
Higher Professional Occupations	57 (4.2)			0.29	0.36	0.43
Intermediate Occupations	305(23.1)			0.48	0.56	0.63
Small Employers and Own accountant workers	70(5.2)			0.38	0.55	0.56
Lower Supervisory and Technical Occupations	84(6.3)			1	1	1
Semi Routine and Routine Occupations	387(29.1)			0.76	0.83	0.83
Shift Worker					*	*
Yes	217(16.3)				1.66*	1.62*
No	1114(83.7)				1	1
Time Spent Commuting					NS	NS
No Commuting Reported	173(13)				1	1
1-20 min	347(26.2)				2.08	2.03
21-50 min	443(33.3)				1.98	2.01
51-120 min	312(23.5)				3.05**	3.37*
$>$ 2 hrs	56(4)				3.63**	3.89*
Time Spent on HouseWork						*
$\leq$ 30 min	298(22.3)					1
31-60 min	251(18.9)					0.95
61-120 min	360(27.1)					1.09
$>$ 121 min	422(31.7)					2.11*
Time Spent on Childcare †						NS
$\leq$ 30 min	1021(76.7)					1
$>$ 30 min	310(23.3)					0.94
Δdf		3	3	5	5	4
-2 LLR		699.4	685.3	675.4	663.2	655.3
Δ-2LRR			14.1	9.9	12.2	7.9
Significance of Δ-2LRR			**	NS	*	NS

Source:2000 UK Time Use Survey; N=1331; weighted;
Significance of difference from reference category * p<0.05, ** p<0.01, *** p<0.001
† As a primary activity

Table 3. Odd Ratios for Sex*Occupational Class Interaction

	Men	Women
Large Employers, Higher and Lower		
Managerial Occupations	2.53***	1.62
Higher Professional Occupations	2.32*	0.47
Intermediate Occupations	3.38***	0.73
Small Employers and Own accountant workers	1.96	0.79
Lower Supervisory and Technical Occupations	1.00	1.26
Semi Routine and Routine Occupations	2.95***	1.01

Source:2000 UK Time Use Survey; N= 2882; weighted; Significance of difference from reference category * $p<0.05$, ** $p<0.01$, *** $p<0.001$
The model is adjusted for all the variables in Tables 1 and 2.