Article

Journal of Aging and Health
1–23

DOI: 10.1177/0898264317696775
journals.sagepub.com/home/jah
SAGE

Medicalization of Sleep Problems in an Aging Population: A Longitudinal Cross-National Study of Medication Use for Sleep Problems in Older European Adults

Vera van de Straat, MSc[1], Veerle Buffel, PhD[1], and Piet Bracke, PhD[1]

Abstract

Objective: The association between age and sleep problems is considered to be positive, and medication use is a common health care intervention among older individuals. Because daytime consequences are often stated as a reason to seek care, we study to what extent the medicalization of sleep problems is found in an aging European population, with a focus on daily activities. **Method:** Data from the Survey of Health Ageing and Retirement in Europe are used in three-level, generalized linear mixed models. Medicalization is operationalized as the use of medication for sleep problems at least once per week. **Results**: Men are more likely than women to use medication for sleep problems, and the process of aging is associated with a decrease in medicalization. **Discussion:** Sleep problems seem to be medicalized particularly when they prevent aging individuals from engaging in

[1]Ghent University, Belgium

Corresponding Author:
Vera van de Straat, Health and Demographic Research, Department of Sociology, Ghent University, Korte Meer 5, 9000 Ghent, Belgium.
Email: Vera.vandeStraat@UGent.be

work-related responsibilities, as medication is especially used by employed individuals with sleep problems.

Keywords
sleep problems, medicalization, older adults, longitudinal analysis, SHARE

Introduction

Getting enough sleep is vital for daily functioning, health, and well-being (Ailshire & Burgard, 2012; Arber, Hislop, & Williams, 2007). Accordingly, dealing with sleep sensibly has increasingly become a personal responsibility (Williams, Coveney, & Gabe, 2013). This individualization of sleep problems, combined with an increase in both scientific and media attention paid to sleep problems and how poor sleep may jeopardize our health and affect our lives, has created the opportunity for the medicalization of sleep (Seale, Boden, Williams, Lowe, & Steinberg, 2007). Another potential trigger for the medicalization of sleep is the rapid development of sleep medicines, and the accompanying increased availability of such medication together with sleep aids (Venn, Meadows, & Arber, 2013; Williams, 2005).

Medicalization in general describes how normal biological processes, behavior differing from the norm, and natural life events—none of which are self-evidently medical in nature—become defined and treated as medical problems (Conrad, 1992). As sleep is both a biological and a physiological process, it has always had the potential to be medicalized (Hislop & Arber, 2003) and to be studied in terms of a medicalized problem accordingly. Given that the prescription of sleep medication is considered an important indicator of the medicalization of sleep (Hislop & Arber, 2003), we focus on medication use for sleep problems.

Because previous research has concluded the consumption of psychotropic medication to be higher among women than men (Colman, Croudace, Wadsworth, & Jones, 2008; Ohayon, Caulet, Priest, & Guilleminault, 1998), and men and women are found to react to poor sleep in different ways (Venn et al., 2013), we also examine gender differences. Nevertheless, our focus in this study is on the effects of aging, because sleep problems are widely recognized to be positively associated with age (Fok, Stewart, Besset, Ritchie, & Prince, 2010). Previous studies show that older people are more likely to experience an increase in sleep latency, a reduction in sleep efficiency, and frequent awakenings that are followed by greater

difficulty in falling asleep again (Asplund, 1999; Vitiello, Larsen, & Moe, 2004). The prescription and use of medication is the most common health care intervention among older patients (Avorn, 2010), an intervention that is also often applied to older people experiencing sleep problems (Ancoli-Israel, 2005; Montgomery & Dennis, 2004). In the older population, however, the use of benzodiazepine—the most commonly prescribed drug for sleep problems—poses risks, such as cognitive impairment (de Gage et al., 2012), increased possibilities of falls and hip fractures (Wagner et al., 2004), reduced mobility, and impairment of driving skills (Madhusoodanan & Bogunovic, 2004; Smink, Egberts, Lusthof, Uges, & de Gier, 2010). With the sharp rise in the aging population, sleep problems can be expected to become more prevalent in society. If medication use increases accordingly, the aforementioned side effects may also become more problematic, making aging individuals an interesting study population. Care is often sought due to the daytime consequences of experiencing sleep problems (Morin, LeBlanc, Daley, Gregoire, & Mérette, 2006), which is why we expect active aging to be associated with an increased medicalization of sleep problems. Therefore, we pay specific attention to people's daily activities. As sleep can be regarded as a behavior, it will be influenced by values and practices (Knutson, 2013) and subjective reports of sleep disturbance may reflect how people from different countries react to complaining about sleep (Dregan & Armstrong, 2011). If values and practices do influence the likelihood to complain about sleep, they are likely to influence the likelihood to medicalize sleep as well. Therefore, we will take into account that our sample consists of older adults from 18 different European countries.

In this study, we aim to explore whether medicalization is more pronounced among women than men, and to what extent the process of aging—focusing specifically on active aging—is related to an increase or a decrease in the medicalization of sleep problems in the European population above the age of 50.

Medicalization and the Medicalization of Sleep

In the process of medicalization, normal biological processes or behaviors come to be described, accepted, and/or treated as medical problems (Conrad, 1992). Over the last decade, attention has shifted from general life expectancy and aging toward healthy life expectancy and "successful" aging (Bowling & Dieppe, 2005; Salomon et al., 2012). Moreover, these goals are inextricably related to personal responsibility (Bendelow, 2011). Consumers'

health knowledge and literacy have been substantially enriched, and the availability of new types of medication keeps on growing. These trends have led to a lower tolerance of health problems and discomfort (Conrad, 2005; Zheng, 2015), which may strengthen the demand for medical solutions. Conrad and Leiter (2004) state that common problems in everyday life that are located on the margins of medicine, such as sleep problems, hold the greatest potential for medicalization.

The medicalization perspective has sound theoretical foundations (Conrad, 1992; Conrad & Leiter, 2004), but existing literature mostly consists of qualitative studies that focus on the meanings, concepts, experiences, and interpretations of the medicalization of sleep, and how the media can play a role in their construction (see, for example, Hislop & Arber, 2003; Seale et al., 2007; Venn et al., 2013; Williams et al., 2013). Although this approach has produced valuable contributions, several researchers have recently accentuated the lack of empirical measurements as a limitation of literature concerning medicalization (Buffel, Dereuddre, & Bracke, 2015; Christiaens & Bracke, 2014; Moloney, Konrad, & Zimmer, 2011; Olafsdottir, 2007; Zheng, 2011). Previous researchers who have tried to assess the degree of medicalization have used aggregated measurements, such as medication prescriptions and hospital bed use (Moloney et al., 2011; Olafsdottir, 2011; Zheng, 2011), but these methods are exposed to the risk of an ecological fallacy. In line with Christiaens and Bracke (2014) and Buffel and colleagues (2015), who studied, respectively, the medicalization of work–family conflict and of unemployment, we believe that medicalization should be observed at the individual level through the health behavior of people. Accordingly, in this study, the consumption of medication for sleep problems is used as an indicator of medicalization, because the use of medication can be seen as the result of an evaluation of the need to manage sleep to ensure daily roles and responsibilities can be performed (Hislop & Arber, 2003).

Gender, Aging, and the Medicalization of Sleep

Because sleep is equally present in the lives of men and women, and the occasional inability to sleep is part of the universal human experience (Moloney et al., 2011), this topic is particularly interesting with regard to addressing gender differences in medicalization. Empirical studies consistently find a higher prevalence of sleep problems among women than among men (Arber, Bote, & Meadows, 2009; Fok et al., 2010; Haaramo, Lallukka, Lahelma, Hublin, & Rahkonen, 2014; Hale, Peppard, & Young, 2007;

Morlock, Tan, & Mitchell, 2006; van de Straat & Bracke, 2015; Yoshioka et al., 2012). In line with women's higher prevalence of sleep problems, they are also reported to use more medication (Morlock et al., 2006; Neutel & Patten, 2009; Rasu, Shenolikar, Nahata, & Balkrishnan, 2005). Nevertheless, it remains unclear whether women's higher consumption of sleep medication is a reflection of the greater prevalence of sleep problems among them or that they truly are more prone to medicalize sleep problems than men.

Women are generally perceived as being more likely to have problematic experiences defined and treated medically (Riessman, 1983). They label problems and discomfort as healthrelated more easily and are more likely to accept mental health services (Catalano, Dooley, & Jackson, 1985). By comparison, men instead neglect their problems or ascribe them to "external factors," such as work stress. In addition, women tend to be the primary carers in the family (Bracke, Christiaens, & Wauterickx, 2008) and, thus, have a greater involvement with health matters (O'Brien, Hunt, & Hart, 2005). The use of medical treatment may be a more common coping mechanism among women, because society gives women more freedom to express feelings, perceive emotional problems, be tired, and seek medical care (Shofield, Connell, Walker, Wood, & Butland, 2000). This leads us to expect a higher likelihood of medicalization among women than among men.

Hypothesis 1: We expect women to be more likely than men to medicalize their sleep problems.

Aging is considered to be positively associated with sleep problems (Ancoli-Israel, 2005), and in many ways, the ability to sleep diminishes with age (Ancoli-Israel, 1997). The idea that older people are more likely to experience sleep problems turns out to be so common in the population that many older adults admit they expect poor sleep to be part of the aging process (Venn et al., 2013). When the social norms theory is applied to the medicalization of sleep problems in an aging population (Berkowitz, 2003), we could expect that aging individuals who regard poor sleep as an inconvenience everyone experiences might refrain from expressing their own discomfort with sleep problems. Because poor sleep needs to become described, accepted, or treated as a medical problem to be able to speak of a process of medicalization (Conrad, 1992), we hypothesize that through aging, individuals will become less likely to medicalize their sleep problems.

Hypothesis 2a: Through the process of aging, individuals become less likely to medicalize their sleep problems.

Although older people recognize that their sleep changes with age and some of them expect a negative change in nighttime sleep (Venn et al., 2013), research concerning daytime sleep and active aging shows that older people often resist signifiers of aging related to sleep, such as more frequent visits to the toilet during the night and napping during the day, because it implies they have to acknowledge that they are aging (Venn & Arber, 2011). Moreover, poor sleep results in a reduction in activity and in the ability to accomplish routine tasks during the day (Roth & Ancoli-Israel, 1999). In the case of employment, higher rates of absenteeism and diminished job performance are repeatedly found to be associated with persistent sleep disturbance (Roth, 2007; Roth & Roehrs, 2003). Because older individuals find it particularly important to remain active (Venn & Arber, 2011), sleep problems pose a threat to this by reducing the ability to concentrate and perform tasks.

Perceived daytime consequences are the most commonly cited reasons to seek care for sleep problems (Morin et al., 2006) and to manage sleep through the use of medication (Ancoli-Israel, 2005; Hislop & Arber, 2003). Therefore, we expect that people who have work-related or nonwork-related activities during the day are more likely to medicalize their sleep problems.

Hypothesis 2b: Aging individuals are more likely to medicalize their sleep problems if they are active during the day, both in terms of work-related activity and nonwork-related activity.

Method

Data

In this study, we use data from the Survey of Health Ageing and Retirement in Europe (SHARE). This cross-national panel study focuses on a representative sample of the noninstitutionalized population above the age of 50. Data collection started in 2004/2005 and has subsequently been repeated every 2 years. We use data from Wave 1 and Wave 2 (release 2.6.0), and Wave 4 (release 1.1.1). Because Wave 3 consists of retrospective data, and is not part of the panel study, and in Wave 5, the SHARE questionnaire no longer contained the question concerning sleep problems, we could not include these.

The surveys were conducted in the respondents' home using computer-assisted personal interviewing (CAPI). A more detailed description of the study design and methodology can be found in the reports written by the SHARE coordination team (Börsch-Supan et al., 2013; Börsch-Supan &

Jürges, 2005; Malter & Börsch-Supan, 2013). Because none of the included variables contain more than 5% missing values across waves, all the cases with missing values are excluded from the sample. Due to the longitudinal design, however, omitting these cases does not necessarily mean that these respondents are omitted from the analyses. In the final analyses, data are used from 111,066 person-periods nested in 76,622 individuals from 18 countries.

Measurements

Medication use for sleep problems was constructed from a question about the medication respondents were taking at least once a week for 14 problems listed on a card. From this question, a dummy variable was created regarding whether (1 = *yes*, 0 = *no*) a respondent was taking medication for sleep problems at least once a week. *Sleep problems* were measured similarly, as part of a list of 11 health conditions people may have been disturbed by for at least the 6 months prior to the survey. Respondents who reported having been troubled by sleep problems in this period were coded 1, whereas those who had not were coded 0.

Gender, age, aging, and daily activity are central variables in our models. For *gender*, men form the reference category. *Age* is included as a metric variable for both *age* and *aging*. By including both variables, the cross-sectional age effect—measured as the age at first participation—could be separated from the longitudinal effect of aging by means of a time-dependent age variable that captures the process of growing older. Both variables are grand mean centered. Sensitivity analyses were performed and confirm that the effects of the two age variables are neither quadratic nor cubic (results not shown). To capture *daily activity*, or tasks and commitments people had during the day, respondents were asked for their employment situation, and whether they had carried out voluntary or charity work; attended an educational or training course; gone to a sports, social, or other type of club; taken part in a religious organization; and/or been involved in a political or community-related organization. From these two variables, we created one variable with the following categories: (a) employed, (b) nonemployed but socially active—when respondents had been involved in at least one of the activities mentioned, and (c) nonemployed and nonactive.

In addition, several control variables are included in the models. The highest educational level obtained measures *educational attainment*. The answer categories are no education, primary education, or first stage of basic education (International Standard Classification of Education [ISCED]0-1); lower secondary or second stage of basic education (ISCED2); upper secondary

education (ISCED3); postsecondary, nontertiary education (ISCED4); and tertiary education (ISCED5-6). The categories were derived from the ISCED from 1997 (UNESCO, 2006). The category capturing ISCED5-6 is used as the reference category.

Educational attainment is assumed to be constant over time, whereas the other control variables are all included as time-dependent covariates. *Marital status* was constructed through a combination of marital status and partner status, resulting in the following five categories: (a) married or in a registered partnership (reference category); (b) separated or divorced; (c) widowed; (d) separated, divorced, or widowed with a new partner; and (e) never married.

The *household net worth* is included as a measurement of the financial situation of the respondents. This variable incorporates the sum of the real assets, net of any debts, and the net financial assets of the household, and was created by SHARE using a multiple imputation procedure (Christellis, 2011). The scores were divided by 1,000,000 to enlarge unstandardized parameter estimates.

In line with Haaramo et al. (2014), a measurement indicating a history of depression, as well as two measurements of previous care use, are taken into account, because these researchers found the adjustment for these variables to have strong effects on the associations between insomnia symptoms and subsequent medication use. We believe these associations can be seen as an indication of a process of social learning regarding care seeking and medicalization. *History of depression* is captured by the question, "Has there been a time or times in your life when you suffered from symptoms of depression which lasted at least two weeks?" Respondents were divided into two categories based on whether (1 = *yes*, 0 = *no*) they had previously suffered from symptoms of depression. Following on from this question, people were also asked whether they had a *history of treatment for depression*. Finally, to take into account respondents' *tendency to seek care*, we added a numeric variable concerning the number of times a doctor was visited in the year prior to the survey.

Analysis

MLwiN version 2.34 was used to estimate three-level generalized linear models. In the three-level model, countries are located at the third level, individuals at the second level, and period at the first level. The country level is included to control for individuals being nested within countries. Gender, age, aging, daily activity, and sleep problems were included in the first model. In addition, five models were estimated with interaction effects between gender and sleep problems (Model 2), age and sleep problems (Model 3), aging and

sleep problems (Model 4), daily activity and sleep problems (Model 5), and aging, daily activity, and sleep problems (Model 6). Because MLwiN does not provide measurements of model fit, all the models were reestimated using R. By doing this, we were able to establish that Models 2, 3, 4, and 5, which are nested within Model 1, fit the data significantly better than Model 1 and Model 6. Therefore, in Table 2 only Models 1 to 5 are reported.

As described above, all the models were controlled for educational attainment, marital status, household net worth, history of depression, history of treatment for depression, and tendency to seek care. Random effects models were estimated for all variables, but only the random intercepts turned out to be significant. When random effects are not significant, a model without these effects fits the data better, so we chose to report the simplified model without random slopes in Table 2. Because of the multiple imputation procedure for household net worth, all the models were estimated five times and the parameters were averaged across estimations. The "Rubin rules" were used to calculate the standard errors (Royston, 2004; Rubin, 1987). In addition, we used y-standardization to make odds ratios (ORs) comparable across the different models (Mood, 2010).

Several sensitivity analyses were performed. First, we selected those who reported sleep problems and estimated our models. No notable differences were found. Some countries are only included in the final wave, which is why we ran a jackknife test excluding every country once. The jackknife test confirms that none of the countries influences the analyses too strongly. Finally, we controlled our models for two variables indicating migratory status, dividing nonmigrants and first-generation migrants, as well as non-migrants, European migrants, and non-European migrants; this did not lead to differences in the results either.

Results

The descriptive statistics of the most important variables in our analyses are shown in Table 1. In all three waves, the sample consists of approximately 55% women and 45% men, with an average age of 64 at first participation. The percentage of employed people decreased from 28.9% to 26.2% over time, as could be expected in an aging population. Nevertheless, an increasing number of the nonemployed individuals reported being socially active. In Wave 1, 25.3% of the sample reported being nonemployed but socially active, whereas this percentage was 30.6% in Wave 4. Over time, the percentage of respondents who used medication for sleep problems increased slightly, and the prevalence of sleep problems increased from approximately one in five (19.5%) in Wave 1 to almost one in four (24.3%) in Wave 4.

Table 1. Descriptive Statistics of Most Important Variables ($N_{wave\ 1}$ = 29,584; $N_{wave\ 2}$ = 35,285; $N_{wave\ 4}$ = 56,364).

	Wave 1	Wave 2	Wave 4
	M (*SD*)	*M* (*SD*)	*M* (*SD*)
Age	64.797 (10.105)	64.236 (9.842)	64.337 (9.746)
Aging	64.797 (10.105)	65.696 (9.938)	66.317 (9.941)
	%	%	%
Medication use for sleep problems			
No medication	91.4	91.3	90.6
Medication	8.6	8.7	9.4
Sleep problems			
Not reported	80.5	79.2	75.7
Reported	19.5	20.8	24.3
Gender			
Male	45.7	45.6	44.4
Female	54.3	54.4	55.6
Daily activity			
Employed	28.9	28.0	26.2
Nonemployed, but socially active	25.3	25.5	30.6
Nonemployed, not socially active	45.8	46.5	43.3

Before adding any of the variables to the models, the variance decomposition of the null model (not shown) was calculated for both the country level and the individual level. Based on the standard logistic distribution with a fixed variance of 3.29 that is assumed in logistic regression (Mood, 2010), the variance partition coefficient (VPC) for the country level was found to be 0.196 / (0.196 + 3.29) = 0.056. This means that 5.6% of the medication use for sleep problems in the total sample is influenced by the country of residence. A much larger proportion of the variation in medication use for sleep problems is located at the individual level, the second level in the models, with a VPC of 0.402. Throughout the models, the random intercepts remain significant for both levels.

Table 2 shows the results of the three-level generalized linear models. In Model 1, gender, age, aging, daily activity, and sleep problems—as well as the control variables—are included. Models 2 to 5 in Table 2 show the different interaction effects included one by one. To clarify the interpretation of the interaction effects, Table 3 shows only the main effects and interaction effects for Models 2 to 5, controlled for all the variables as shown in Table 2.

First, we should note that an OR of 4.001 was found for the association between the experience of sleep problems and medication use. As could be

expected, the experience of sleep problems increased the likelihood of taking medication for these problems. Before we turn to the effects of the other key variables, the effects of the control variables in Model 1 are described briefly. We find that separated or divorced people (OR = 1.157), widowed people (OR = 1.107), and people who never married (OR = 1.094) are more likely to take medication for sleep problems compared with married individuals. Those who had found a new partner do not differ from married individuals. The variables related to care-seeking behavior show that those with a history of depression (OR = 1.215) and those with a history of treatment for depression (OR = 1.460) more often reported using medication for sleep problems. Furthermore, it is found that a higher tendency to seek care is positively associated with medication use for sleep problems (OR = 1.012). No differences in medication use for sleep problems are found for household net worth or for different levels of educational attainment in any of the models.

As can be seen in Model 1 in Table 2, women were more likely to take medication for sleep problems than men (OR = 1.155). When the interaction effect between gender and sleep problems was included in Model 2, an OR of 4.494 was found for men with sleep problems. For women with sleep problems an OR of $4.494 \times 0.821 = 3.690$ was found. This observation suggests that although women seem to be more likely to take sleep medication than men, men are more likely to use medication when the reported presence of sleep problems is taken into account. This contradicts Hypothesis 1.

The effect of age was estimated using two variables to separate age from aging. Age at first participation was included to study the cross-sectional effect of age, and a longitudinal age variable was added to study the effect of aging. Model 1 shows a negative association between age and medication use for sleep problems (OR = 0.991). In Model 3, the interaction between age and sleep problems was introduced, which reveals that this negative association only exists for individuals with sleep problems. Individuals with a mean age of approximately 64.5 years who experienced sleep problems are more likely to take medication ($OR_{\text{sleep problems}} = 4.099$), but the association attenuates with age ($OR_{\text{Sleep problems} \times \text{Age}} = 0.993$). This means that the OR of taking medication is $4.099 \times 0.993 = 4.070$ for a 65.5-year-old individual with sleep problems, and 3.982 for someone at the age of 68.5. However, it must be noted that we cannot be sure whether this association is entirely due to the age of the individual, as it could also be an effect of birth cohort.

Although a negative association is found for age, medication use for sleep problems turns out to be positively associated with aging (OR = 1.029). These findings suggest that although older people generally tend to be less likely to use medication for sleep problems, the process of growing older does seem to increase the likelihood of medication use for troubled sleep among some

Table 2. Medication Use for Sleep Problems Regressed on Gender, Age, Aging, Daily Activity, and Sleep Problems in a European Population of Older Adults ($N_{country}$ = 18; $N_{individuals}$ = 76,622; N_{wave} = 111,066).

	Model 1	Model 2	Model 3	Model 4	Model 5
	OR	OR	OR	OR	OR
Fixed effects					
Intercept	0.115***	0.107***	0.113***	0.113***	0.118***
Gender (ref. = male)	1.155***	1.308***	1.155***	1.155***	1.154***
Age (grand mean centered)	0.991**	0.991**	0.996	0.991**	0.991**
Aging (grand mean centered)	1.029***	1.029***	1.029***	1.034***	1.029***
Daily activity (ref. = nonemployed + not socially active)					
Employed	0.778***	0.780***	0.778***	0.778***	0.710***
Nonemployed + socially active	0.894***	0.895***	0.895***	0.895***	0.872***
Sleep problems (ref. = not reported)	4.001***	4.494***	4.099***	4.108***	3.859***
Control variables					
Marital status (ref. = married/registered partnership)					
Separated or divorced	1.157***	1.156***	1.155***	1.155***	1.157***
Widowed	1.107***	1.105***	1.106***	1.106***	1.107***
Separated/divorced/widowed—with new partner	1.019	1.018	1.018	1.017	1.019
Never married	1.094**	1.089*	1.093**	1.093**	1.094**
Educational attainment (ref. = ISCED5-6)					
No education/primary or first stage of basic education (ISCED01)	1.030	1.030	1.029	1.029	1.030
Lower secondary or second stage of basic education (ISCED2)	1.044	1.043	1.043	1.043	1.044
Upper secondary/postsecondary nontertiary education (ISCED34)	0.997	0.997	0.995	0.995	0.997

(continued)

Table 2. (continued)

	Model 1	Model 2	Model 3	Model 4	Model 5
	OR	OR	OR	OR	OR
Household net worth	0.990	0.991	0.990	0.990	0.990
History of depression (ref. = no)	1.215***	1.214***	1.213***	1.212***	1.214***
History of treatment for depression (ref. = no)	1.460***	1.460***	1.457***	1.456***	1.459***
Number of doctor visits in the past year	1.012***	1.012***	1.012***	1.012***	1.012***
Interaction effects					
Sleep problems × gender (ref. = No sleep problems × male)		0.821***			
Sleep problems × age			0.993***		
Sleep problems × aging				0.993***	
Sleep problems × daily activity (ref. = no sleep problems × nonemployed + not socially active)					
Sleep problems × employed					1.149**
Sleep problems × nonemployed + socially active					1.041
Random effects					
Level: country					
Intercept	1.079	1.079	1.073	1.078	1.079
VPC	0.023	0.023	0.023	0.022	0.022
Level: individual					
Intercept	1.726	1.709	1.702	1.701	1.710
VPC	0.190	0.142	0.140	0.139	0.139

Note. OR = odds ratio; ISCED = International Standard Classification of Education; VPC = variance partition coefficient.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 3. Interactions From Models 2-5 of Table 2 on the Total Sample ($N_{country}$ = 18; $N_{individuals}$ = 76,622; N_{wave} = 111,066).

	Models 2-5[a]
	OR
Model 2: Gender (ref. = male)	
Intercept	0.107***
Female	1.308***
Sleep problems	4.494***
Sleep problems × female	0.821***
Model 3: Age	
Intercept	0.113***
Age (grand mean centered)	0.996
Sleep problems	4.099***
Sleep problems × age (grand mean centered)	0.993***
Model 4: Aging	
Intercept	0.113***
Aging (grand mean centered)	1.034***
Sleep problems	4.108***
Sleep problems × aging (grand mean centered)	0.993***
Model 5: Daily activity (ref. = nonemployed + not socially active)	
Intercept	0.118***
Daily activity	
(Self-)employed	0.710***
Nonemployed + socially active	0.872***
Sleep problems	3.859***
Sleep problems × daily activity	
(Self-)employed	1.149**
Nonemployed + socially active	1.041

[a]Controlled for gender, age, aging, marital status, educational attainment, daily activity, household net worth, history of depression, history of treatment for depression, and tendency to seek care. Each model includes the same variables, only the interaction term differs. OR = odds ratio.
*$p < .05$. **$p < .01$. ***$p < .001$.

individuals. Model 4 shows that the process of aging is related to a higher likelihood of taking medication, irrespective of whether or not sleep problems were reported ($OR_{sleep\ problems} = 4.108$, $OR_{aging} = 1.034$). Furthermore, the relationship between sleep problems and the use of medication decreases as

people grow older ($OR_{Sleep\ problems \times Aging} = 0.993$). The OR for taking medication of an individual with sleep problems decreases from an initial 4.108 to 4.108 × 0.993 = 4.079, 1 year later, and 3.994, 4 years later. These results could be interpreted as a confirmation of the decrease in medicalization with aging we suggested in Hypothesis 2a.

Finally, being active compared with being inactive, both in terms of employment (OR = 0.778) and social activities (OR = 0.894), is found to be associated with a lower likelihood of taking medication for sleep problems. Nevertheless, when the reported presence of sleep problems is taken into account (Model 5), the likelihood of taking medication increases for employed individuals compared with those who are not employed and not socially active. For the inactive individuals, the OR for the association between sleep problems and medication use is 3.859. This association is multiplied by 1.149, resulting in an OR of 3.859 × 1.149 = 4.434 for employed individuals. If active individuals with sleep problems have a higher likelihood of taking medication than inactive individuals with sleep problems, this could mean that the medication may be used to cope with the daytime consequences of a lack of sleep. Medicalization could then be seen as a strategy used to be able to age actively. Our analyses show that this coping mechanism may be used by working individuals, which is in line with Hypothesis 2b, but it does not hold for individuals who are only socially active, as this group does not differ from the nonactive reference group.

Discussion

In this study, we focus on the medicalization of sleep problems in an aging European population using SHARE data from 2004 to 2011. The medicalization of sleep problems is quantified as the use of medication for sleep problems, which enables us to study the impact of individual characteristics on the medicalization of sleep. Based on existing literature, we expected to find more medicalization among women than among men, a decrease in medicalization with the process of aging and more medicalization among people who still have work-related or social activities with duties to perform during the day.

One of the key findings from our study deals with gender differences. The analyses show that when sleep problems are reported, women use less medication than men. This leads us to conclude that women are less likely to medicalize their sleep problems, which contradicts both our hypothesis and the general perception that women are more likely to have problems defined and treated medically (Riessman, 1983). Women have been consistently found to seek medical care more often than men (Bertakis, Azari, Helms, Callahan, &

Robbins, 2000; Buffel, Van de Velde, & Bracke, 2014), but after the initial barrier to seek and access care is crossed, it may well be that men accept the prescription and use of medication more easily than women. This assumption is in line with the results of Christiaens and Bracke (2014), who found that after contacting a general practitioner (GP) or specialist, men were more likely to take prescription medication than women. A similar pattern has been reported related to unemployment; after taking both mental health and care use into account, unemployed men used antidepressants more often, whereas this was not the case for unemployed women (Buffel et al., 2015). Furthermore, a previous qualitative study on sleep in older adults has already shown women to experiment more with self-help methods to cope with poor sleep compared with men (Venn et al., 2013). Hence, for future research, we suggest incorporating measurements capturing the use of alternative medicine or behavioral changes to further explore gender differences in coping with sleep problems, and medicalization in general.

From our study, we further conclude that although older adults generally are less likely to use medication for sleep problems, they become more likely to use medication as they age. Moreover, we believe the process of aging to be related to a decrease in the medicalization of sleep problems, because the association between sleep problems and medication use attenuates as people age. Venn et al. (2013) have previously described older men and women as resisting the medicalization of sleep. The older adults they studied did not consider sleep problems to be an illness; instead, poor sleep was expected as part of the normal process of aging. However, in line with research that reports daytime consequences to be important motives to seek care for sleep problems (Morin et al., 2006), we find aging individuals who are still employed to be more likely to medicalize their sleep problems than those who are neither employed nor socially active. Medicalization is no longer only an issue of care and cure but also a way to optimize daily active life (Clarke & Shim, 2011). From this, we conclude that sleep problems may be medicalized when they prevent people from fully participating in their work-related responsibilities during the day (Hislop & Arber, 2003). In our results, individuals who are nonemployed and socially active do not differ from those who are neither employed nor socially active. One reason for this might be that although social activities come with responsibilities, these are generally voluntary. Unlike work, which is arranged by fixed schedules and requires commitment to get paid and remain employed, voluntary activities can be planned or rescheduled in a flexible way. Consequently, troubled sleep and resulting tiredness are much more likely to affect productivity and the ability to engage in responsibilities in the case of work-related activities.

Several limitations regarding this study need to be mentioned. An important limitation of longitudinal data in general is the problem of dropout and missing data (Fitzmaurice, Laird, & Ware, 2011). The SHARE project uses refreshment samples in the follow-up waves to counterbalance dropout (Malter & Börsch-Supan, 2013). The use of refreshment samples, however, means that respondents who start participating in a later wave have missing data for previous waves. Moreover, missing data are especially problematic when the reason for dropping out is related to the subject of interest (Fitzmaurice et al., 2011), and we cannot be entirely sure whether this is the case here. Furthermore, as described in the "Data" section, we could not include the third wave of SHARE, which implies variation in time between the different follow-up studies. Data for Wave 1 and Wave 2 were collected 2 years apart, whereas there are approximately 4 years between the data collection for Wave 2 and Wave 4.

In this article, we measure the medicalization of sleep problems at the individual level by looking at the use of sleep medication related to reported sleep problems as an indicator of medicalization. As previously described, medicalization is a dynamic concept that is not easily defined or analyzed (Christiaens & van Teijlingen, 2009), which is why we need to acknowledge some potential problems with our operationalization. Although Hislop and Arber (2003) describe medication use for sleep problems as an indicator of the medicalization of sleep problems, they also discuss how nonprescription medications can be interpreted as an intermediate step between medicalization and personalized strategies to cope with sleep problems.

Our measurement both of sleep problems and of medication use for sleep problems are self-reported, and the latter does not discriminate between prescribed and over-the-counter medication, and it does not include the duration or doses of medication used. However, previous studies indicate that self-reported information on the frequency of care use is less reliable than merely distinguishing between users and nonusers (Alonso et al., 2004; Longobardi, Walker, Graff, & Bernstein, 2011). Moreover, relatively high correlations are found between self-reported and administrative data. Therefore, self-reports may provide useful general estimates when administrative data are not available (Longobardi et al., 2011). Nevertheless, in future studies, it would be useful to include administrative data to capture the associations with prescribed medication for sleep problems on an individual level. It must be noted, however, that a disadvantage of administrative data in turn is that the actual use of medication still remains unknown, and could be underestimated if nonprescribed medication is used.

A final issue related to the measurement of sleep problems and medication use is that although we use longitudinal data, we do not know exactly when the

sleep problems and use of medication started or whether sleep problems or medication use came first. In spite of this, we believe that most individuals who take medication for sleep problems will also report sleep problems, and by using a longitudinal design, we probably come to a conservative estimate of the relevance of the phenomenon of medicalization, as we consider the change in medication use given a change in the experience of sleep problems.

To conclude, this study shows that in a population of older European adults, women seem to be less likely to medicalize their sleep problems than men, and the medicalization of sleep problems decreases with the process of aging. Moreover, sleep problems appear to be medicalized particularly when they prevent people from fully engaging in their work-related responsibilities. Although our measurement of the medicalization of sleep has its drawbacks, it enables us to add an empirical quantitative study, based on an individual health outcome, to literature on the medicalization of sleep that mainly studies this subject on a conceptual level using a social–constructivist approach. This operationalization can be used in multilevel research that studies the impact of both individual and structural characteristics, and it creates opportunities to look at cross-country differences by including macro variables. For future studies, we believe it would be very interesting to see whether the likelihood to medicalize sleep problems varies across countries, and how structural characteristics, such as the number of GPs per 10,000 inhabitants, household out-of-pocket payments as a percentage of the total health expenditure, private/public health expenditure as a percentage of GDP, and the percentage of the population above the age of 65, might be associated with the medicalization of sleep. Because the preparations that are made before people go to bed, as well as practices regarding the timing, location, and the presence of other people in sleep are highly shaped by culture and society (Knutson, 2013; Schwartz, 1970; Williams, 2007), it would also be worthwhile to study how differences in sleep patterns, as a result of the siesta in Mediterranean countries and the long winter nights in the Northern European countries, for example, may shape the medicalization of sleep differently across Europe.

Acknowledgments

This article uses data from SHARE wave 4 release 1.1.1, as of March 28, 2013 (DOI: 10.6103/SHARE.w4.111), and SHARE Waves 1 and 2 release 2.6.0, as of November 29, 2013 (DOI: 10.6103/SHARE.w1.260 and 10.6103/SHARE.w2.260). The SHARE data collection has been primarily funded by the European Commission through the 5th Framework Programme (project QLK6-CT-2001-00360 in the thematic programme Quality of Life), through the 6th Framework Programme (projects SHARE-I3, RII-CT-2006-062193, COMPARE, CIT5- CT-2005-028857, and SHARELIFE, CIT4-CT-2006-028812), and through the 7th Framework Programme (SHARE-PREP,

N° 211909, SHARE-LEAP, N° 227822 and SHARE M4, N° 261982). Additional funding from the U.S. National Institute on Aging (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, R21 AG025169, Y1-AG-4553-01, IAG BSR06-11 and OGHA 04-064) and the German Ministry of Education and Research as well as from various national sources is gratefully acknowledged (see www.share-project.org for a full list of funding institutions).

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

Ailshire, J. A., & Burgard, S. A. (2012). Family relationships and troubled sleep among U.S. adults: Examining the influences of contact frequency and relationship quality. *Journal of Health and Social Behavior*, *53*(2), 248-262.

Alonso, J., Angermeyer, M. C., Bernert, S., Bruffaerts, R., Brugha, T. S., Bryson, H., . . . Vollebergh, W. A. M. (2004). Use of mental health services in Europe: Results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. *Acta psychiatrica Scandinavica*, *109*(Suppl. 420), 47-54.

Ancoli-Israel, S. (1997). Sleep problems in older adults: Putting myths to bed. *Geriatrics*, *52*(1), 20-30.

Ancoli-Israel, S. (2005). Sleep and aging: Prevalence of disturbed sleep and treatment considerations in older adults. *Journal of Clinical Psychiatry*, *66*(9), 24-30.

Arber, S., Bote, M., & Meadows, R. (2009). Gender and socio-economic patterning of self-reported sleep problems in Britain. *Social Science & Medicine*, *68*(2), 281-289.

Arber, S., Hislop, J., & Williams, S. J. (2007). Editors' introduction: Gender, sleep and the life course. *Sociological Research Online*, *12*(5), 19.

Asplund, R. (1999). Sleep disorders in the elderly. *Drugs & Aging*, *14*(2), 91-103.

Avorn, J. (2010). Medication use in older patients: Better policy could encourage better practice. *Journal of the American Medical Association*, *304*(14), 1606-1607.

Bendelow, G. (2011). Sociological aspects of the emotions. In D. Pilgrim, A. Rogers, & B. Pescosolido (Eds.), *The SAGE handbook of mental health and illness* (pp. 67-79). London, England: Sage.

Berkowitz, A. D. (2003). Applications of social norms theory to other health and social justice issues. In H. W. Perkins (Ed.), *The social norms approach to preventing school and college age substance abuse: A handbook for educators, counselors, and clinicians* (pp. 259-279). San Francisco, CA: Jossey-Bass.

Bertakis, K. D., Azari, R., Helms, L. J., Callahan, E. J., & Robbins, J. A. (2000). Gender differences in the utilization of health care services. *Journal of Family Practice*, *49*(2), 147-152.

Börsch-Supan, A., Brandt, M., Hunkler, C., Kneip, T., Korbmacher, J., Malter, F., . . . Zuber, S. (2013). Data resource profile: The Survey of Health, Ageing and Retirement in Europe (SHARE). *International Journal of Epidemiology*, *42*(4), 992-1001.

Börsch-Supan, A., & Jürges, H. (Eds.). (2005). *The survey of health, ageing and retirement in Europe: Methodology*. Mannheim, Germany: Mannheim Research Institute for the Economics of Ageing.

Bowling, A., & Dieppe, P. (2005). What is successful ageing and who should define it? *The BMJ*, *331*, 1548-1551.

Bracke, P., Christiaens, W., & Wauterickx, N. (2008). The pivotal role of women in informal care. *Journal of Family Issues*, *29*(10), 1348-1378.

Buffel, V., Dereuddre, R., & Bracke, P. (2015). Medicalization of the uncertainty? An empirical study of the relationships between unemployment or job insecurity, professional care seeking, and the consumption of antidepressants. *European Sociological Review*, *31*(4), 446-459.

Buffel, V., Van de Velde, S., & Bracke, P. (2014). Professional care seeking for mental health problems among women and men in Europe: The role of socio-economic, family-related and mental health status factors in explaining gender differences. *Social Psychiatry & Psychiatric Epidemiology*, *49*(10), 1641-1653.

Catalano, R. A., Dooley, D., & Jackson, R. L. (1985). Economic antecedents of help seeking: Reformulation of time-series tests. *Journal of Health and Social Behavior*, *26*(2), 141-152.

Christellis, D. (2011). *Imputations of missing data in wave 1 and 2 of SHARE* (SHARE Working Paper No. 01-2011). Mannheim, Germany: University of Mannheim.

Christiaens, W., & Bracke, P. (2014). Work-family conflict, health services and medication use among dual-income couples in Europe. *Sociology of Health & Illness*, *36*(3), 319-337.

Christiaens, W., & van Teijlingen, E. (2009). Four meanings of medicalization: Childbirth as a case study. *Salute e Società*, *8*, 123-141.

Clarke, A. E., & Shim, J. (2011). Medicalization and biomedicalization revisited: Technoscience and transformations of health, illness and American medicine. In B. A. Pescosolido, J. K. Martin, J. D. McLeod, & A. Rogers (Eds.), *Handbook of the sociology of health, illness, and healing* (pp. 173-199). New York, NY: Springer.

Colman, I., Croudace, T. J., Wadsworth, M. E. J., & Jones, P. B. (2008). Factors associated with antidepressant, anxiolytic and hypnotic use over 17 years in a national cohort. *Journal of Affective Disorders*, *110*(3), 234-240.

Conrad, P. (1992). Medicalization and social control. *Annual Review of Sociology*, *18*, 209-232.

Conrad, P. (2005). The shifting engines of medicalization. *Journal of Health and Social Behavior*, *46*(1), 3-14.

Conrad, P., & Leiter, V. (2004). Medicalization, markets and consumers. *Journal of Health and Social Behavior*, *45*, 158-176.

de Gage, S. B., Bégaud, B., Bazin, F., Verdoux, H., Dartigues, J.-F., Pérès, K., . . . Pariente, A. (2012). Benzodiazepine use and risk of dementia: Prospective population based study. *BMJ*, *345*, Article e6231.

Dregan, A., & Armstrong, D. (2011). Cross-country variation in sleep disturbance among working and older age groups: An analysis based on the European Social Survey. *International Psychogeriatrics*, *23*(9), 1413-1420.

Fitzmaurice, G. M., Laird, N. M., & Ware, J. H. (2011). *Applied longitudinal analysis* (2nd ed.). Hoboken, NJ: John Wiley.

Fok, M., Stewart, R., Besset, A., Ritchie, K., & Prince, M. (2010). Incidence and persistence of sleep complaints in a community older population. *International Journal of Geriatric Psychiatry*, *25*(1), 37-45.

Haaramo, P., Lallukka, T., Lahelma, E., Hublin, C., & Rahkonen, O. (2014). Insomnia symptoms and subsequent psychotropic medication: A register-linked study with 5-year follow-up. *Social Psychiatry & Psychiatric Epidemiology*, *49*(12), 1993-2002.

Hale, L., Peppard, P. E., & Young, T. (2007). Does the demography of sleep contribute to health disparities? In D. Leger & S. R. Pandi-Perumal (Eds.), *Sleep disorders: Their impact on public health* (pp. 1-17). Oxford, UK: Informa Health Care.

Hislop, J., & Arber, S. (2003). Understanding women's sleep management: Beyond medicalization-healthicization? *Sociology of Health & Illness*, *25*(7), 815-837.

Knutson, K. L. (2013). Sociodemographic and cultural determinants of sleep deficiency: Implications for cardiometabolic disease risk. *Social Science & Medicine*, *79*, 7-15.

Longobardi, T., Walker, J. R., Graff, L. A., & Bernstein, C. N. (2011). Health service utilization in IBD: Comparison of self-report and administrative data. *BMC Health Services Research, 11*, Article 137.

Madhusoodanan, S., & Bogunovic, O. J. (2004). Safety of benzodiazepines in the geriatric population. *Expert Opinion on Drug Safety*, *3*(5), 485-493.

Malter, F., & Börsch-Supan, A. (Eds.). (2013). *SHARE Wave 4: Innovations & methodology*. Munich, Germany: MEA, Max Planck Institute for Social Law and Social Policy.

Moloney, M. E., Konrad, T. R., & Zimmer, C. R. (2011). The medicalization of sleeplessness: A public health concern. *American Journal of Public Health*, *101*(8), 1429-1433.

Montgomery, P., & Dennis, J. (2004). A systematic review of non-pharmacological therapies for sleep problems in later life. *Sleep Medicine Reviews*, *8*(1), 47-62.

Mood, C. (2010). Logistic regression: Why we cannot do what we think we can do, and what we can do about it. *European Sociological Review*, *26*(1), 67-82.

Morin, C. M., LeBlanc, M., Daley, M., Gregoire, J. P., & Mérette, C. (2006). Epidemiology of insomnia: Prevalence, self-help treatments, consultations, and determinants of help-seeking behaviors. *Sleep Medicine*, *7*(2), 123-130.

Morlock, R. J., Tan, M., & Mitchell, D. Y. (2006). Patient characteristics and patterns of drug use for sleep complaints in the United States: Analysis of National

Ambulatory Medical Survey Data, 1997–2002. *Clinical Therapeutics*, *28*(7), 1044-1053.

Neutel, C. I., & Patten, S. B. (2009). Sleep medication use in Canadian seniors. *The Canadian Journal of Clinical Pharmacology*, *16*(3), 443-452.

O'Brien, R., Hunt, K., & Hart, G. (2005). "It's caveman stuff, but that is to a certain extent how guys still operate": Men's accounts of masculinity and help seeking. *Social Science & Medicine*, *61*(3), 503-516.

Ohayon, M. M., Caulet, M., Priest, R. G., & Guilleminault, C. (1998). Psychotropic medication consumption patterns in the UK general population. *Journal of Clinical Epidemiology*, *51*(3), 273-283.

Olafsdottir, S. (2007). *Medicalizing mental health: A comparative view of the public, private, and professional construction of mental illness* (Doctoral dissertation). Indiana University, Bloomington. (UMI No. 3278236)

Olafsdottir, S. (2011). Medicalization and mental health: The critique of medical expansion, and a consideration of how markets, national states, and citizens matter. In D. Pilgrim, A. Rogers, & B. Pescosolido (Eds.), *The SAGE handbook of mental health and illness* (pp. 239-260). London, England: Sage.

Rasu, R. S., Shenolikar, R. A., Nahata, M. C., & Balkrishnan, R. (2005). Physician and patient factors associated with the prescribing of medications for sleep difficulties that are associated with high abuse potential or are expensive: An analysis of data from the National Ambulatory Medical Care Survey for 1996–2001. *Clinical Therapeutics*, *27*(12), 1970-1979.

Riessman, C. K. (1983). Women and medicalization: A new perspective. *Social Policy*, *14*(1), 3-18.

Roth, T. (2007). Insomnia: Definition, prevalence, etiology, and consequences. *Journal of Clinical Sleep Medicine*, *3*(Suppl. 5), S7-S10.

Roth, T., & Ancoli-Israel, S. (1999). Daytime consequences and correlates of insomnia in the United States: Results of the 1991 National Sleep Foundation Survey II. *Sleep*, *22*(Suppl. 2), S354-S358.

Roth, T., & Roehrs, T. (2003). Insomnia: Epidemiology, characteristics, and consequences. *Clinical Cornerstone*, *5*(3), 5-15.

Royston, P. (2004). Multiple imputation of missing values. *The Stata Journal*, *4*(3), 227-241.

Rubin, D. B. (1987). *Multiple imputation for nonresponse in surveys*. New York, NY: John Wiley.

Salomon, J. A., Wang, H., Freemand, M. K., Vos, T., Flaxman, A. D., Lopez, A. D., & Murray, C. J. L. (2012). Healthy life expectancy for 187 countries, 1990-2010: A systematic analysis for the Global Burden Disease Study 2010. *The Lancet*, *380*(9859), 2144-2162.

Schwartz, B. (1970). Notes on the sociology of sleep. *The Sociological Quarterly*, *11*(4), 485-499.

Seale, C., Boden, S., Williams, S., Lowe, P., & Steinberg, D. (2007). Media constructions of sleep and sleep disorders: A study of UK national newspapers. *Social Science & Medicine*, *65*(3), 418-430.

Shofield, T., Connell, R. W., Walker, L., Wood, J. F., & Butland, D. L. (2000). Understanding men's health and illness: A gender-relations approach to policy, research, and practice. *Journal of American College Health*, *48*(6), 247-256.

Smink, B. E., Egberts, A. C. G., Lusthof, K. J., Uges, D. R. A., & de Gier, J. J. (2010). The relationship between benzodiazepine use and traffic accidents. *CNS Drugs*, *24*(8), 639-653.

UNESCO. (2006). *International Standard Classification of Education ISCED 1997*. Montréal, Canada: UNESCO Institute for Statistics.

van de Straat, V., & Bracke, P. (2015). How well does Europe sleep? A cross-national study of sleep problems in European older adults. *International Journal of Public Health*, *60*(6), 643-650.

Venn, S., & Arber, S. (2011). Day-time sleep and active ageing in later life. *Ageing & Society*, *31*(2), 197-216.

Venn, S., Meadows, R., & Arber, S. (2013). Gender differences in approaches to self-management of poor sleep in later life. *Social Science & Medicine*, *79*, 117-123.

Vitiello, M. V., Larsen, L. H., & Moe, K. E. (2004). Age-related sleep change: Gender and estrogen effects on the subjective–objective sleep quality relationships of healthy, noncomplaining older men and women. *Journal of Psychosomatic Research*, *56*(5), 503-510.

Wagner, A. K., Zhang, F., Soumerai, S. B., Walker, A. M., Gurwitz, J. H., Glynn, R. J., & Ross-Degnan, D. (2004). Benzodiazepine use and hip fractures in the elderly: Who is at greatest risk? *Archives of Internal Medicine*, *164*, 1567-1572.

Williams, S. J. (2005). *Sleep and society: Sociological ventures into the (un)known*. London, England: Routledge.

Williams, S. J. (2007). The social etiquette of sleep: Some sociological reflections and observations. *Sociology*, *41*(2), 313-328.

Williams, S. J., Coveney, C. M., & Gabe, J. (2013). Medicalisation or customisation? Sleep, enterprise and enhancement in the 24/7 society. *Social Science & Medicine*, *79*, 40-47.

Yoshioka, E., Saijo, Y., Kita, T., Satoh, H., Kawaharada, M., Fukui, T., & Kishi, R. (2012). Gender differences in insomnia and the role of paid work and family responsibilities. *Social Psychiatry & Psychiatric Epidemiology*, *47*(4), 651-662.

Zheng, H. (2011). *Medicalization as a rising rational myth: Health implications, reproduction and public response* (Doctoral dissertation, Duke University, Durham, NC). Retrieved from http://hdl.handle.net/10161/3947

Zheng, H. (2015). Why has medicine expanded? The role of consumers. *Social Science Research*, *52*, 34-46.