Complaints of insomnia among midlife employed people – the contribution of childhood and present socioeconomic circumstances

Running head: Socioeconomic circumstances and sleep

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Abstract

Background: Studies using conventional socioeconomic indicators have reported inconsistent evidence on socioeconomic differences in complaints of insomnia. We lack studies using a comprehensive socioeconomic framework over the life course ranging from childhood to adulthood. This study therefore aimed to examine the associations of both past and present socioeconomic circumstances with complaints of insomnia.

Methods: Data were derived from cross-sectional postal surveys (2000-2002) representative of the staff of the City of Helsinki, Finland (n=8960, aged 40-60 years). Socioeconomic circumstances were measured by parental education, childhood economic difficulties, own education, occupational class, household income, housing tenure, and current economic difficulties. Complaints of insomnia during the previous month were measured by difficulties initiating and maintaining sleep, and non-restorative sleep. Logistic regression analysis was used adjusting for age and marital status.

Results: Complaints of insomnia at least once a week were reported by 24% of women and 21% of men. Childhood economic difficulties showed associations with complaints of insomnia among both women (OR 1.52; 95% CI 1.31-1.76) and men (OR 2.25; 95% CI 1.67-3.02) even after full adjustments. Also current economic difficulties remained associated with complaints of insomnia, but only among women (OR 1.65; 95% CI 1.41-1.93). However, education, occupational class, and income showed only limited age-adjusted associations with complaints of insomnia and these associations disappeared after full adjustments.

Discussion: Past and present economic difficulties are strongly associated with current complaints of insomnia. Supporting both families with children and adults to cope with their economic difficulties might reduce complaints of insomnia in adulthood.

1. Introduction

Poor sleep is closely linked with both mental (1,2) and physical ill-health (3-5). In particular, complaints of insomnia bear large costs attributable to increased sickness absence, accidents, morbidity, and early retirement (6-8). Thus, more evidence of their determinants is needed in order to prevent these evident public health problems. Detailed examination of past and present socioeconomic circumstances may help identify potential risk groups who have higher likelihood of suffering from complaints of insomnia and subsequent ill-health.

Accordingly, good sleep is not equally distributed and complaints of insomnia tend to be more prevalent among those with lower socioeconomic positions (9,10). The associations have, however, been inconsistent across studies and between different socioeconomic indicators (11,12). Socioeconomic differences in sleep have been typically examined focusing on a single indicator only (9). Some studies have examined several current indicators such as education, occupational class, income level, and housing tenure (10) or past adversities (13), but we lack studies examining associations of multiple past and present socioeconomic circumstances with complaints of insomnia. A comprehensive framework is needed as socioeconomic position is a multidimensional theoretical and empirical concept covering a broad range of social, financial, and material circumstances (14).

It is reasonable to assume that different domains of socioeconomic position across the life course are associated in diverse ways with sleep, since each domain reflects both common ranking in society as well as particular socioeconomic circumstances according to the nature of the indicator in question (15-18). Any single indicator cannot capture the range of an individual's past and present socioeconomic circumstances, and therefore there is no paramount indicator. It follows that the socioeconomic indicators are not interchangeable,

but we need to better understand their interrelationships and the potential pathways through which socioeconomic inequalities in sleep may occur.

First, past socioeconomic circumstances are of potential importance. Childhood socio-economic circumstances may contribute to own education and subsequent own socioeconomic position (19,20). Furthermore, adverse living conditions during childhood contribute to health even in adulthood (21). Childhood economic adversities may also be related to poorer sleep in adulthood (13) but it is not known to what extent the present socioeconomic differences in sleep can be explained by childhood circumstances and whether the association of childhood socioeconomic circumstances remains robust when current adversities are taken into account.

Second, the conventional indicators of socioeconomic position, including education, occupational class, and income differ in their links to sleep. Among midlife people, education is likely to be a more distant indicator acquired typically by early adulthood. However, it reflects health-related knowledge, values and attitudes (18,19) and can thus be assumed to be linked with sleep as well. One may assume that high educated people have better means to improve their sleep, have better living conditions, and are more aware of the importance of good sleep to health (10,22). Occupational class, in turn, represents current social standing and hierarchical position, as well as reflects working conditions which have been found to be associated with sleep (9,23). Although income levels are associated with material resources, income levels can however rapidly change (24). Therefore current income does not directly reflect cumulative wealth over the life course.

Third, a focus on the conventional socioeconomic indicators largely neglects the potential effects of not only childhood socioeconomic circumstances but also the effects of housing tenure and current economic difficulties. Housing tenure reflects wealth, while current economic difficulties reflect financial strains that can influence sleep over and above

the effects of level of income or other conventional indicators of socioeconomic position (10,12,25,26). A particular feature of economic difficulties is that they can exist at different levels of income (27) and may provide more concrete information about how an individual's economic situation is associated with their sleep quality. Economic difficulties thus widen the perspective as they move beyond the conventional domains of socioeconomic position, i.e. educational level, occupational class, and income. The assumed temporal order between the domains of socioeconomic position is of importance as the association of for example education with sleep may be mediated through current income (28).

Finally, socioeconomic inequalities in sleep also tend to differ by gender (9), and socioeconomic position has been found to be a major explanation of the female excess in reported complaints of insomnia (9,10).

The aim of this study was to examine the associations of past and present socioeconomic circumstances with complaints of insomnia. The study thus provides a comprehensive understanding of the associations of socioeconomic circumstances with complaints of insomnia among both women and men. Since previous studies have focused on either past or present indicators, using a multi-dimensional framework of lifecourse socioeconomic circumstances enables a more detailed identification of potential risk groups for prevention of complaints of insomnia.

2. Methods

2.1 Data

The data were derived from the Helsinki Health Study baseline questionnaire surveys among 40-60 year old employees of the City of Helsinki in 2000-2002 (29). Altogether 8960 women and men responded (women 80%, response rate 67%). The lower proportion of men corresponds to the target population, as well as the public sector in Finland

more general (30). Based on non-response analyses, these data are broadly representative of the target population (31). Non-respondents were somewhat more likely to be men, younger employees, and have lower occupational social class. Department of Public Health, University of Helsinki and the City of Helsinki have given ethical approvals for the Helsinki Health Study.

The analyses of the cross-sectional survey data were conducted among those with complete data on socioeconomic indicators and complaints of insomnia. The proportion of missing responses was 1-2% per item, thus 7957 participants were eligible for this analysis. We have previously reported that the effects of item missing concerning the socioeconomic indicators (32) and complaints of insomnia (23) are unlikely to bias the estimates of the outcome.

2.2 Past and present socioeconomic circumstances

Childhood socioeconomic circumstances were measured first by parental education and second by childhood economic difficulties. Father's education was used if it was higher or equal to mother's education, and was coded into three groups: basic, intermediate, and higher education. Economic difficulties in childhood were measured by an item enquiring whether or not there had been serious economic difficulties in the family when the respondent was under 16 years old.

Own education was classified as basic, intermediate, and higher education.

Four occupational classes were used: manual workers, routine non-manual employees, semi-professionals, and professionals, and managers. Data on occupational class were derived from current occupations recorded in the City of Helsinki personnel register for those with written consent for linkage (80%). For the rest occupational class was obtained from the questionnaires.

Household income was asked after taxes, and taking into account any welfare benefits and other sources of income received in an average month. Household income was weighted for the number of people living in the household by giving the respondent the value of one, all other adults the value of 0.5, and children (under 18) the value of 0.3, based on a standard OECD procedure (33). The weighed income was divided into gender-specific quartiles of 'very low', 'low', 'high', and 'very high' household income levels.

Housing tenure comprised four response alternatives: owner-occupier, renter from employer, renter from the private market, or other. The responses were dichotomised into owner-occupiers and others.

Current economic difficulties were measured by two items. Participants were asked first about problems in buying food and clothes, and second about problems paying bills (34). The items covered the frequency of these difficulties. Both of the items had five response alternatives ranging from always to never concerning item enquiring about having enough money to buy food or clothes for themselves or their family, and from very little to very much concerning item enquiring about difficulty paying bills. Responses to these two items were combined into three groups to compare those with frequent economic difficulties and occasional economic difficulties to those with no difficulties. Those who reported always having enough money to buy food and clothes and who had never or very little difficulties in paying bills formed the reference group. Those with occasional difficulties in buying food or clothes or paying bills formed the intermediate group, whereas those who reported having never or rarely enough money to buy food and clothes or much difficulty in paying bills were defined as having frequent economic difficulties.

Further details of the indicators of these socioeconomic circumstances have been reported elsewhere (32,35,36).

2.3 Complaints of insomnia

Complaints of insomnia during the previous four weeks were examined using the Jenkins Sleep Questionnaire (37). The four items enquired about ‘having trouble falling asleep,’ ‘waking up several times per night,’ ‘having trouble staying asleep,’ and ‘waking up after the usual amount of sleep feeling tired and worn out.’ Six response alternatives ranged from ‘never’ to ‘every night.’ We summed up responses to these four items and used a summary score divided by the number of responses as a dichotomous variable in the analyses. Complaints of insomnia at least once a week during the previous month was used as a cut-off point, whereas those with occasional or no complaints of insomnia served as the reference group. If two or more of the four items were missing, the sum score was not calculated and the respondent was excluded from the analyses (2.4%). Our procedure for classifying sleep complaints follows previous studies (23,38,39).

2.4 Statistical analyses

Correlations between the socioeconomic indicators ranged from low to relatively high (0.05-0.77). The strongest correlations were found between own education and occupational class (0.76, $p < .0001$). Correlation between parental education and own education (0.38, $p < .0001$) as well as parental education and occupational class (0.31, $p < .0001$) were also rather high. Otherwise, childhood socioeconomic circumstances correlated weakly with current socio-economic circumstances (0.07-0.14). The highest correlation observed was between childhood and current economic difficulties (0.14). The correlation of household income with current economic difficulties was 0.31 ($p < .0001$). Multicollinearity for socioeconomic circumstances was not found. First, we calculated age-adjusted prevalence of complaints of insomnia (with 95% confidence intervals) for each of the various socioeconomic indicators using general linear modelling (Table 1). Next, logistic

regression analysis was used to examine the associations of past and present socioeconomic circumstances with complaints of insomnia separately for women and men (Tables 2 and 3). The most advantaged groups were used as the reference category for each indicator. First, age-adjusted bivariate associations between each socioeconomic indicator and complaints of insomnia were computed (Model 0). Sequential logistic regression models were then fitted, adjusting for age, marital status, and socioeconomic circumstances. We assume that parental education and childhood adversities may contribute to own education and subsequent occupational social class as discussed in the Introduction. Following this assumed temporal order, childhood circumstances were added first in the models (Model 1), followed by own education (Model 2), occupational social class (Model 3), and household income (Model 4). Housing tenure was added after income (Model 5), and the final model was adjusted for current economic difficulties (Model 6). In this final model, all socioeconomic circumstances and covariates were mutually adjusted for. After mutual adjustments, the estimates that remain statistically significant are interpreted to show independent associations with complaints of insomnia. Finally, to examine whether the associations differed by gender, interactions between socioeconomic circumstances and gender were examined within the pooled data (Type 3 test). All analyses were conducted using SAS version 9.1.3.

3. Results

3.1 Descriptive analyses

Complaints of insomnia at least once a week were reported by 24% of women and by 21% of men (Table 1). Prevalence of complaints of insomnia was significantly higher among both women and men who reported severe economic difficulties in their childhood family compared to those with no difficulties (32% vs. 23% of women and 34% vs. 18% of men).

Housing tenure was related to complaints of insomnia but only among men, owner-occupiers reporting less complaints of insomnia as compared to renters (19% vs. 27%). Prevalence of complaints of insomnia was highest among those with frequent current economic difficulties as compared to those with no difficulties for both women (32% vs. 22%) and men (26% vs. 19%).

3.2 Childhood and present socioeconomic inequalities in sleep

We fitted a series of logistic regression models to further examine the associations between indicators of socioeconomic position and complaints of insomnia (Tables 2-3).

Childhood economic difficulties remained associated with complaints of insomnia among both women (OR 1.57; CI 1.36-1.81) and men (OR 2.29; CI 1.73-3.04) after adjusting for age (Model 0, Tables 2-3). Furthermore, the associations remained largely unchanged among both women (OR 1.52; CI 1.31-1.76) and men (OR 2.25; CI 1.67-3.02) after marital status and all the indicators of past and present socioeconomic circumstances were mutually adjusted for (Model 6, Tables 2-3).

Own education and occupational class were unrelated to complaints of insomnia among both women and men, whereas lower income tended to show some association with complaints of insomnia among both women and men when adjusting for age (Model 0, Tables 2-3). After housing tenure and current economic difficulties were entered in the analysis (Models 5-6, Tables 2-3), the associations with income attenuated for men but remained largely unchanged for women.

Among women there was no association between housing tenure and complaints of insomnia, whereas among men renters were more likely to report complaints of insomnia in the age-adjusted Model 0 (1.58; CI 1.23-2.04). The association remained when

adjusted for all other indicators until Model 6, but entering current economic difficulties attenuated this association (OR 1.32; 0.99-1.76). Frequent current economic difficulties were associated with complaints of insomnia among both women (OR 1.67; CI 1.45-1.93) and men (OR 1.46; CI 1.08-1.97) in the age-adjusted Model 0 (Tables 2-3). Among women, frequent current economic difficulties remained associated with complaints of insomnia after mutually adjusting for all socioeconomic indicators (OR 1.65; CI 1.41-1.93, Model 6). However, the association attenuated among men after adjustments (Models 6, Tables 2-3).

An interaction was found between childhood economic difficulties and gender suggesting that the association was stronger among men ($p=0.0036$). Another interaction was found for housing tenure confirming its significance for complaints of insomnia among men only ($p=0.0007$).

4. Discussion

4.1 Main findings

This study aimed to examine the associations of past and present socioeconomic circumstances with complaints of insomnia among midlife employees. The first main finding was that both childhood and current economic difficulties were associated with complaints of insomnia even after adjusting for all the other socioeconomic circumstances. The second main finding was the practically non-existent associations of education, occupational class, and income with complaints of insomnia, in particular after adjusting for current economic difficulties. The third finding was that some gender differences were observed. The associations of current economic difficulties with complaints of insomnia remained only for women, whereas the association of childhood economic difficulties with complaints of insomnia was stronger among men. Housing tenure showed some association only with men's sleep. The fourth finding was that practically no pathways i.e., potential links from childhood

to current socioeconomic position or from education to occupational class and to income were identified. Thus, present socioeconomic circumstances did not explain the associations of past socioeconomic circumstances with complaints of insomnia.

4.2 Previous studies

A broad framework covering domains of socioeconomic position from past to present circumstances has not previously been used in the study of complaints of insomnia. Our results concerning childhood socioeconomic circumstances are, however, in line with a recent study that reported a dose-response relationship between the number of childhood adversities and poor quality of sleep in the Finnish population (13). Economic difficulties were not the focus of the previous study, but the association was of similar strength as our findings. However, the previous study did not take into account parental socioeconomic position, current economic difficulties or other socioeconomic circumstances. Thus, our findings extend the previous evidence by showing that the association between childhood economic difficulties and sleep is not explained by current situation. Also other types of adverse childhood conditions such as abuse or neglect (40,41) and family conflicts or discontent in parents (42,43) have predicted later complaints of insomnia. Furthermore, in addition to complaints of insomnia, childhood economic difficulties bear significance for later health as they have been shown to be associated with adult self-rated health and limiting long-standing illness among both women and men independent of present socioeconomic circumstances (44). Additionally, adverse childhood conditions have predicted receipt of disability pensions even after health behaviours, health status, and current socioeconomic position have been adjusted for (45).

The association of current economic difficulties with sleep is also supported by some earlier studies (11,12,46). However, comparability of the results is limited due to

different measures and previous studies have not applied a life course approach. Hall et al. (12) showed that current economic difficulties were associated with complaints of insomnia such as difficulties falling asleep and staying asleep. Economic difficulties were asked as currently experienced financial strain that had lasted at least twelve months, and the degree to which the strain was 'upsetting' with response alternatives ranging from "absent" or "not upsetting" to "very upsetting". The study examined a small US sample of elderly people, but the association remained after it was controlled for health status and other correlates of sleep. In New Zealand, Paine et al. (11), reported a strong association between complaints of insomnia and socioeconomic deprivation defined as a score of nine indicators of deprivation such as not living in own home, no access to car or telephone, low household income, and being unemployed. Our association of current economic difficulties with complaints of insomnia is partly in line with a recent British study (46). In that study, economic difficulties over the last year were, however, unassociated with sleep loss through worry after full adjustment, while in our study the association between current economic difficulties and complaints of insomnia remained among women after all past and present indicators of socioeconomic circumstances were adjusted for.

In contrast to some previous studies (9,10) and our findings concerning economic difficulties, conventional indicators of socioeconomic position were mostly unrelated to complaints of insomnia in the mutually adjusted models. However, inconsistent associations between conventional socioeconomic indicators and sleep are in accordance with some other studies. Thus, education and occupational class have shown less consistent associations with sleep than material resources (11,12). In other words, a common finding of previous studies despite their diverse methodologies suggests that economic difficulties are associated with sleep more strongly or consistently than conventional socioeconomic position indicators. This further suggests that when addressing socioeconomic inequalities in sleep, a

broad framework is needed taking into account economic difficulties over the life course as these may be related to sleep to a greater extent than education, occupational class, or current income level.

Alternatively, the lack of an association between conventional indicators of socioeconomic position and complaints of insomnia might be due to the nature of our cohort, i.e., all participants were municipal employees living in the Helsinki metropolitan area. For example, occupational class differences might be evident in a more heterogeneous sample comprising different sectors of employment, wider age-groups and different geographical areas, representative of the national level. Furthermore, all employees worked for a single employer and around 90% of them had permanent jobs and stable incomes which can be considered a relatively advantaged situation as compared to the general population. All these employees also had an equal access to occupational health care. Based on these issues and our focus on an employed cohort, the findings are likely to be relatively conservative. In particular, complaints of insomnia have been found to be more prevalent among unemployed people across various cohorts (11,47,48), which may reflect the higher likelihood of economic difficulties during unemployment that, in turn, disrupt sleep. Concerning current economic difficulties, it is of note that these difficulties are not equivalent to poverty but are of importance across all income levels, including our sample of relatively affluent employed women who had stable incomes and mostly permanent employment status. Finally, if frequent economic difficulties cause stress, this can explain their effects on sleep while differences in coping skills could modify the association.

Gender differences in the associations also partly agree with previous evidence. For example, living in public housing as compared to private housing was related to complaints of insomnia among men but not among women in a previous study from Hong

Kong (48). It is possible that housing as an indicator of wealth is more important to men than women, but reasons for gender differences warrant further studies.

In all, previous findings about the potential links between past and present economic difficulties and complaints of insomnia are derived from heterogeneous study populations from different parts of the world and using varying measures for both sleep and economic difficulties. Our study is the first to show a robust association between childhood and present economic difficulties and complaints of insomnia among women, whereas among men only childhood economic difficulties showed a persistent association with complaints of insomnia.

Longitudinal studies are needed to examine causal effects as well as persistence of economic difficulties over longer periods of time, and whether such chronic exposures are causally related to more severe complaints of insomnia. This is of importance also due to connections of complaints of insomnia with decline in physical and mental health (49,50). The causality of the associations between mental and physical health with complaints of insomnia is, however, a very complex issue (49,51,52). We conducted control analyses adjusting for common mental disorders as well as further confirmatory analyses among those free from such mental health problems (data not shown). Another reason for these analyses was to test whether mental health explains both reporting economic difficulties and their associations with complaints of insomnia, and in particular whether the associations between adverse childhood socioeconomic circumstances and sleep are explained by mental health. The associations between complaints of insomnia and both childhood and current economic difficulties remained strong suggesting that these effects cannot be accounted for by mental health and indirect effects. Health related explanations are, nonetheless, out of the focus of this study. As suggested in a previous study (10), socioeconomic circumstances may affect health partly due to their associations with sleep.

4.3 Strengths and limitations

Some further limitations of our study need to be acknowledged. First, this study was cross-sectional and the assumed temporal order between socioeconomic circumstances and complaints of insomnia cannot be confirmed. In particular, the cross-sectional design is problematic concerning childhood socioeconomic circumstances, which were reported in adulthood. Additionally, our two items provide a limited way of capturing childhood adversities (53). However, other studies have shown that such retrospective evidence about the effects of childhood adversities can provide useful evidence for promoting adult health (54). Retrospective reports also provide opportunities for having to have a broader approach when examining adult health. Our control analyses suggest that there is only some overlap between responses to childhood and present economic difficulties (data not shown). Thus bias, or reporting current economic difficulties, is unlikely to distort reporting of childhood economic difficulties to a large extent. However, we lack data on childhood complaints of insomnia and their persistence to adulthood to corroborate the effects of adverse childhood conditions on sleep across the life course. This is a limitation, since complaints of insomnia have recently been shown to potentially begin in adolescence and persist in adulthood (55). Second, as this study was focused on an employed cohort sleep- and health-related selection may affect the findings (56). In other words, it is possible that those with the most severe complaints of insomnia and subsequent ill-health have already been selected out of the workforce. Third, the associations of conventional indicators of socioeconomic position with complaints of insomnia might be stronger in the general population than in the relatively affluent study population of employees as discussed above. In particular, this could apply to the association of economic difficulties with complaints of insomnia which, nevertheless, was

strong in the examined cohort. The associations might also differ by employment sector, or in younger age-groups as well as other areas than the Helsinki metropolitan area.

The strengths of this study include first, a large cohort representative of the target population (31), and second, data on a broad variety of both childhood and present socioeconomic circumstances. Complaints of insomnia were measured by a validated four-item measure (37) in contrast to many other studies with limited data about sleep. By focusing on a homogenous study population of public sector employees, we were able to reduce unmeasured heterogeneity. A broad approach is of importance due to long-lasting effects of childhood economic difficulties that are not explained by current economic difficulties and other socioeconomic circumstances.

5. Conclusions

Using a broad socioeconomic framework we have shown that childhood and current economic difficulties contribute to complaints of insomnia even among relatively affluent employed people, whereas the effects of education, occupational class, and income appear to be negligible. Furthermore, the associations of childhood socioeconomic circumstances with sleep are persistent and independent of conventional indicators as well as of current economic difficulties. Thus, prevention of complaints of insomnia needs to take into account past socioeconomic circumstances that are associated with an individual's current situation. Attempts to support people to cope and better manage with their economic situation might help prevent complaints of insomnia. Since childhood economic difficulties were the most robust predictors of complaints of insomnia in midlife, early intervention may be needed to moderate their effects on adult sleep.

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Table 1: Distribution of socioeconomic indicators and age-adjusted prevalence of complaints of insomnia among women and men (prevalence and 95% confidence intervals)

	Women (N=6330)			Men (n=1627)		
	Age-adjusted complaints of insomnia			Age-adjusted complaints of insomnia		
	N	%	CI (95%)	N	%	CI (95%)
Complaints of insomnia (all)	1544	24.39		344	21.14	
Age						
40	1361	17.9	(15.6 -20.1)	299	22.7	(18.1 -27.4)
45	1409	19.7	(17.4 -21.9)	316	21.2	(16.7 -25.7)
50	1379	26.5	(24.2 -28.7)	338	21.0	(16.6 -25.4)
55	1491	30.1	(27.9 -32.3)	435	20.7	(16.8 -24.5)
60	690	30.4	(27.3 -33.6)	239	20.1	(14.9 -25.3)
Marital status						
Married	4247	24.9	(23.6 -26.2)	1272	19.2	(16.9 -21.5)
Single	878	23.1	(20.3 -26.0)	178	27.3	(21.2 -33.4)
Divorced & widowed	1205	26.2	(23.7 -28.6)	177	28.8	(22.8 -34.8)
Parental education						
Higher	649	26.5	(23.2 -29.8)	223	20.5	(15.1 -25.9)
Intermediate	666	27.4	(24.1 -30.6)	195	24.6	(18.8 -30.4)
Lower	5015	24.4	(23.2 -25.6)	1209	20.7	(18.4 -23.1)
Childhood economic difficulties						
No	5233	23.4	(22.2 -24.5)	1344	18.4	(16.2 -20.6)
Yes	1097	32.2	(29.7 -34.8)	283	34.0	(29.3 -38.8)
Own education						
Higher	1607	26.0	(23.9 -28.1)	537	18.7	(15.2 -22.2)
Intermediate	2112	25.4	(23.5 -27.3)	462	23.5	(19.7 -27.2)
Lower	2611	23.8	(22.2 -25.5)	628	21.6	(18.3 -24.8)
Occupational class						
Managers and professionals	1779	25.9	(23.9 -27.9)	722	19.2	(16.2 -22.2)
Semiprofessionals	1198	26.0	(23.6 -28.5)	315	21.6	(17.1 -26.2)
Routine non-manuals	2649	24.0	(22.3 -25.7)	164	22.4	(16.1 -28.7)
Manual workers	704	23.8	(20.6 -26.9)	426	23.7	(19.7 -27.6)
Household income						
Highest quartile	1864	22.6	(20.6 -24.6)	373	17.0	(12.8 -21.2)
3rd quartile	1545	25.4	(23.2 -27.5)	423	21.8	(17.8 -25.7)
2nd quartile	1491	26.5	(24.2 -28.7)	429	25.6	(21.7 -29.5)
Lowest quartile	1430	25.9	(23.7 -28.1)	402	19.6	(15.5 -23.6)
Housing tenure						
Owner-occupied	4156	24.3	(23.0 -25.6)	1120	18.6	(16.2 -21.1)
Other	2174	26.1	(24.3 -28.0)	507	26.6	(23.0 -30.2)
Current economic difficulties						
No difficulties	3267	22.4	(21.0 -23.9)	869	19.0	(16.3 -21.8)
Occasional difficulties	1663	23.9	(21.8 -26.0)	414	21.9	(17.9 -25.9)
Frequent difficulties	1400	32.2	(29.9 -34.4)	344	25.6	(21.2 -29.9)

Table 2. Associations between socioeconomic indicators and complaints of insomnia. Women (n=6330)

WOMEN	Model 0: Individual effects*		Model 1: Childhood SEP-indicators		Model 2: 1+own education		Model 3: 2+ occupational class		Model 4: 3+ income		Model 5: 4+ housing tenure		Model 6: 5+ economic difficulties	
	OR	CI 95%	OR	CI 95%	OR	CI 95%	OR	CI 95%	OR	CI 95%	OR	CI 95%	OR	CI 95%
Parental education														
Higher	1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Intermediate	1.05	(0.82 - 1.35)	1.02	(0.79 - 1.31)	1.03	(0.80 - 1.33)	1.03	(0.80 - 1.33)	1.03	(0.80 - 1.33)	1.03	(0.80 - 1.32)	1.05	(0.82 - 1.35)
Lower	0.89	(0.74 - 1.08)	0.83	(0.68 - 1.00)	0.87	(0.71 - 1.06)	0.87	(0.71 - 1.07)	0.87	(0.71 - 1.07)	0.87	(0.71 - 1.06)	0.88	(0.72 - 1.08)
Childhood economic difficulties														
No	1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Yes	1.57	(1.36 - 1.81)	1.61	(1.39 - 1.86)	1.62	(1.40 - 1.87)	1.62	(1.40 - 1.87)	1.60	(1.38 - 1.85)	1.59	(1.38 - 1.84)	1.52	(1.31 - 1.76)
Own education														
Higher	1.00				1.00		1.00		1.00		1.00		1.00	
Intermediate	0.97	(0.83 - 1.13)			0.98	(0.84 - 1.14)	0.98	(0.80 - 1.21)	0.97	(0.79 - 1.19)	0.96	(0.79 - 1.18)	0.97	(0.79 - 1.19)
Lower	0.89	(0.77 - 1.03)			0.89	(0.76 - 1.05)	0.95	(0.74 - 1.22)	0.92	(0.71 - 1.19)	0.91	(0.71 - 1.17)	0.90	(0.70 - 1.16)
Occupational class														
Managers and professionals	1.00						1.00		1.00		1.00		1.00	
Semiprofessionals	1.01	(0.85 - 1.19)					1.04	(0.83 - 1.29)	1.00	(0.81 - 1.25)	1.00	(0.80 - 1.24)	1.00	(0.80 - 1.24)
Routine non-manuals	0.90	(0.78 - 1.03)					0.94	(0.75 - 1.18)	0.88	(0.70 - 1.12)	0.87	(0.69 - 1.10)	0.86	(0.68 - 1.08)
Manual workers	0.89	(0.72 - 1.09)					0.92	(0.69 - 1.23)	0.85	(0.64 - 1.14)	0.84	(0.62 - 1.12)	0.81	(0.60 - 1.09)
Household income														
Highest quartile	1.00								1.00		1.00		1.00	
3rd quartile	1.16	(0.99 - 1.36)							1.21	(1.03 - 1.42)	1.20	(1.02 - 1.42)	1.18	(1.00 - 1.39)
2nd quartile	1.24	(1.05 - 1.47)							1.30	(1.09 - 1.55)	1.29	(1.08 - 1.54)	1.24	(1.04 - 1.48)
Lowest quartile	1.20	(1.02 - 1.41)							1.31	(1.08 - 1.57)	1.29	(1.07 - 1.55)	1.17	(0.97 - 1.42)
Housing tenure														
Owner-occupied	1.00										1.00		1.00	
Other	1.11	(0.98 - 1.25)									1.12	(0.98 - 1.28)	1.04	(0.90 - 1.19)
Current economic difficulties														
No difficulties	1.00												1.00	
Occasional difficulties	1.08	(0.94 - 1.25)											1.07	(0.92 - 1.24)
Frequent difficulties	1.67	(1.45 - 1.93)											1.65	(1.41 - 1.93)

*Age-adjusted associations between each socioeconomic indicator and complaints of insomnia; subsequent models 1-6 adjusted for age, marital status, and all the variables from previous models

Table 3. Associations between socioeconomic indicators and complaints of insomnia. Men (n=1627)

MEN	Model 0: Individual effects*		Model 1: Childhood SEP-indicators		Model 2: 1+own education		Model 3: 2+ occupational class		Model 4: 3+ income		Model 5: 4+ housing tenure		Model 6: 5+ economic difficulties	
	OR	CI 95%	OR	CI 95%	OR	CI 95%	OR	CI 95%	OR	CI 95%	OR	CI 95%	OR	CI 95%
Parental education														
Higher	1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Intermediate	1.26	(0.80 – 2.00)	1.15	(0.72 - 1.83)	1.08	(0.67 - 1.73)	1.09	(0.68 - 1.74)	1.06	(0.66 - 1.7)	1.09	(0.68 - 1.75)	1.10	(0.68 - 1.77)
Lower	1.01	(0.71 - 1.44)	0.86	(0.60 - 1.24)	0.80	(0.54 - 1.18)	0.80	(0.54 - 1.18)	0.78	(0.53 - 1.15)	0.79	(0.54 - 1.17)	0.80	(0.54 - 1.18)
Childhood economic difficulties														
No	1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Yes	2.29	(1.73 - 3.04)	2.32	(1.74 - 3.09)	2.35	(1.76 - 3.14)	2.32	(1.73 - 3.1)	2.35	(1.75 - 3.15)	2.30	(1.72 - 3.09)	2.25	(1.67 - 3.02)
Own education														
Higher	1.00				1.00		1.00		1.00		1.00		1.00	
Intermediate	1.33	(0.98 - 1.82)			1.35	(0.98 - 1.87)	1.27	(0.88 - 1.84)	1.27	(0.87 - 1.84)	1.25	(0.86 - 1.81)	1.23	(0.85 - 1.79)
Lower	1.20	(0.90 - 1.60)			1.15	(0.83 - 1.58)	0.98	(0.62 - 1.55)	0.96	(0.60 - 1.53)	0.94	(0.59 - 1.50)	0.93	(0.58 - 1.48)
Occupational class														
Managers and professionals	1.00						1.00		1.00		1.00		1.00	
Semiprofessionals	1.16	(0.84 - 1.61)					1.11	(0.75 - 1.65)	1.12	(0.76 - 1.67)	1.11	(0.75 - 1.65)	1.11	(0.75 - 1.65)
Routine non-manuals	1.22	(0.81 - 1.84)					1.07	(0.65 - 1.75)	1.12	(0.68 - 1.85)	1.04	(0.63 - 1.72)	1.03	(0.62 - 1.71)
Manual workers	1.31	(0.97 - 1.75)					1.26	(0.81 - 1.96)	1.27	(0.81 - 1.99)	1.21	(0.77 - 1.90)	1.19	(0.76 - 1.87)
Household income														
Highest quartile	1.00								1.00		1.00		1.00	
3rd quartile	1.36	(0.95 - 1.94)							1.28	(0.89 - 1.85)	1.28	(0.88 - 1.84)	1.27	(0.88 - 1.83)
2nd quartile	1.68	(1.19 - 2.39)							1.45	(1.00 - 2.11)	1.43	(0.98 - 2.09)	1.41	(0.96 - 2.06)
Lowest quartile	1.19	(0.82 - 1.73)							0.97	(0.64 - 1.46)	0.94	(0.63 - 1.42)	0.90	(0.59 - 1.36)
Housing tenure														
Owner-occupied	1.00										1.00		1.00	
Other	1.58	(1.23 - 2.04)									1.35	(1.01 - 1.79)	1.32	(0.99 - 1.76)
Current economic difficulties														
No difficulties	1.00												1.00	
Occasional difficulties	1.20	(0.89 - 1.60)											1.10	(0.81 - 1.49)
Frequent difficulties	1.46	(1.08 - 1.97)											1.23	(0.89 - 1.71)

*Age-adjusted associations between each socioeconomic indicator and complaints of insomnia; subsequent models 1-6 adjusted for age, marital status, and all the variables from previous model.