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Original Article

Associations of relative weight with subsequent changes over time in insomnia symptoms: A follow-up study among middle-aged women and men

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ABSTRACT

Background: Obese people tend to report more insomnia symptoms than their normal-weight counterparts. However, longitudinal studies are sparse. We aimed to examine whether relative weight is associated with changes over time in insomnia symptoms.
Methods: The data were derived from the prospective Helsinki Health Study cohort among 40–60-year-old employees of the City of Helsinki. Baseline survey data were collected in 2000–2002 ($n = 8960$, response rate 67%) and follow-up data in 2007 ($n = 7332$, response rate 83%). Body mass index (BMI) was calculated from self-reported height and weight. Insomnia symptoms were measured at baseline and follow-up. Multinomial logistic regression analysis was used.
Results: 45% of women and 59% of men were overweight or obese at baseline. Most participants reported at least occasional or transient insomnia symptoms, with 29% of women and 34% of men reporting no or rare symptoms at both time points. Adjusting for age, baseline BMI was strongly associated with persistent and increasing insomnia symptoms. The associations mainly remained after adjustments for marital status, occupational class, alcohol consumption, physical inactivity, common mental disorders, physical health, and employment status.
Conclusion: BMI is a strong determinant of persistent and increasing insomnia symptoms. Successful maintenance of a healthy body weight probably helps prevent insomnia symptoms, and their increase and persistence, among both women and men.

1. Introduction

Occasional insomnia symptoms are prevalent and have tended to increase in recent decades among working-aged people [1]. Chronic insomnia also shows high incidence and is persistent across different populations [2–7]. While insomnia symptoms likewise tend to be persistent, they are more likely to be remitted than diagnosed insomnia [3,8]. Few studies have been able to measure insomnia prospectively and examine factors that are associated with changes over time in insomnia symptoms. As persistent and increasing insomnia symptoms are likely to have adverse consequences, e.g., for subsequent work disability [9], this highlights the need to shed light on the determinants of such symptoms among working-aged people.

Alongside insomnia, obesity is a common current public health problem. Various sleep disorders, such as obstructive sleep apnoea, have been linked with obesity [10]. Insomnia may also be associated with obesity [6,11,12] but most studies have been cross-sectional. The evidence is, however, inconsistent, as some studies have failed to report associations between insomnia and weight or weight change [13–15]. Our previous study among women and men, as well as another study among men only, longitudinally examined insomnia, weight gain and overweight, supporting the significance of insomnia to weight change [6,16]. However, previous studies have not examined the significance of relative weight to the persistence, increase, and remission of insomnia among working-aged women and men. In a recent US laboratory study, a statistically non-significant association between obesity and persistent insomnia was suggested, while a strong association between obesity and partially remitted insomnia was found in a 7.5-year follow-up [5]. A Canadian study with a one-year follow-up focused on mean body mass index (BMI) and other health-related determinants of insomnia incidence among initially good sleepers [2]. No association between mean BMI and incident insomnia symptoms could be confirmed. As the study included only good sleepers at baseline, persistent insomnia symptoms and changes in insomnia could not be examined. Detailed analyses of different BMI groups were not included in either of these previous studies [2,5], and it remained open whether associations could be found among overweight and obese people, whether there is a gradient in the associations, and whether the associations

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are similar between women and men. Another study focused on the association of baseline relative weight and incident and persistent insomnia among elderly Nigerian women and men [17]. Although the prevalence and determinants of obesity, as well as the consequences of obesity, likely differ in elderly populations, there was a tendency among the obese to report persistent insomnia over the follow-up. Two recent studies have also examined the contribution of body weight to incident and persistent insomnia symptoms and chronic insomnia in a general population [4,8]. Obesity was suggested to be a risk factor for chronic insomnia [4]. Additionally, obesity has been found to be an independent risk factor for incidence of insomnia symptoms [8]. In sum, prior studies are different with regard to study designs, insomnia measures, and classification of weight. Additionally, evidence is lacking for women and men, as well as for covariates such as sociodemographic and health related factors that can be assumed to shape the associations between relative weight and insomnia [18–21]. Most studies have also been conducted among elderly populations or relative weight has not been the main focus.

We first aimed to examine the associations of relative weight with changes over time in insomnia symptoms among middle-aged women and men. Second, we aimed to examine whether key covariates including sociodemographic factors, health behaviours, mental and physical health, and employment status contribute to the examined associations. This was done as it was hypothesized that these covariates contribute to the associations found between relative weight and changes in insomnia symptoms, e.g., through shared morbidities.

2. Methods

2.1. Data

The Helsinki Health Study cohort data were used, including baseline (2000–2002, $n = 8960$, response rate 67%) and follow-up (2007, $n = 7332$, response rate 83%) postal surveys among 40- to 60-year-old employees of the City of Helsinki, Finland [22]. Respondents were mostly women (80%), corresponding to the gender distribution among middle-aged employees of the City of Helsinki and the public sector in general. At baseline all participants were employed, and 71% were continuously employed at follow-up. Our non-response analyses suggest that the baseline data broadly represent the target population, with men, younger participants, and those in lower socioeconomic positions or with long sickness absence spells being slightly less likely to participate in the surveys [22–24]. Further attrition analyses suggest that baseline working conditions and health status were mostly similar among respondents and non-respondents, but male manual workers were slightly less likely to respond to the follow-up survey [22].

Ethical approvals for the Helsinki Health Study were received from the Department of Public Health, University of Helsinki, and the City of Helsinki, Finland.

2.2. Measures

2.2.1. Insomnia symptoms

Insomnia symptoms were measured by the Jenkins sleep questionnaire [2] both at baseline and follow-up. The questionnaire covered difficulties initiating and maintaining sleep as well as non-restorative sleep. The respondents were asked whether they had had such symptoms during the previous four weeks. There were six response alternatives: not at all (1), 1–3 days (2), 4–7 days (3), 8–14 days (4), 15–21 days (5) and 22–28 days (6). To examine persistence and changes in insomnia symptoms, we used responses to both surveys. Reporting any insomnia symptoms occurring for 15–28 days during the previous four weeks was categorised as frequent insomnia symptoms, whereas reporting any insomnia symptoms for 4–14 days during the previous four weeks was categorised as occasional insomnia symptoms. Those who did not report any insomnia symptoms either at baseline or follow-up, or only had such symptoms very rarely (1–3 days), formed the reference category.

Persistent insomnia symptoms were categorised into two groups. Those who reported frequent insomnia symptoms at baseline and at follow-up were classified as having persistent frequent insomnia, whereas those who reported occasional insomnia symptoms at both time points were classified as having persistent occasional insomnia. Participants whose insomnia symptoms emerged from none to occasional or frequent over the follow-up were classified as having incident insomnia symptoms. Those whose insomnia symptoms became more severe from occasional to frequent over the follow-up were classified as having increased insomnia symptoms. In turn, declining insomnia symptoms during the follow-up were categorised into two groups: partial or full remittance of insomnia symptoms. Most participants with insomnia symptoms at baseline reported at least occasional symptoms at follow-up, while frequent insomnia symptoms were unlikely to be fully remitted over the follow-up (3.2% of women and 2.6% of men). Corresponding classifications and terminology have also been previously applied [3,6,7,26].

2.2.2. Body mass index

Body mass index (BMI) was calculated based on self-reported weight and height at baseline (kg/m^2). Underweight (BMI less than 20), overweight (BMI 25–29.9), obese (BMI 30–34.9) and severely obese (BMI 35 or more) participants were compared with normal-weight participants (BMI 20–24.9).

2.2.3. Covariates

Sociodemographic factors, health behaviours, common mental disorders and physical health at baseline, and employment status at follow-up, were included as covariates. Marital status was classified into single, married or cohabiting, and divorced or widowed. Four occupational classes were distinguished: manual workers, routine non-manual employees, semi-professionals, and professionals and managers. Alcohol consumption was based on reported units of beer, wine and spirits during an average week. These were summed up and divided into non-drinkers, less than four units a week, 4–16 units a week, and 16 or more units a week. The classification has been used in previous studies and was based on the Finnish Current Care Guidelines [27,28]. Leisure-time physical activity was examined by using reported amount and intensity of activities such as walking, jogging and the like transformed to metabolic equivalent task (MET) [29]. Those with an MET value of 30 or more were categorised as physically active. Others served as a reference group. Common mental disorders were examined by the General Health Questionnaire (GHQ-12), which measures mainly non-psychotic, context-free, affective mental ill health, but is also indicative of more severe mental disorders. For the 12 items of the GHQ, a cut-off point of three or more was used to indicate common mental disorders, as suggested in earlier work [30,31]. Physical health was assessed based on self-reported doctor-diagnosed diabetes and cardiovascular diseases (angina pectoris, claudication, stroke, other CVD). Employment status at follow-up was included to distinguish between those who were continuously employed, retired, unemployed or otherwise non-employed at follow-up. Further details of these covariates can be found in our previous reports [16,32,33].