The Medicalization of Sleeplessness: A Public Health Concern

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Sleeplessness, a universal condition with diverse causes, may be increasingly diagnosed and treated (or medicalized) as insomnia. We examined the trend in sleeplessness complaints, diagnoses, and prescriptions of sedative hypnotics in physician office visits from 1993 to 2007. Consistent with the medicalization hypothesis, sleeplessness complaints and insomnia diagnoses increased over time and were far outpaced by prescriptions for sedative hypnotics. Insomnia may be a public health concern, but potential overtreatment with marginally effective, expensive medications with nontrivial side effects raises definite population health concerns. (*Am J Public Health.* 2011;101:1429–1433. doi:10.2105/AJPH.2010.300014)

The occasional inability to sleep, or sleeplessness, is part of the universal human experience and has been recorded by ancient and modern authors.[1–4] Recently, however, sleeplessness has been characterized as an epidemic[5] and an unmet public health problem.[6] Insomnia diagnoses in the United States, which appear to be increasing, are associated with poor health outcomes and may cost $100 billion annually in health services, accidents, and lost productivity.[7–9]

It is unclear, however, if the United States is facing a true insomnia epidemic or a surplus of diagnoses and drug prescriptions.[10] Sleep patterns are influenced by changing cultural norms, shifting demographics (adults ≥65 years are more likely to be sleepless[11]), and increased use of technology.[6,12,13] Awareness raised by public health and pharmaceutical agencies may facilitate new diagnoses.[14,15] Medicalization may also contribute to the increased perception, diagnosis, and treatment of sleeplessness as the medical condition insomnia.[3]

Medicalization is the process by which formerly normal biological processes or behaviors come to be described, accepted, or treated as medical problems.[16] The process is value neutral, but outcomes affect individual and public health.[16] Medicalization may raise awareness about and improve access to beneficial medical treatments for previously underrecognized disorders.[17] Conversely, it may reframe and transform ideas of physical and emotional normalcy prompting the overuse of potentially harmful drugs or surgery.[18,19] Excessive or inappropriate use of medical solutions to treat life problems may negatively affect public health.[10,17–19]

We explored the idea that the US epidemic of insomnia may be, in part, facilitated by medicalization. Explorations of medicalization are typically qualitative and focus on the conceptual nature of the disorder.[17] Sleep is no exception.[20–23] Our research is the first to our knowledge to focus on the measurable outcomes of the patient–physician interaction surrounding sleeplessness and the public health implications.

Using nationally representative office visit data we measured trends over time in (1) complaints of sleeplessness, (2) diagnoses of insomnia, and (3) prescriptions of sedative hypnotics. Medicalization theory predicts an increasing incidence of insomnia diagnoses and treatments over time that outpace sleeplessness complaints, particularly among younger adults.

METHODS

We used the National Ambulatory Medical Care Survey (NAMCS), an annual population-based, nationally representative survey of US office-based physician visits conducted by the National Center for Health Statistics (NCHS). The NAMCS provides information on private-pay and public-sector patients using a multistage geographically clustered probability sample of approximately 3000 randomly chosen physicians per year.[24]

The unit of analysis was the office visit. To maintain *International Classification of Diseases, Ninth Revision* (*ICD-9*)[25] code consistency for insomnia diagnosis and capture 1 year of data before the introduction of zolpidem, the first of the nonbenzodiazepine sedative hypnotics (NBSHs), we examined data from 1993 to 2007 for adults aged 18 years and older.

Key variables included the following:

- Sleeplessness as reason for office visit (complaints of "sleeplessness," "can't sleep," "trouble falling asleep" [NCHS code 1135.1]);
- Diagnoses of insomnia (*ICD-9* diagnosis codes 78052, 78050, 3074, 78059, 30742, 3074, 30748, 78056, 78055, 30741, 30742, 30749, 32700, and 32709);
- Prescription of benzodiazepines (estazolam, flurazepam, quazepam, temazepam, and triazolam) or NBSHs (zolpidem, zaleplon, eszopiclone, and ramelteon) indicated for insomnia.

We calculated means and 95% confidence intervals using SVY commands in Stata version 10 (StataCorp LP, College Station, TX), which adjust for the complex weighted design of NAMCS. We calculated rates per 10 000 visits for each type of event (complaint, diagnosis, and prescription) and age group (18–44, 45–64, and ≥65 years) and regressed on year using a bivariate linear model. The regression coefficients (slopes) represent the average annual increase in each type of event over the 15-year observation period. Because of small cell sizes, we combined data years into 5 blocks of 3-year increments when calculating outcomes by age groups.

RESULTS

Table 1 reveals that approximately 2.7 million adult office visits involved complaints of sleeplessness in 1993. By 2007, this figure had more than doubled to 5.7 million. During the same period, insomnia diagnoses increased more than 7-fold, from about 840 000 to 6.1 million. Approximately 2.5 million office visits in 1993 resulted in a prescription for a benzodiazepine, compared with 3.7 million in 2007. Prescriptions for NBSHs increased about 30-fold from 1994 (540 000 prescriptions) to 2007 (16.2 million).

We observed linear slopes over time for rates of sleeplessness complaints (b=203 712), insomnia diagnoses (b=301178), and prescriptions for benzodiazepines (b=113 624) and NBSHs (b=1029 827). Given the large sample size, all slopes were positive and

TABLE 1—National Estimates of Sleeplessness-Related Complaints, Diagnoses, and Prescriptions for Benzodiazepine and Nonbenzodiazepine Sedative Hypnotics as a Result of Physician Office Visits: United States, 1993–2007

Year	Total Visits (Total Weighted Estimates),	Sleeplessness Complaints, Estimated No. (95% CI),	Insomnia Diagnoses, Estimated No. (95% CI),	BDZ Prescriptions, Estimated No. (95% CI),	NBSH Prescriptions, Estimated No. (95% CI),
1993	35 978 (717.2)	2.7 (1.9, 3.5)	0.8 (0.4, 1.3)	2.5 (1.7, 3.4)	NA[a]
1994	33 598 (681.5)	2.9 (1.9, 3.9)	1.1 (0.7, 1.6)	2.0 (1.4, 2.6)	0.54 (0.3, 0.8)
1995	36 875 (697.1)	2.8 (2.0, 3.7)	1.4 (0.9, 1.9)	1.9 (1.3, 2.4)	1.1 (0.8, 1.5)
1996	29 805 (734.5)	3.2 (2.4, 4.0)	1.6 (1.0, 2.2)	1.9 (0.8, 3.0)	1.6 (1.0, 2.3)
1997	24 715 (787.4)	3.8 (2.7, 4.8)	2.3 (1.2, 3.4)	1.8 (1.2, 2.3)	2.1 (1.4, 2.7)
1998	23 339 (829.3)	3.7 (2.6, 4.8)	2.8 (1.5, 4.1)	2.2 (1.4, 3.0)	2.1 (1.4, 2.9)
1999	20 760 (756.7)	5.0 (3.2, 6.8)	2.3 (1.6, 3.1)	2.3 (1.4, 3.2)	2.4 (1.7, 3.2)
2000	27 369 (823.5)	5.1 (3.8, 6.4)	3.1 (2.0, 4.1)	2.2 (1.1, 3.2)	3.3 (2.2, 4.5)
2001	24 281 (880.5)	4.5 (3.1, 5.8)	2.7 (1.8, 3.7)	3.0 (2.0, 4.1)	4.8 (3.5, 6.1)
2002	28 738 (890.0)	4.4 (3.2, 5.6)	3.1 (2.0, 4.3)	1.9 (1.2, 2.6)	4.4 (3.3, 5.4)
2003	25 288 (906.0)	5.0 (3.7, 6.4)	3.6 (2.4, 4.7)	2.4 (1.5, 3.4)	6.3 (5.0, 7.6)
2004	25 286 (910.9)	5.0 (3.7, 6.4)	3.2 (1.9, 4.5)	3.0 (2.1, 4.0)	8.4 (6.3, 10.6)
2005	25 665 (963.6)	5.9 (4.4, 7.5)	4.2 (2.8, 5.5)	3.4 (2.2, 4.6)	12.3 (9.9, 14.7)
2006	29 392 (902.0)	4.4 (3.3, 5.5)	5.2 (3.7, 6.6)	3.5 (2.5, 4.5)	12.6 (10.5, 14.8)
2007	32 778 (994.3)	5.7 (4.4, 7.1)	6.1 (4.8, 7.5)	3.7 (2.6, 4.8)	16.2 (13.7, 18.6)
			Model statistics[b]		
Slope, b		203 712	301 178	113 624	1 029 827
Correlation, *r*		0.87	0.94	0.77	0.93

Note. BDZ = benzodiazepine; NBSH = nonbenzodiazepine sedative hypnotic. All measures are in millions.
[a]NBSHs were not separately coded in the survey until 1994.
[b]For model statistics, b is the slope from bivariate regression of variable on year; *r* is the temporal correlation of variable with year.

statistically significant. However, the NBSH trajectory far outpaced other outcomes.

Figure 1, which illustrates Table 1 data, shows the actual time trends in the 4 variables. Complaints of sleeplessness exceeded diagnosis rates from 1993 through 2005; by 2006, however, these lines had merged. Over time, NBSH prescriptions far outpaced both complaints of sleeplessness and diagnoses of insomnia. By 2007, more than 1.6% of all office visits in the United States were generating these prescriptions. The temporal linear correlations in order by strength (0.94–0.77) were diagnoses, NBSH prescriptions, complaints, and benzodiazepines. All were strong, confirming the linear trajectories of the variables over time.

By the year 2000, adults aged 65 years and older were less likely than were those aged 18 to 44 years or 45 to 64 years to list sleeplessness as the reason for an office visit or to receive an insomnia diagnosis. As seen in Table 2, from 1996 to 1998 onward those aged 65 years and older were less likely to receive an NBSH prescription than were those aged 45 to 64 years. Compared with other age groups, adults aged 65 years and older were most likely to receive a benzodiazepine prescription in all years, but, as indicated by low temporal correlations and small negative slopes, their sleeplessness complaints and benzodiazepine prescriptions did not increase steadily over time. The steepest slopes are for the NBSH prescriptions across all age groups.

DISCUSSION

Analysis of NAMCS data over a 15-year period revealed a striking disparity between rates of sleeplessness complaints and insomnia diagnoses compared with the rapid increase in NBSHs prescribed. NBSH prescriptions grew 21 times more rapidly than did sleeplessness complaints and 5 times more rapidly than did insomnia diagnoses, suggesting that life problems are being treated with medical solutions, without benefit of formal complaint or diagnosis. Conversely, tandem increases in diagnosis and treatment—or significant increases in diagnosis alone—would suggest greater prevalence of a discrete disease state.

Age trends were also suggestive of medicalization. Although middle-aged (those aged 45–64 years) and sometimes younger adults (those aged 18–44 years) lack the changing sleep architecture and increased comorbidities of older adults,[26] they still outpaced those aged 65 years and older on all sleeplessness-related measures, excluding benzodiazepine prescription. Increased sleeplessness among young and middle-aged adults may be attributable to nonbiological issues, including stress, multiple social roles, increased use of technology, or targeted marketing of sleep-inducing drugs.[3,6,15]

Also noteworthy is the convergence of the numbers of complaints and diagnoses in 2006 and 2007. Previously, sleeplessness complaints were more likely to result in a diagnosis of mental illness.[27] Greater awareness of correlations between insomnia, health, and quality of life may result in the topic of sleep being introduced in unrelated office visits, prompting diagnoses.[28,29] Medicalization may

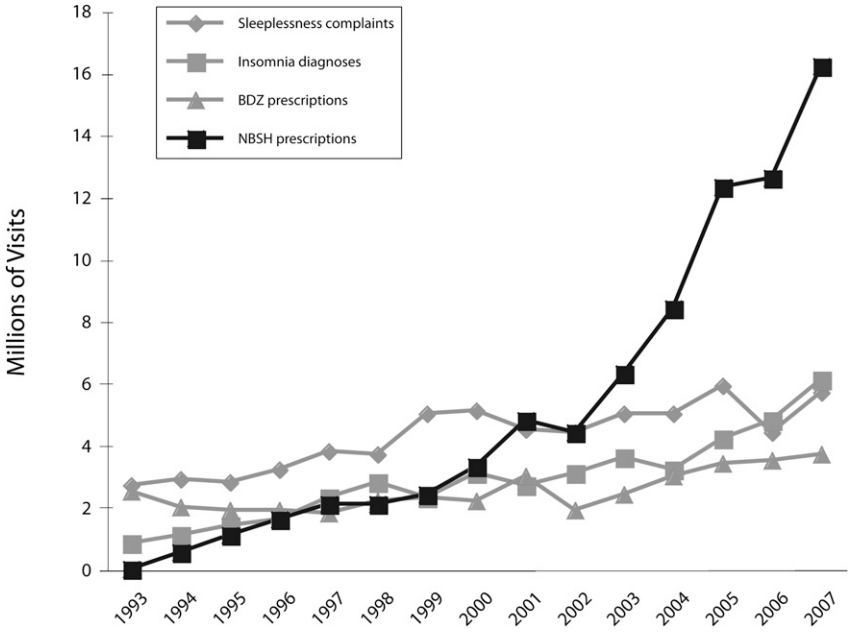

FIGURE 1—Sleeplessness-related trends of complaint, insomnia diagnosis, benzodiazepine (BDZ) and nonbenzodiazepine sedative hypnotic (NBSH) prescription as a result of physician office visits: United States, 1993–2007.

also be a factor; instead of viewing insomnia as a symptom of another illness (e.g., depression or arthritis), it may be viewed as a discrete medical problem with a pharmacological solution.

Although efficacious treatment of sleeplessness positively affects other facets of well-being,[27,28] underlying causes and mode of therapy are important considerations. NBSHs are relatively expensive but may be less addictive than are benzodiazepines.[30,31] However, NBSHs increase sleep time by less than 12 minutes on average,[32,33] and side effects include sleep driving, sleep eating, sleep walking, and short-term amnesia.[34,35] NBSHs may be particularly risky for patients who take multiple medications, have histories of drug abuse or mental illness, or are older and at risk for falls.[36,37]

Proven nondrug treatments exist; a review of 48 clinical trials found that almost 80% of insomnia patients benefited from behavioral therapies for at least 6 months after treatment completion without known side effects.[38] Sleep hygiene practices (e.g., controlling diet, exercise, and substance use) and environmental modifications (e.g., light, temperature, noise) can counteract sleep deterrents such as artificial light and 24-hour Internet access.[39] Preventing occupational stress and implementing job sharing, flexible hours, and sleep hygiene school curricula, could reduce the societal burden of sleeplessness.[6]

Despite these facts, prescription sleep aids remain the treatment of choice for most physicians.[40] Physicians' choices, however, may be influenced by market pressures, time constraints, direct-to-consumer advertising, and increased consumerism among patients.[41,42] With greater awareness and training, clinicians might utilize more nondrug treatments.[43,44] Patients, in turn, require more information about the deleterious health effects of long-term sleep loss and the benefits of behavioral therapies.

Although this study goes beyond previous work on the medicalization of sleep by using quantitative indicators to track the outcomes of the patient–physician interaction and highlighting related public health risks, it has several

TABLE 2—National Estimates of Sleeplessness-Related Complaints, Diagnoses, and Prescriptions for Benzodiazepine and Nonbenzodiazepine Sedative Hypnotics as a Result of Physician Office Visits, by Age Group: United States, 1993–2007

	Sleeplessness as Reason for Office Visit, Complaints Per 10 000 Visits			Insomnia Diagnoses, Per 10 000 Visits			BDZ Prescriptions, Per 10 000 Visits			NBSH Prescriptions, Per 10 000 Visits		
Years	18–44 Years	45–64 Years	≥65 Years	18–44 Years	45–64 Years	≥65 Years	18–44 Years	45–64 Years	≥65 Years	18–44 Years	45–64 Years	≥65 Years
1993–1995	48.3	55.5	51.7	16.1	25.6	21.9	21.9	34.1	63.6	11.9	17.8	18.1
1996–1998	47.9	67.1	59.9	30.1	37.1	44.0	13.7	37.1	49.3	17.8	42.4	37.0
1999–2001	79.8	71.5	67.6	39.2	44.1	38.7	32.2	36.5	45.1	37.8	79.1	43.5
2002–2004	69.5	85.1	40.8	47.7	57.6	29.2	27.3	32.7	42.3	60.0	110.0	91.9
2005–2007	69.0	81.4	57.1	73.1	71.6	53.0	28.4	46.1	63.9	143.5	228.3	159.0
Model statistics[a]												
Slope, b	2.10	2.33	−0.28	4.40	3.75	1.58	0.93	0.68	−0.16	10.63	16.95	11.69
Correlation, *r*	0.70	0.93	−0.13	0.98	0.99	0.61	0.60	0.60	−0.07	0.91	0.95	0.95

Note. BDZ = benzodiazepine; NBSH = nonbenzodiazepine sedative hypnotic.
[a]For model statistics, b is the slope from bivariate regression of variable on year-range midpoint.; *r* is the temporal correlation of variable with year-range midpoint. Ranges are 3 years except for the first year range for NBSH which is 2 years (1994-1995), because NBSH was not coded in 1993.

noteworthy limitations. NAMCS was neither intended nor designed to capture or measure the medicalization process and may underrepresent lower-income groups who use emergency services for primary health care. Because the unit of analysis is the office visit, results are suggestive of, but not equivalent to, patient outcomes. Finally, NAMCS is cross-sectional, so data may be capturing the same patients across or within years. However, the 1-week data collection period is unlikely to include repeat visitors.

Sleeplessness may very well be a public health problem, but its medicalization as insomnia—a diagnostic entity with predominantly pharmacological solutions—may encourage overuse of expensive, potentially harmful drugs while deflecting attention from effective public health approaches. ■

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Contributors

M.E. Moloney conceptualized and carried out the study and led the writing. T.R. Konrad and C.R. Zimmer assisted with conceptualization, analyses, and interpretation of results. All authors helped to conceptualize ideas, interpret and write up findings, and review drafts of the brief.

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Human Participant Protection

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The Impact of Stand-Biased Desks in Classrooms on Calorie Expenditure in Children

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Childhood obesity is a public health concern with significant health and economic impacts. We conducted a prospective experimental study in 4 classrooms in central Texas to determine the effect of desks that encourage standing rather than sitting on caloric expenditure in children. Students were monitored with calorie expenditure–measuring arm-bands worn for 10 days in the fall and spring. The treatment group experienced significant increases in calorie expenditure over the control group, a finding that has implications for policy and practice. (*Am J Public Health.* 2011;101:1433–1436. doi:10.2105/AJPH.2010.300072)

A 2010 report released by the Trust for America's Health and the Robert Wood Johnson Foundation entitled *F as in Fat: How Obesity Threatens America's Future, 2010* states that the percentage of overweight and obese children is at or above 30% in 30 states.[1] The probability of obese children becoming obese adults is significantly higher than is the probability among their nonobese counterparts.[2,3] Obese children who grow into obese adults also have more severe health risks than do individuals with adult-onset obesity, including potential for a shorter lifespan.[4,5]

School-based physical activity programs and environmental changes have proven helpful in increasing health-enhancing physical activities for children.[6-9] However, these activities typically concentrate on small portions of a child's day and miss the opportunity to increase health-enhancing physical activities throughout the entire school day, particularly during instructional time. The pilot study described in this brief targeted childhood obesity by increasing passive calorie expenditure in the classroom. Classroom environments were modified to increase standing (rather than sitting) by replacing students' and teachers' traditional seated desks with standing height desks specifically manufactured for this study (Artco-Bell, Temple, TX); standing height stools were also provided to allow students to sit at their discretion. This concept biased the classroom environment toward standing, encouraging healthy movements, and increased energy expenditure.

METHODS

The intervention was pilot tested during the 2009 to 2010 school year in 4 first-grade classrooms in an ethnically diverse elementary school in central Texas; the treatment and control classrooms were randomly selected. All of the desks in the 2 treatment classrooms were converted to stand–sit workstations with stools, whereas the control classrooms remained unaltered for the entire school year. Students were told about the desks during the consent–assent process, and their teachers reinforced that they could stand or sit at their discretion. In addition to calorie expenditure, our study investigated children's standing activity after giving them no specific instruction that they must stand or sit for any portion of their day. By the 12th week of school after the treatment, students had acclimated to their desks; 70% of the students were not using stools at all, standing 100% of the time at their primary homeroom workstation, and the other 30% were standing, on average, approximately 75% of the time. Differences in energy expenditure for the most frequent users compared with the least frequent users of the standing position were not measured because the mean time standing for treatment classes was 91% of homeroom time.

Eighty students (20 each in 4 classrooms) were contacted for potential inclusion in the study. Parental consent and child assent were obtained at the beginning of the school year for 71 participants (58 completed the study by recording complete data for both fall and spring data collections—31 from the treatment group and 27 from the control group). Every student in the treatment classrooms received the stand–sit desk; consent was solely for participation in the data collection activities. Those that did not consent were children whose parents who did not attend parent night and were unable to be reached in the 2 weeks afterward.

Data collected on each student included gender; age; initial and final height, weight, and body mass index (weight in kg divided by height in m^2); body fat percentage; and calorie expenditure measured by the BodyBugg armband (Apex Fitness, Westlake Village, CA) worn on the upper left arm during the course of 5 consecutive school days at 4 intervals during the school year. The BodyBugg armband device is self-calibrating; takes frequent measurements, which reduces wear time needed to collect data; reports actual wear time of the device; can distinguish between different activities and their intensities; and, unlike an accelerometer-only device, does not require movement to acquire data on energy expenditure. This type of armband has been used in studies on children and adults; early validation studies on children resulted in modifications of the algorithm in the software to improve accuracy and validity.[10–17] The current algorithm, adjusted on the basis of findings of 2007 and 2008 studies, incorporates height, weight,