European Journal of Public Health, Vol. 33, No. 3, 411–417

https://doi.org/10.1093/eurpub/ckad038 Advance Access published on 20 March 2023

Time use, time pressure and sleep: is gender an effect modifier?

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Background: The gendered division of labour contributes to differences in the way time is spent and experienced by women and men. Time spent in paid and unpaid labour is associated with sleep outcomes, therefore, we examined (i) the relationships between time use and time pressure, and sleep, and (ii) whether these relationships were modified by gender. **Methods:** Adults from the Household Income and Labour Dynamics in Australia survey were included in the analysis ($N = 7611$). Two measures of time use (total time commitments, ≥50% of time spent in paid work) were calculated based on estimates of time spent in different activities. One measure of time pressure was also included. Three sleep outcomes (quality, duration and difficulties) were examined. Logistic regression and effect measure modification analyses were employed. **Results:** Total time commitments were associated with sleep duration, whereby more hours of total time commitments were associated with an increase in the odds of reporting <7 h sleep. Gender was an effect modifier of the association between ≥50% of time spent in paid work and (i) sleep duration on the multiplicative scale, and (ii) sleep difficulties on the multiplicative and additive scales. Men who spent <50% of time in paid work reported more sleep difficulties than men who spent ≥50% of time spent in paid work. Feeling time pressured was associated with poor sleep quality, short sleep duration and sleep difficulties. **Conclusions:** Time use and time pressure were associated with sleep, with some effects experienced differently for men and women.

Background

A clear gender divide in the way paid and unpaid labour is shared between men and women persists.[1,2] This is despite greater female participation in the workforce and men taking on more caring responsibilities than ever before.[3,4] In Australian families with children, the most common household arrangement is that the father works full-time and the mother works part-time, while retaining the majority of responsibility for domestic duties.[5,6] This gendered division of labour likely contributes to significant differences in the way time is spent and experienced by women and men.

Studies of Australian families have revealed that while the total number of combined hours men and women spend in paid and unpaid labour are similar, women do significantly more unpaid work and caring.[2,7] Furthermore, concurrent paid and unpaid roles throughout the day results in women feeling more time pressured (i.e. the subjective feeling of being time stressed or rushed).[8] Strazdins et al.[9] argue that time use (e.g. total amount of time committed to activities, the amount of time spent in paid or unpaid work) and time pressure[10] are social determinants of health. Indeed, there is evidence that long hours of paid work and having greater time commitments are associated with lower physical activity[7] and unhealthy eating.[11] Additionally, feeling time pressured is associated with physical inactivity,[12] as well as poor self-rated health and mental health.[13] Notably, feeling time pressured has been associated with increased distress for both men and women and likely contributes to the significantly higher rates of depression observed in employed women.[13] This highlights the importance of considering different measures and constructs of time use, and time pressure in the analysis of gender inequalities in health.

Sleep is an important, but often neglected component of health. Sleep that is insufficient in duration or quality is associated with suboptimal daytime function and adverse health outcomes.[12,14] On average, women sleep longer but have poorer sleep quality, more sleep disturbances and more difficulty getting to sleep and staying asleep, than men.[15,16] In a study of American adults, Burgard[16] found that paid and unpaid work commitments were major contributing factors to the observed gender differences in sleep duration. Additionally, women are more likely to wake during the night to provide caregiving.[16,17] To date, the majority of studies have focussed only on time use and sleep duration,[16,18,19] without consideration of the potential impact of time use and time pressure on other gender sleep inequalities, such as sleep quality and sleep difficulties.

Aims

The aims of this study were to examine: (i) the associations between time use (total time commitments, ≥50% of total time commitments spent in paid work), and time pressure, and sleep quality, sleep duration and sleep difficulties, and (ii) whether these associations were modified by gender.

Methods

Data source

Established in 2001, the HILDA survey is an ongoing longitudinal, nationally representative study of over 13 000 individuals within over 7000 households in Australia.[20] Annual surveys cover a range of topics including social, demographic, health and economic

conditions. Data are collected using a combination of face-to-face interviews with trained interviewers, and a self-completion questionnaire. Wave 1 had a response rate of 66%. Participants have been added to the sample over the years as a result of changes in household composition. Additionally, a top-up of over 4000 individuals from over 2000 households were added to the cohort in 2011 to facilitate better representation of the Australian population (69% initial response rate). The response rate for individuals new to the survey is over 70%, and the wave-to-wave retention rate for individuals continuing in the survey is above 90%.[20]

This study drew on data from Waves 13 (prior sleep), 15 (covariates), 16 (exposures) and 17 (outcomes). Individuals aged 18–64 years in Wave 15 who (i) reported being employed in Wave 15, and (ii) did not report having had/adopted a baby in the past 12 months in Wave 16 or 17, were eligible for inclusion ($n = 12\,649$). We conducted complete case analysis and excluded participants if they had missing data on the exposures, outcomes, or confounding variables. The analytic sample included 7611 individuals (3524 men and 4087 women). Compared to the eligible sample, the analytic sample was older, more educated, had a higher income, and a greater proportion were born in Australia. The study sample selection is displayed in figure 1.

Outcome variables

Three measures of sleep were included as outcomes. Sleep quality was measured with the question 'During the past month how would you rate your sleep quality overall?' and was responded to on a four-point Likert scale, from [0] very good to [3] very bad. We dichotomized the variable such that people who responded 'very good' or 'good' were classified as having good sleep quality, and those who responded 'very bad' or 'bad' were classified as having poor sleep quality. Sleep duration was derived from two questions. The first question asked: 'How many hours of actual sleep do you usually get on a [X] night?' People who were employed were asked separately about workdays and non-workdays, while people who were Not In the Labour Force (NILF) were asked about weekdays and weekends. The second question asked: 'How many hours of sleep do you get from naps in a typical week'. Total sleep quantity for a typical week was calculated as $5 \times$ weekday sleep $+ 2 \times$ weekend sleep $+$ naps for those NILF, and n (n = number of days) $\times$ workday sleep $+ n \times$ non-workday sleep $+$ naps for those employed, whereby the number of workdays and non-workdays was based on days worked in the main job. Total sleep quantity was divided by 7 to obtain a daily sleep estimate. The measure was dichotomized as those who had <7 h sleep on average each night (a common definition of short sleep),[21] and those who had 7 or more hours of sleep on average each night. The measure of sleep difficulties comprised two questions 'During the past month how often have you had trouble sleeping because you (i) cannot get to sleep within 30 min, (ii) wake up in the middle of the night or early morning' that were responded to on a five-point Likert scale, from [1] not during the past month to [5] five or more times a week. The numeric responses to the two questions were summed to get a total sleep disturbance score. This measure was then dichotomized whereby a total score of 7 or more indicated the presence of sleep difficulties, and a score of <7 indicated no sleep difficulties.

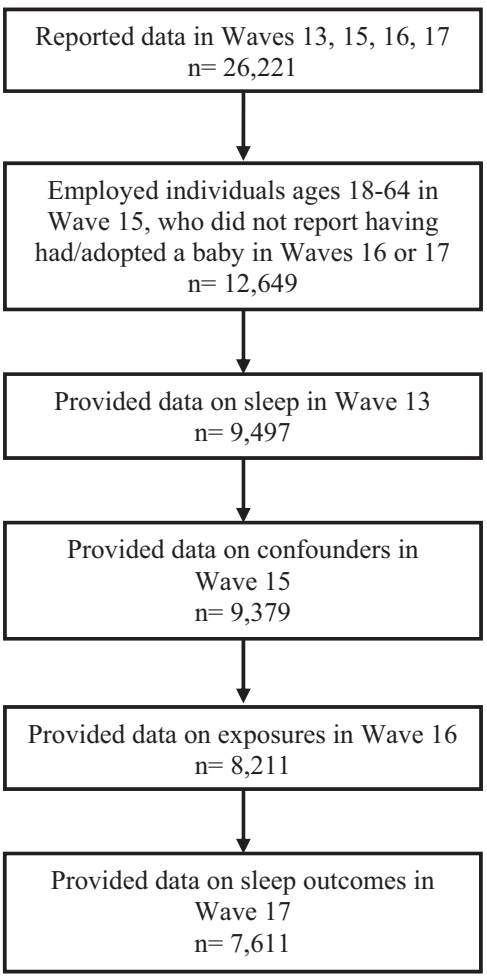

Figure 1 Study sample selection flow-chart

Exposure variables

Time use and time stress measures were operationalized as per Strazdins et al.[7] Time use was measured by asking individuals to estimate how much time (hours and minutes) they 'would spend on each of the following activities in a typical week'. The activities were classified into three categories: paid work (paid work and travelling to and from a place of paid employment), unpaid work (household errands, housework and outdoor tasks including home maintenance, volunteering or charity work) and caring (playing with you children, looking after other people's children and caring for a person with a disability). Data for each activity were winsorized such that any outlier was replaced with the mean of the activity, plus two standard deviations. The values were summed for each category and all categories were summed to obtain a 'total time commitments' score. Any value that exceeded 168 hours was excluded. Six categories of total time commitments were created (0–19 h, 20–39 h, 40–59 h, 60–79 h, 80–99 h and 100–168 h). A measure of the 'percentage of time spent in paid work' was created, dichotomized as either $<50\%$ or $\geq 50\%$ of total time commitments spent in paid work. Time pressure was measured with one question, 'how often do you feel rushed or pressed for time?' and was responded to on a five-point Likert scale, from [1] almost always to [5] never. This measure was dichotomized, with people who responded 'almost always' or 'often' considered time pressured and everyone else considered not time pressured.

Effect modifier

Gender (man/woman) was included in our models as an effect modifier.

Covariates

Several covariates were included in models to adjust for confounding. These were selected based on a directed acyclic graph (Supplementary file S1) and included: age (grouped as: 15–24, 25–34, 35–44, 45–54 and 55–64), education (secondary school not completed, year 12/certificate or diploma, bachelor's degree and above), occupation (blue collar workers, white collar workers, professionals and managers and NILF), total household income (quintiled), non-

standard work hours (standard and non-standard), disability/long-term health conditions (yes/no), country of birth (Australia, other English speaking country and non-English speaking country), relationship status (married/*de facto*, divorced/separated, widowed and single), presence of children aged under five in household (yes/no) and number of children in household. In addition, we adjusted for prior sleep quality, sleep quantity and sleep difficulties. All covariates were measured in 2015 (Wave 15) except for prior sleep, which was measured in 2013 due to data availability (Wave 13).

Statistical analysis

Sleep data were only collected in Waves 13 and 17 of HILDA. For this reason, baseline sleep data were taken from 2013 and outcome sleep variables were measured in 2017. To align with theorized temporal sequencing in which exposure precedes outcomes, exposure time variables were measured in 2016. Based on the principles of covariate selection, confounding variables were measured 1 year prior to the exposure variables in 2015.[22] All analyses were conducted using STATA 16.0.[23]

For each exposure variable (total time commitments, ≥50% of time spent in paid work, time pressure) separate logistic regressions were conducted with the three outcome variables: sleep quality, sleep duration and sleep difficulties (table 3 presents both the unadjusted and fully adjusted models). To determine if gender modified these relationships, effect measure modification (EMM) analyses were undertaken, using the approach recommended by Knol and VanderWeele.[24] We measured effect modification on both the additive and multiplicative scales (Supplementary file S2). If gender was found to be an effect modifier on either scale, we also computed odds ratios (ORs) and 95% confidence intervals (95% CIs) within the relevant strata.

Results

A description of key characteristics of the sample by gender at baseline (Wave 15) is presented in table 1. Men and women reported similar total hours of time use, but men spent more time in paid work and women spent more time in unpaid work and caring (table 1). A greater proportion of men spent ≥50% of their time in paid work, but more women reported being time pressured. A similar proportion of men and women reported an average sleep duration of <7 h. A higher proportion of women reported poor sleep quality and sleep difficulties.

Table 2 presents the unadjusted and adjusted logistic regression results for total time commitments, ≥50% of time spent in paid work and time pressure.

In fully adjusted models, there was an increase in the odds of reporting <7 h sleep, for each categorical increase in total time commitments. Those who had a total time commitment of 40–59 h (OR 1.26; 95% CI 1.02, 1.56; $P = 0.036$), 60–79 h (OR 1.61; 95% CI 1.28, 2.02; $P < 0.001$), 80–99 h (OR 1.60; 95% CI 1.24, 2.07; $P < 0.001$), or 100–168 h (OR 2.51; 95% CI 1.74, 3.63; $P < 0.001$) had greater odds of reporting <7 h sleep, compared to those with a total time commitment <19 h. There were no associations with total time commitment and sleep quality or sleep difficulties. Gender did not modify these relationships on either the additive or multiplicative scales.

In fully adjusted models, there were no associations between ≥50% of time spent in paid work on sleep quality, sleep duration, or sleep difficulties. There was EMM on the additive scale (RERI: −0.26 95% CI −0.53, 0.01; $P = 0.057$), however, the 95% CI contained values <1 so there was insufficient evidence to reject the null hypothesis. In contrast, there was evidence of EMM on the multiplicative scale (OR: 0.78; 95% CI: 0.62, 0.98; $P = 0.036$) for sleep duration (table 3). This indicates that the combined effect of being female and spending more than 50% of time in paid work is less than the product of the individual effects of being female and spending more than 50% of time in paid work on sleep duration. Stratum specific results indicated no difference in the odds of getting <7 h sleep between men who spent more or <50% of their total time use in paid work, or women who spent more or <50% of their total time use in paid work.

There was evidence of EMM between gender and ≥50% of time spent in paid work and sleep difficulties on both the multiplicative (OR: 1.42; 95% CI 1.10, 1.85; $P = 0.008$) and additive (RERI: 0.31 95% CI 0.08, 0.53; $P = 0.009$) scales. Looking at the cells within the strata in table 3, it is clear that the effect modification was driven by the effect of working more than 50% of time for men, which was protective against sleep difficulties (OR: 0.72; 95% CI 0.57, 0.91; $P = 0.004$). For women, in comparison to men who spent <50% of their time in paid work, the effect of spending <50% of time on paid work was 1.08 (95% CI 0.88, 1.34; $P = 0.468$) and spending more than 50% of time on paid work was 1.11 (95% CI 0.88, 1.39; $P = 0.400$), being protective against sleep difficulties. However, the 95% CIs for both effect estimates contained values <1, so there was little evidence against the null hypothesis of no effect of time spent in paid work in each corresponding population.

In fully adjusted models, compared to not feeling time pressured, feeling time pressured was associated with poor sleep quality (OR: 1.76; 95% CI: 1.57, 1.98; $P<0.001$), sleep duration of <7 h (OR: 1.21; 95% CI: 1.09, 1.35; $P<0.001$) and sleep difficulties (OR: 1.32; 95% CI: 1.16, 1.50; $P<0.001$). Gender did not modify these relationships on either the additive or multiplicative scales.

Discussion

This study provides important new evidence about the gendered impact of time use and time pressure on sleep outcomes. To the authors' knowledge, it is the first article to demonstrate that time use and time pressure influence not only the sleep duration of men and women, but also sleep quality and sleep difficulties. Specifically, our findings revealed that (i) total time commitments were associated with sleep duration, whereby more hours of total time use was associated with an increase in the odds of reporting <7 h sleep, (ii) feeling time pressured was associated with poor sleep quality, sleep duration of <7 h and sleep difficulties and (iii) gender modified the associations between spending more than 50% of time in paid work and both sleep duration and sleep difficulties. These findings are discussed in detail below.

Total time commitments were associated with sleep duration, such that greater total time commitments were associated with greater odds of reporting <7 h sleep. This is consistent with past literature that has shown that both longer work hours and more time in unpaid work are associated with shorter sleep duration.[16] There were no associations between total time commitments and sleep quality or sleep difficulties. These findings suggest that the relationship between total time use and sleep duration is driven by time available for sleep (time remaining once other activities are accounted for). Gender was not an effect modifier in the relationship between total time commitments and sleep.

With regard to time spent in paid work, the main effect estimate indicated no association between spending more than 50% of time in paid work and sleep duration or sleep difficulties. However, when stratifying the analysis by gender, we found that the effect of spending 50% or more of time in paid work on sleep duration was significantly different for men and women on the multiplicative scale. Compared to men who spent <50% of their time in paid work, men who spent more than 50% of their time on paid work reported greater odds of shorter sleep. Compared to men who spent <50% of their time in paid work, women who spent <50% of their time in paid work reported greater odds of shorter sleep, but women who spent more than 50% of their time in paid work reported reduced odds of shorter sleep. However, these effect estimates did not reach significance.

Table 1 Demographics (covariates; Wave 15), time variables (exposures; Wave 16) and sleep variables (outcomes; Wave 17) for men and women in the sample

	Men (*N*=3524)	Women (*N*=4087)
Demographics (Wave 15)		
Age group [*N* (%)]		
18–24 years	435 (12%)	526 (13%)
25–34 years	614 (17%)	704 (17%)
35–44 years	712 (20%)	860 (21%)
45–54 years	901 (26%)	1025 (25%)
55–64 years	862 (25%)	972 (24%)
Education [*N* (%)]		
School not completed	543 (15%)	767 (19%)
Year 12/certificate/diploma	1997 (57%)	1934 (47%)
Bachelor degree and above	984 (28%)	1386 (34%)
Occupation [*N*(%)]		
Professionals and managers	1225 (35%)	1225 (30%)
White-collar workers	608 (17%)	1523 (37%)
Blue-collar workers	1258 (36%)	338 (8%)
NILF	433 (13%)	1001 (25%)
Non-standard work hours [*N*(%)]		
Standard work hours (9–5, Monday–Friday)	2824 (80%)	3375 (83%)
Non-standard work hours	700 (20%)	712 (17%)
Total household income (AUD) [*N*(%)]		
$0–61 105	583 (16%)	807 (20%)
$61 127–96 149	638 (18%)	829 (20%)
$96 161–134 160	796 (23%)	845 (21%)
$134 200–190 448	766 (22%)	786 (19%)
$190 450–1 221 452	741 (21%)	820 (20%)
Relationship status [*N*(%)]		
Married/*de facto*	2320 (66%)	2552 (62%)
Divorced/separated	394 (11%)	612 (15%)
Widowed	22 (1%)	83 (2%)
Single	788 (22%)	840 (21%)
Presence of children aged under 5 in the house [*N*(%)]		
No children under 5	3047 (86%)	3502 (86%)
Children under 5 present	477 (14%)	585 (14%)
Number of children aged under 15 in the house [*N*(%)]		
0	2457 (70%)	2739 (67%)
1	363 (10%)	508 (12%)
2	468 (13%)	566 (14%)
3	191 (6%)	215 (5%)
4+	45 (1%)	59 (2%)
Long-term health conditions [*N*(%)]		
No	2927 (83%)	3311 (72%)
Yes	597 (17%)	776 (18%)
Country of birth [*N*(%)]		
Australia	2827 (80%)	3331 (82%)
English speaking	343 (10%)	306 (7%)
Other	354 (10%)	450 (11%)
Time variables (Wave 16)		
Total time use during an average week [*N*(%)]		
0–19 h	303 (9%)	341 (8%)
20–39 h	363 (10%)	611 (15%)
40–59 h	1079 (31%)	1301 (32%)
60–79 h	1171 (33%)	1174 (29%)
80–99 h	488 (14%)	541 (13%)
100–168 h	120 (3%)	119 (3%)
Time use during an average week [M(SD)]		
Hours of paid work	39.1 (20.1)	26.9 (20.0)
Hours of unpaid work	14.2 (9.9)	22.8 (13.1)
Hours of caring	5.2 (8.1)	8.6 (12.0)
Proportion of time in paid work [*N*(%)]		
<50%	744 (21%)	1976 (48%)
≥50%	2780 (79%)	2111 (52%)
Time pressured [*N*(%)]		
No	2338 (66%)	2277 (56%)
Yes	1186 (34%)	1810 (44%)
Sleep outcomes (Wave 17)		
Sleep quality [*N*(%)]		
Good	2631 (75%)	2840 (69%)
Poor	893 (25%)	1247 (31%)
Sleep quantity [*N*(%)]		
<7 h nightly (average)	1832 (52%)	2243 (55%)
≥7 h nightly (average)	1692 (48%)	1844 (45%)
Sleep difficulties [*N*(%)]		
No	2819 (80%)	2958 (72%)
Yes	705 (20%)	1129 (28%)

Additionally, we found that the effect of spending 50% or more of time in paid work on sleep difficulties was significantly different for men and women on both the additive and multiplicative scales. This effect modification was driven by the effect of working more than 50% of time for men, which was protective against sleep difficulties. Compared to men who spent <50% of their time in paid work, both women who spent <50% of their time on paid work and women who spent more than 50% of their time on paid work reported greater odds of sleep difficulties. The effect estimates for women did not reach significance.

Past evidence indicates that men who are unemployed experience poorer sleep than those who are employed,[25] and we have previously demonstrated that the sleep of men with low job security is poorer than that of men with high job security.[26] These findings indicate the importance of work for men's sleep. The predominant model for the division of labour in Australia whereby men do the majority of paid work and women the majority of unpaid work reinforces the traditional gender stereotypes of men as breadwinners, and women as homemakers and carers. Therefore, spending <50% of their time in paid work likely leads men to experience both financial stress due to a reduced income, and distress at not conforming to gendered expectations, contributing to more sleep difficulties. In contrast, most women in paid employment still do the majority of unpaid work and are more likely to provide care to their family overnight.[17] Therefore, women may be more likely to experience broken and disturbed sleep, regardless of the time spent in paid work.

Feeling time pressured was associated with poor sleep quality, sleep duration of <7 h, and sleep difficulties. Gender was not an effect modifier in the relationship between time pressure and sleep. However, more women reported feeling time pressured compared to men, possibly because women are more likely to be juggling multiple roles, and therefore, more women experience the negative effects of time pressure on their sleep. As per Strazdins'[7] argument, time pressure is a stressor and may impact health and well-being via a bio-behavioural stress response. Indeed, poor sleep is a common sign of stress,[27] supporting this proposition.

Together, these findings demonstrate that time use and time pressure impact sleep in varied ways, and that these associations are different for men and women. This is likely influenced by the predominance of employment arrangements, which support men as primary breadwinners and women as primary caregivers and secondary earners. Indeed, such arrangements influence the way women and men spend their time, with men expected to spend the majority of their time in paid work, while women are expected to juggle both paid and unpaid work. Public policies and workplace practices that support a more equal division of paid and unpaid labour may benefit the sleep of both men and women.[16]

The findings of this study are strengthened by the use of a large representative Australian cohort, allowing for the timely division between covariates, exposures and outcomes. Validated measures of time were employed, however, we cannot rule out the presence of misclassification bias. As noted above, the analytic sample was older, more educated, had a higher income, and a greater proportion were born in Australia, compared to the eligible sample. This is

Table 2 Unadjusted and adjusted associations between time use, time stress and sleep ($N = 7611$)

	Poor sleep quality (ref: good sleep quality)				Sleep duration/<7 h sleep (ref: ≥7 h sleep)				Sleep difficulties (ref: no sleep difficulties)			
	Unadjusted		Adjusted		Unadjusted		Adjusted		Unadjusted		Adjusted	
	OR (95% CI)	*P*	OR (95% CI)	*P*	OR (95% CI)	*P*	OR (95% CI)	*P*	OR (95% CI)	*P*	OR (95% CI)	*P*
Total time use (ref: 0–19 h)												
20–39 h	0.83 (0.67, 1.02)	0.077	1.03 (0.81, 1.31)	0.793	1.13 (0.93, 1.39)	0.226	1.25 (0.99, 1.57)	0.058	0.80 (0.65, 1.00)	0.046	1.00 (0.79, 1.28)	0.984
40–59 h	0.66 (0.55, 0.80)	<0.001	1.00 (0.79, 1.25)	0.980	1.14 (0.95, 1.36)	0.162	1.26 (1.02, 1.56)	0.036	0.59 (0.49, 0.71)	<0.001	0.90 (0.71, 1.14)	0.382
60–79 h	0.73 (0.60, 0.87)	0.001	1.11 (0.87, 1.41)	0.387	1.63 (1.37, 1.95)	<0.001	1.61 (1.28, 2.02)	<0.001	0.62 (0.51, 0.75)	<0.001	1.03 (0.80, 1.32)	0.817
80–99 h	0.75 (0.61, 0.93)	0.009	1.11 (0.85, 1.46)	0.442	1.77 (1.45, 2.17)	<0.001	1.60 (1.24, 2.07)	<0.001	0.61 (0.49, 0.76)	<0.001	1.12 (0.84, 1.49)	0.436
100–168 h	0.77 (0.56, 1.07)	0.116	1.13 (0.77, 1.66)	0.539	2.93 (2.15, 3.99)	<0.001	2.51 (1.74, 3.63)	<0.001	0.70 (0.50, 0.98)	0.036	1.25 (0.84, 1.87)	0.273
Time in paid work (ref: ≤50% time in paid work)												
≥50% time in paid work	0.65 (0.59, 0.72)	<0.001	0.95 (0.82, 1.10)	0.500	0.86 (0.78, 0.94)	0.001	1.00 (0.87, 1.14)	0.952	0.59 (0.53, 0.66)	<0.001	0.90 (0.77, 1.05)	0.184
Time pressure (ref: not time pressured)												
Time pressured	1.77 (1.60, 1.96)	<0.001	1.76 (1.57, 1.98)	<0.001	1.28 (1.17, 1.40)	<0.001	1.21 (1.09, 1.35)	<0.001	1.35 (1.22, 1.51)	<0.001	1.32 (1.16, 1.50)	<0.001

Note: Models adjusted for age, education, occupation, income, non-standard work hours, disability/long-term health condition, country of birth, relationship status, presence of children aged under 5 in household, number of children in household and prior sleep (sleep quality, sleep duration, or sleep difficulties per the outcome measure).

Table 3 Examining gender as an effect modifier in the relationship between ≥50% of time spent in paid work and sleep duration, and sleep difficulties using the EMM approach by Knol and VanderWeele ($N = 7611$)

Sleep duration/<7 h sleep (ref: ≥7 h sleep)	<50% paid work OR (95% CI)	>50% paid work OR (95% CI)	OR (95% CI) for 50% paid work within strata of gender	Sleep difficulties (ref: no sleep difficulties)	<50% paid work OR (95% CI)	>50% paid work OR (95% CI)	OR (95% CI) for 50% paid work within strata of gender
Men	1.00 (ref)	1.16 (0.95, 1.42) *P*=0.135	1.16 (0.95, 1.42) *P*=0.135	Men	1.00 (ref)	0.72 (0.57, 0.91) ***P*=0.004**	0.72 (0.57, 0.91) ***P*=0.004**
Women	1.07 (0.89, 1.30) *P*=0.455	0.98 (0.79, 1.20) *P*=0.821	0.91 (0.77, 1.07) *P*=0.236	Women	1.08 (0.88, 1.34) *P*=0.468	1.11 (0.88, 1.39) *P*=0.400	1.02 (0.85, 1.22) *P*=0.814
EMM on multiplicative scale: (OR) 0.78 (0.62, 0.98) ***P*=0.036**				EMM on multiplicative scale: (OR) 1.42 (1.10, 1.85) ***P*=0.008**			
EMM on additive scale: (RERI) −0.26 (−0.53, 0.01) *P*=0.057				EMM on additive scale: (RERI) 0.31 (0.08, 0.53) ***P*=0.009**			

Note: Models adjusted for age, education, occupation, income, non-standard work hours, disability/long-term health condition, country of birth, relationship status, presence of children aged under 5 in household, number of children in household, and prior sleep (sleep duration or sleep difficulties, per the outcome measure).

common in cohort samples, but as such we cannot ensure selection bias was not present. Three components of subjective sleep were examined. While subjective sleep measures do not correlate closely with objective sleep measures, they are associated with health outcomes.[28] Time spent in leisure activities is recognized as an important component of time use,[1] is gendered,[1,29] and is associated with health outcomes.[30] Unfortunately, there was no available measure of leisure.

Conclusions

In conclusion, findings from this study indicate that time use and time pressure impact sleep outcomes, and that on some measures, the effect is different for men and women. Given that time pressure and time use are known to impact health outcomes, this result further suggests that sleep may be an important mediator of this relationship, more research is needed to disentangle these effects.

Supplementary data

Supplementary data are available at *EURPUB* online.

Funding

A.J.S. was supported by a National Health and Medical Research Council Postgraduate Scholarship (#1191061) and the Australian Government Research Training Program (RTP) Scheme. B.H. was supported by Australian Research Council (DP180101217). T.L. is supported by the Academy of Finland (Grant #330527) and the Social Insurance Institution of Finland (grant 29/26/2020). A.O. is supported by a National Health & Medical Research Council Emerging Leader 2 Fellowship (2009295). T.L.K. was supported by an Australian Research Council DECRA Fellowship (DE200100607). No funding body was involved in the design, analysis or writing of this article.

Conflicts of interest: None declared.

Data availability

The data underlying this article (HILDA Survey data) are available via application through the National Centre for Longitudinal Data Dataverse: https://dataverse.ada.edu.au/dataverse/hilda.

Key points

- For the first time, we present evidence that time use and time pressure influence not only the sleep duration of men and women, but also sleep quality and sleep difficulties.
- Gender is an effect modifier in the relationship between spending more than 50% of time in paid work and sleep, demonstrating that the effect of time in paid work on sleep differs for men and women.
- Public policies and workplace practices that support a more equal division of paid and unpaid labour may benefit the sleep of both men and women.

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