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Doctor-patient sleep discussions for US adults: results from the SHADES study

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ABSTRACT

Objectives: Determine the current rate of patient-provider sleep discussions and identify factors associated with occurrence of these discussions.
Design: Secondary cross-sectional analysis of self-report data collected during the Sleep and Healthy Activity Diet Environment and Socialization study. Logistic regressions were used.
Setting: Urban and suburban Southeastern Pennsylvania
Participants: A total of n = 998 adults (aged 22-60), 38.6% female, racially and socioeconomically diverse, from urban and suburban Southeastern Pennsylvania.
Measurements: Outcome measures were responses to 3 questions: (1) ever discussed sleep with a provider, (2) a provider ever discussed importance of sleep schedule, and (3) a provider ever discussed importance of enough sleep. Descriptive/independent variables included demographic factors and a wide range of patient-reported measures of health and sleep habits.
Results: About a third of individuals have ever discussed sleep with a provider. Factors associated with higher odds of sleep-related discussions included sleep medication use, worse insomnia severity, race (Black/African American, Hispanic, Latino, other/multiracial), female sex, higher education, higher body mass index, and worse depression severity. Factors associated with lower odds were Asian race and low income. Sleep discussions were not associated with certain factors indicative of sleep disorders: sleep duration, snoring, shift work schedule, not working, and anxiety.
Conclusions: Low rates of patient-provider sleep discussions and factors associated (or not) with their occurrence indicate missed opportunities for improved health outcomes.

Sleep disorders are highly prevalent in health care settings: nearly ubiquitous in adults (ranging from 30% to 100%, depending on the study and number of sleep disorders considered[1–3]). As or more important than their high prevalence, sleep disorders directly affect medical and mental health and are, in and of themselves, costly to society.[4,5] Untreated sleep disorders are known to increase the risk for developing depression, obesity, diabetes, and cardiovascular disease and to complicate the long-term management of these independent disorders once developed.[6–10] Given the direct impact of sleep disorders and the potential for prophylaxis when identified and treated, it follows that health care providers, in particular those providing primary care, would incorporate discussions about sleep into routine visits. The literature, however, supports the assertion that conversations between doctors and patients regarding sleep health are not occurring as frequently as they should be.[11] For example, the prevalence of sleep disorders documented in charts, which ranges from 0.1% to 8.9%,[3,12] falls far below expected prevalence found in the general population. Similarly, only about a fourth of primary care providers record sleep histories during new patient intake visits, and almost half of primary care providers fail to document sleep disturbances in charts of patients who specifically complain about their

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Table 1
Sample characteristics

Variable		Talk to doctor about sleep			Doctor talk about sleep schedule			Doctor talk about enough sleep		
	Sample	No	Yes	*P*	No	Yes	*P*	No	Yes	*P*
Total sample (n)	998	641	357	–	683	315	–	625	373	–
Age										
50-60	9.9 %	8.0 %	13.5 %	<.001	8.6 %	12.7 %	.016	8.6 %	12.1 %	.124
41-49	14.6 %	13.0 %	17.6 %		13.6 %	16.8 %		13.6 %	16.3 %	
31-39	28.3 %	26.6 %	31.4 %		27.4 %	30.2 %		28.3 %	28.2 %	
22-29	47.2 %	52.6 %	37.5 %		50.4 %	40.3 %		49.4 %	43.4 %	
Sex										
Male	38.6 %	41.0 %	34.2 %	.033	37.8 %	40.3 %	.44	39.8 %	36.5 %	.29
Female	61.4 %	59.0 %	65.8 %		62.2 %	59.7 %		60.2 %	63.5 %	
Race/Ethnicity										
Non-Hispanic White	59.5 %	59.3 %	59.9 %	.003	63.0 %	52.1 %	<.001	62.9 %	53.9 %	<.001
Black/African-American	25.0 %	25.0 %	24.9 %		21.1 %	33.3 %		21.0 %	31.6 %	
Hispanic/Latino	4.6 %	3.3 %	7.0 %		5.1 %	3.5 %		5.0 %	4.0 %	
Asian	5.5 %	7.2 %	2.5 %		6.3 %	3.8 %		6.7 %	3.5 %	
Other/multiracial	5.4 %	5.3 %	5.6 %		4.5 %	7.3 %		4.5 %	7.0 %	
Income										
Quintile 5	18.4 %	18.7 %	17.9 %	.21	16.54 %	22.5 %	.121	16.0 %	21.2 %	.53
Quintile 4	15.7 %	16.1 %	15.1 %		15.37 %	16.5 %		15.7 %	15.8 %	
Quintile 3	24.5 %	26.4 %	21.3 %		25.62 %	22.2 %		25.1 %	23.6 %	
Quintile 2	23.1 %	22.3 %	24.4 %		24.45 %	20.0 %		23.7 %	22.0 %	
Quintile 1	18.2 %	16.5 %	21.3 %		18.01 %	18.7 %		18.7 %	17.4 %	
Shift work (yes)	19.8 %	19.3 %	20.7 %	.50	19.8 %	20.0 %	.93	19.5 %	20.4 %	.74
Not working	17.9 %	16.4 %	20.7 %	.086	16.7 %	20.6 %	.131	16.8 %	19.8 %	.23
BMI points, mean (SD)	26.6 (6.5)	25.9 (5.7)	27.8 (7.7)	<.001	25.9 (5.8)	28.1 (7.7)	<.001	25.8 (5.8)	27.9 (7.4)	<.001
Health										
Excellent	12.4 %	14.8 %	8.1 %	<.001	13.2 %	10.8 %	.002	13.4 %	10.7 %	.014
Very good	34.1 %	39.1 %	24.6 %		37.2 %	27.3 %		37.1 %	29.0 %	
Good	36.2 %	32.2 %	42.0 %		35.0 %	38.7 %		34.4 %	39.1 %	
Fair/poor	17.3 %	12.9 %	25.2 %		14.6 %	23.2 %		15.0 %	21.2 %	
Anxiety										
GAD7, mean (SD)	7.1 (.6)	6.2 (5.2)	8.8 (5.9)	<.001	6.8 (5.29)	7.86 (6.2)	.009	6.8 (5.5)	7.5 (5.8)	.017
Depression										
PHQ9, mean (SD)	8.6 (6.4)	7.2 (.9)	12.0 (6.4)	<.001	7.9 (5.89)	9.90 (7.1)	<.001	7.9 (5.0)	9.7 (6.8)	<.001
Insomnia										
ISI, mean (SD)	10.5 (6.3)	8.66 (5.7)	13.9 (6.0)	<.001	9.5 (5.8)	12.75 (6.9)	<.001	9.56 (5.8)	12.2 (6.8)	<.001
Snoring (yes)	27.4 %	24.2 %	33.0 %	.003	25.3 %	31.8 %	.035	25.6 %	30. %	.108
Sleep duration (h), mean (SD)	6.46 (1.6)	6.6 (1.4)	6.1 (1.8)	<.001	6.5 (1.47)	6.3 (1.8)	.096	6.5 (1.5)	6.33 (1.7)	.053
Sleep med use (yes)	28.0 %	16.2 %	49.0 %	<.001	21.4 %	42.2 %	<.001	21.6 %	38.6 %	<.001

sleep.[13] And, primary care providers have been shown to inadequately question patients who likely have obstructive sleep apnea.[14] It may be that primary care providers are not discussing sleep with patients, or it may be that, if the discussions do occur, they are not documented or used to determine the presence or absence of sleep disorders. According to the 1995 Sleep in America Poll, only 30% of US adults who reported sleep problems indicated that they had ever discussed sleep with their doctors.[15] Given the age of these data and the growth in knowledge regarding sleep and health, the purpose of this study was to determine the current prevalence of patient-provider sleep discussions and to identify factors associated with their occurrence. Whereas primary care providers include physicians (MDs, DOs), advanced practice registered nurses (Nurse Practitioners [NPs], Clinical Nurse Specialists), physician assistants, and licensed psychologists, the available evidence is based on queries that used the term *doctor* or *doctor or other health care provider*. The present study, therefore, focuses primarily on doctor-patient discussions.

Methods

Study setting and population

Data were originally collected as part of the Sleep and Healthy Activity Diet Environment and Socialization (SHADES) study. The study described herein was a secondary analysis of deidentified SHADES data and as such was exempt from Institutional Review Board review. The original SHADES study was approved by the Institutional Review Board of the University of Pennsylvania. The SHADES study included n = 1007 US adults age 22-60 years recruited from a 5-county region in southeastern Pennsylvania, including Philadelphia, Montgomery, Bucks, Chester, and Delaware counties. The sample comprised racially and socioeconomically diverse adults residing in predominantly urban and suburban areas. Data were collected between 2012 and 2014; data from n = 998 of the SHADES subjects were complete enough to use for the analyses of this study.

SHADES data collection protocol

Data were collected through an online survey which included assessments of demographics (age, sex, marital/family status, socioeconomics, work schedule) and general health (self-reported height/weight, medical/psychiatric health history) per item developed by SHADES investigators. Overall health was assessed using the item adapted from the CDC's "Healthy Days Measure" instrument,[16,17] mood was evaluated per PHQ-9,[18] anxiety per GAD-7,[19] general functioning per SF-36,[20] sleep duration per STQ,[21] sleep-related attitudes per the Sleep Practices and Attitudes Questionnaire (SPAQ),[22] insomnia status per ISI,[23] sleep apnea status per MAP,[24] and other sleep disorders per SDS-CL-17.[25] Health behaviors were evaluated for diet per DHQ,[26] physical activity per IPAQ,[27] and substance use per ASSIST.[28]

Table 2
Variables associated with ever discussing sleep with a doctor (logistic regression)

	Unadjusted			Age and sex adjusted			Fully adjusted		
Variable Category/units	OR	95% CI	*P*	OR	95% CI	*P*	OR	95% CI	*P*
Age									
50-60					Reference			Reference	
40-49	0.8	(0.5-1.3)	.41	0.9	(0.9-0.5)	.550	0.9	(0.5-1.6)	.729
30-39	0.7	(0.4-1.1)	.129	0.7	(0.7-0.4)	.116	0.6	(0.3-1.0)	.054
22-29	0.4	(0.3-0.7)	<.001	0.4	(0.4-0.3)	<.001	0.5	(0.3-0.8)	.007
Sex									
Female vs male	1.3	(1.0-1.8)	.033	1.4	(1.4-1.1)	.010	1.7	(1.2-2.4)	.002
Race/ethnicity									
Non-Hispanic White		Reference			Reference			Reference	
Black/African-American	1.0	(0.7-1.3)	.94	0.9	(0.9-0.6)	.441	0.7	(0.4-1.0)	.059
Hispanic/Latino	2.1	(1.2-3.9)	.015	2.4	(2.4-1.3)	.006	2.3	(1.1-4.8)	.020
Asian	0.3	(0.2-0.7)	.005	0.4	(0.4-0.2)	.011	0.4	(0.2-1.0)	.046
Other/multiracial	1.0	(0.6-1.9)	.88	1.1	(1.1-0.6)	.761	0.9	(0.5-1.9)	.846
Education									
College		Reference			Reference			Reference	
Some college	1.8	(1.3-2.4)	<.001	1.8	(1.8-1.3)	<.001	1.2	(0.9-1.8)	.267
High school	1.7	(1.1-2.6)	.014	1.6	(1.6-1.0)	.030	1.0	(0.5-1.7)	.922
Less than high school	2.0	(0.9-4.4)	.085	1.8	(1.8-0.8)	.153	0.8	(0.3-2.2)	.649
Income									
Quintile 5		Reference			Reference			Reference	
Quintile 4	1.0	(0.6-1.5)	.94	1.1	(1.1-0.7)	.787	1.0	(0.6-1.7)	.928
Quintile 3	0.8	(0.6-1.3)	.41	0.9	(0.9-0.6)	.605	0.9	(0.6-1.5)	.667
Quintile 2	1.1	(0.8-1.7)	.52	1.3	(1.3-0.9)	.167	1.2	(0.7-1.9)	.522
Quintile 1	1.3	(0.9-2.1)	.170	1.5	(1.5-1.0)	.057	1.3	(0.8-2.3)	.275
Shift work (yes)	1.1	(0.8-1.5)	.60	1.2	(1.2-0.9)	.318	0.9	(0.6-1.4)	.646
Not working	1.3	(1.0-1.9)	.087	1.2	(1.2-0.9)	.246	0.8	(0.5-1.2)	.276
BMI									
per 1 point	1.0	(1.0-1.1)	<.001	1.0	(1.0-1.0)	.001	1.0	(1.0-1.0)	.147
Overall health									
Excellent	0.0	Reference			Reference		0.0	Reference	
Very good	1.1	(0.7-1.9)	.58	1.2	(1.2-0.7)	.574	0.9	(0.6-1.6)	.844
Good	2.3	(1.5-3.7)	<.001	2.2	(2.2-1.3)	.001	1.2	(0.7-2.1)	.465
Fair/poor	3.6	(2.1-5.9)	<.001	3.4	(3.4-2.0)	<.001	1.3	(0.7-2.4)	.468
Anxiety, per GAD7 point	1.1	(1.1-1.1)	<.001	1.1	(1.1-1.1)	<.001	1.0	(0.9-1.0)	.349
Depression, per PHQ9 point	1.1	(1.1-1.1)	<.001	1.1	(1.1-1.1)	<.001	1.0	(1.0-1.1)	.307
Insomnia, per ISI point	1.2	(1.1-1.2)	<.001	1.2	(1.2-1.1)	<.001	1.1	(1.1-1.2)	<.001
Snoring (yes)	1.5	(1.2-2.1)	.003	1.5	(1.5-1.1)	.007	0.9	(0.6-1.3)	.556
Sleep duration, per hour	0.8	(0.7-0.9)	<.001	0.8	(0.8-0.8)	<.001	1.1	(1.0-1.2)	.124
Sleep med use (yes)	5.0	(3.7-6.7)	<.001	4.9	(4.9-3.6)	<.001	3.1	(2.2-4.3)	<.001

Social functioning was evaluated for social stress (MSPSS[29]), social isolation (PHMC[30]), and occupational stress (WBA-P[31]). Work schedule and neighborhood characteristics were assessed per the NDS[32]. Sleep-related questions from the National Health and Nutrition Examination Survey (NHANES)[33] were also incorporated into the SHADES survey.

Doctor-patient discussions

Occurrence of doctor-patient sleep discussions was assessed with 3 items: "Have you ever told a doctor or other health professional that you have trouble sleeping?" (yes/no, item taken from the NHANES); "My doctor has discussed the importance of a regular sleep schedule" (strongly agree, agree, unsure, disagree, strongly disagree; taken from SPAQ[22]); and "My doctor has discussed the importance of getting enough sleep" (strongly agree, agree, unsure, disagree, strongly disagree; also taken from the SPAQ). Each of the SPAQ questions was coded "yes" if respondents answered either "strongly agree" or "agree."

Statistical analysis

The sample was characterized by descriptive statistics and pairwise comparisons (χ^2 tests for categorical variables and *t* tests for continuous variables) for the complete sample and stratified by whether participants did or did not discuss sleep with their doctor. To evaluate which variables were associated with an increased likelihood of discussing sleep-related information with a doctor, logistic regression analyses examined the discussion variable as outcome and all of the possible variables as predictors. First, all variables were examined in unadjusted models. Then, models were adjusted for age and sex. Finally, overcontrolled models were adjusted for all other variables. This sequence of analyses was repeated for all 3 doctor discussion variables. Odds ratios (ORs) with 95% confidence intervals (95% CIs) and *P* values were determined. Next, for each of the doctor-patient discussion outcomes, forward stepwise regression analyses were performed to determine which variables uniquely contributed to the variance of the outcome variables. A forward stepwise regression procedure was used, that is, the regression started with all variables entered, with each successive step in the process retaining the variable that explained the highest R^2 for that step and then adding back in remaining variables until no additional variables explained any variance with $P < .05$. Stepwise regressions were performed twice: first using the full set of independent variables to start the regression and second excluding sleep habits and insomnia severity from the list of potential predictors. The second set of stepwise regressions was performed to focus on non–sleep-related factors. All analyses were performed using STATA 14.2 (STATA Corp, College Station, TX).

Table 3
Variables associated with doctor ever discussing importance of sleep schedule (logistic regression)

	Unadjusted			Age and sex adjusted			Fully adjusted		
Variable Category/Units	OR	95% CI	*P*	OR	95% CI	*P*	OR	95% CI	*P*
Age									
50-60		Reference			Reference			Reference	
40-49	0.8	(0.5-1.4)	.52	0.8	(0.5-1.4)	.49	0.9	(0.5-1.6)	.76
30-39	0.7	(0.5-1.2)	.23	0.8	(0.5-1.2)	.23	0.8	(0.5-1.4)	.48
22-29	0.5	(0.3-0.9)	.008	0.5	(0.3-0.9)	.009	0.9	(0.5-1.5)	.67
Sex									
Female vs male	0.9	(0.7-1.2)	.44	0.9	(0.7-1.2)	.62	1.0	(0.7-1.3)	.92
Race/ethnicity									
Non-Hispanic White		Reference			Reference		0.0	Reference	
Black/African-American	1.9	(1.4-2.6)	<.001	1.8	(1.3-2.4)	<.001	1.9	(1.3-2.7)	.001
Hispanic/Latino	0.8	(0.4-1.7)	.59	0.8	(0.4-1.7)	.64	0.7	(0.3-1.5)	.36
Asian	0.7	(0.4-1.4)	.36	0.8	(0.4-1.5)	.44	0.9	(0.4-1.8)	.78
Other/multiracial	1.9	(1.1-3.4)	.022	2.0	(1.1-3.5)	.019	2.1	(1.1-3.8)	.023
Education									
College		Reference						Reference	
Some college	2.0	(1.5-2.7)	<.001	1.9	(1.4-2.6)	<.001	1.4	(1.0-2.1)	.042
High school	1.9	(1.2-3.0)	.003	1.8	(1.1-2.8)	.014	1.3	(0.8-2.3)	.30
Less than high school	1.6	(0.7-3.6)	.29	1.4	(0.6-3.2)	.47	1.0	(0.4-2.7)	.97
Income									
Quintile 5		Reference			Reference			Reference	
Quintile 4	0.8	(0.5-1.2)	.29	0.8	(0.5-1.3)	.33	0.7	(0.4-1.1)	.113
Quintile 3	0.6	(0.4-1.0)	.029	0.7	(0.4-1.0)	.045	0.5	(0.3-0.8)	.007
Quintile 2	0.6	(0.4-0.9)	.016	0.6	(0.4-1.0)	.033	0.4	(0.3-0.7)	<.001
Quintile 1	0.8	(0.5-1.2)	.22	0.8	(0.5-1.2)	.24	0.5	(0.3-0.8)	.006
Shift work (yes)	1.0	(0.7-1.4)	.93	1.0	(0.7-1.4)	.88	0.9	(0.6-1.4)	.77
Not working	1.3	(0.9-1.8)	.132	1.2	(0.9-1.7)	.29	1.0	(0.7-1.5)	.99
BMI, per 1 point	1.0	(1.0-1.1)	<.001	1.0	(1.0-1.1)	<.001	1.0	(1.0-1.1)	.040
Overall health									
Excellent		Reference			Reference			Reference	
Very good	0.9	(0.6-1.4)	.64	0.9	(0.6-1.4)	.67	0.7	(0.4-1.2)	.225
Good	1.4	(0.9-2.1)	.191	1.3	(0.8-2.0)	.27	0.7	(0.4-1.2)	.26
Fair/poor	1.9	(1.2-3.2)	.009	1.8	(1.1-3.0)	.024	0.9	(0.5-1.6)	.68
Anxiety, per GAD7 point	1.0	(1.0-1.1)	.006	1.0	(1.0-1.1)	.004	1.0	(0.9-1.0)	.122
Depression, per PHQ9 point	1.0	(1.0-1.1)	<.001	1.0	(1.0-1.1)	<.001	1.0	(1.0-1.1)	.40
Insomnia, per ISI point	1.1	(1.1-1.1)	<.001	1.1	(1.1-1.1)	<.001	1.1	(1.1-1.1)	<.001
Snoring (yes)	1.4	(1.0-1.8)	.035	1.3	(0.9-1.7)	.112	0.9	(0.6-1.2)	.45
Sleep duration, per hour	0.9	(0.8-1.0)	.075	1.0	(0.9-1.0)	.25	1.2	(1.0-1.3)	.009
Sleep med use (yes)	5.0	(3.7-6.7)	<.001	4.9	(3.6-6.6)	<.001	2.1	(1.5-2.9)	<.001

Results

Sample characteristics

The analyzed sample included n = 998 adults who completed all assessments (Table 1). On average, study participants slept less than the recommended 7-9 hours of sleep and had insomnia (ISI average >10), with 27.9% reported using some form of sleep medication. Participants considered themselves to be in generally good health and reported mild anxiety and depression.

Sample characteristics differed between those who did and did not have doctor-patient sleep discussions (Table 1). Factors differing between participants who did and did not have sleep discussions with doctors were age (for 2 of the questions), sex (for 1 of the questions), race/ethnicity, body mass index (BMI), health status, anxiety, depression, snoring (for 2 of the 3 questions), sleep duration, and sleep medication use.

Occurrence of doctor-patient sleep discussions

The rates of doctor-patient sleep discussions ranged from 31% to 38% among the study sample. Specifically, 35.7% responded "yes" to the question "Have you ever told a doctor or other health professional that you have trouble sleeping?", 31.6% endorsed the statement "My doctor has discussed the importance of a regular sleep schedule," and 37.4% endorsed the statement "My doctor has discussed the importance of getting enough sleep."

Determinants of doctor-patient sleep discussions (logistic regression results)

Coefficients from unadjusted models, models adjusted for age and sex, and fully adjusted models were evaluated (Tables 2-4). For all 3 measures of doctor-patient sleep discussions, neither employment status nor work schedule was associated with occurrence of discussions.

Factors associated with ever having discussed trouble sleeping with a doctor or other health professional (Table 2) included younger age (22-29) and sex for females vs males. Race/ethnicity was also a significant predictor, with Hispanics/Latinos more than twice as likely to report doctor-patient sleep discussions and Asians less than half as likely compared to non-Hispanic Whites. Having some college was associated with increased odds of discussions in unadjusted and age-sex adjusted models but was no longer significant in the fully adjusted model. BMI was positively associated with occurrence of sleep discussions. Insomnia and depression were also consistently associated with an increased likelihood across models. Snoring was associated with discussions but was no longer significant in the fully adjusted model. Use of sleep medications was associated with a 3- to 5-fold OR for having discussed sleep with a doctor or other health professional. Factors associated with having had a doctor discuss the importance of sleep schedule (Table 3) differed slightly from those associated with ever

Table 4
Variables associated with doctors ever discussing importance of getting enough sleep (logistic regression)

	Unadjusted			Age and sex adjusted			Fully adjusted		
Variable Category/units	OR	95% CI	*P*	OR	95% CI	*P*	OR	95% CI	*P*
Age									
50-60		Reference			Reference			Reference	
40-49	0.9	(0.5-1.4)	.57	0.9	(0.5-1.5)	.65	1.0	(0.6-1.8)	.94
30-39	0.7	(0.4-1.1)	.151	0.7	(0.4-1.1)	.144	0.8	(0.5-1.4)	.44
22-29	0.6	(0.4-1.0)	.039	0.6	(0.4-1.0)	.035	1.0	(0.6-1.7)	.94
Sex									
Female vs male	1.2	(0.9-1.5)	.29	1.2	(0.9-1.6)	.191	1.3	(1.0-1.8)	.080
Race/ethnicity									
Non-Hispanic White		Reference			Reference			Reference	
Black/African-American	1.8	(1.3-2.4)	<.001	1.7	(1.3-2.3)	.001	1.7	(1.2-2.4)	.005
Hispanic/Latino	0.9	(0.5-1.8)	.87	1.0	(0.5-1.9)	.96	0.8	(0.4-1.7)	.61
Asian	0.6	(0.3-1.2)	.127	0.6	(0.3-1.2)	.163	0.7	(0.4-1.4)	.37
Other/multiracial	1.8	(1.0-3.2)	.037	1.8	(1.1-3.2)	.033	1.8	(1.0-3.3)	.053
Education									
College		Reference			Reference			Reference	
Some college	1.7	(1.3-2.2)	<.001	1.7	(1.3-2.3)	<.001	1.3	(0.9-1.8)	.168
High school	1.6	(1.1-2.5)	.025	1.6	(1.1-2.6)	.027	1.3	(0.7-2.1)	.40
Less than high school	2.5	(1.1-5.5)	.024	2.5	(1.1-5.5)	.029	2.0	(0.8-4.9)	.138
Income									
Quintile 5		Reference			Reference			Reference	
Quintile 4	0.8	(0.5-1.2)	.32	0.8	(0.5-1.3)	.42	0.7	(0.4-1.1)	.135
Quintile 3	0.7	(0.5-1.1)	.141	0.8	(0.5-1.1)	.186	0.6	(0.4-1.0)	.032
Quintile 2	0.7	(0.5-1.1)	.131	0.8	(0.5-1.2)	.218	0.5	(0.3-0.8)	.004
Quintile 1	0.7	(0.5-1.1)	.158	0.8	(0.5-1.2)	.22	0.5	(0.3-0.8)	.004
Shift work (yes)	1.1	(0.8-1.5)	.74	1.1	(0.8-1.5)	.57	1.0	(0.7-1.5)	.92
Not working	1.2	(0.9-1.7)	.23	1.2	(0.8-1.6)	.36	1.0	(0.7-1.5)	.87
BMI, per 1 point	1.0	(1.0-1.1)	<.001	1.0	(1.0-1.1)	<.001	1.0	(1.0-1.1)	.011
Overall health									
Excellent		Reference			Reference			Reference	
Very Good	1.0	(0.6-1.5)	.92	1.0	(0.6-1.5)	.94	0.8	(0.5-1.3)	.42
Good	1.4	(0.9-2.2)	.107	1.4	(0.9-2.1)	.138	0.8	(0.5-1.3)	.41
Fair/Poor	1.8	(1.1-2.9)	.021	1.7	(1.1-2.8)	.028	0.8	(0.5-1.5)	.54
Anxiety, per GAD7 point	1.0	(1.0-1.1)	.016	1.0	(1.0-1.1)	.013	1.0	(0.9-1.0)	.025
Depression, per PHQ9 point	1.0	(1.0-1.1)	<.001	1.0	(1.0-1.1)	<.001	1.0	(1.0-1.1)	.034
Insomnia, per ISI point	1.1	(1.0-1.1)	<.001	1.1	(1.0-1.1)	<.001	1.1	(1.0-1.1)	.001
Snoring (yes)	1.3	(1.0-1.7)	.108	1.3	(0.9-1.7)	.132	0.9	(0.6-1.2)	.48
Sleep duration, per hour	0.9	(0.8-1.0)	.043	0.9	(0.9-1.0)	.096	1.1	(1.0-1.2)	.093
Sleep med use (yes)	5.0	(3.7-6.7)	<.001	4.9	(3.6-6.6)	<.001	1.8	(1.3-2.5)	<.001

having discussed trouble sleeping. Sex was not associated with sleep schedule discussions, although it was for the "ever discussed trouble sleeping" question. Other factors associated with having had a doctor discuss the importance of sleep schedules were similar to those associated with the "ever discussed trouble sleeping" question and included age, race/ethnicity, education, income, BMI, ISI, and use of sleep medications. Discussions of sleep schedule were associated with snoring but only in the unadjusted model. Factors associated with discussions about getting enough sleep (Table 4) were similar to factors associated with the "importance of sleep schedule" discussions. First, sex and age were not factors in predicting "enough sleep" discussions in the fully adjusted model (although age was a factor in the unadjusted model). For "getting enough sleep" discussions, race/ethnicity was also a factor, as was income. It is worth noting that snoring was not associated with "getting enough sleep" discussions.

It may be of interest to note that some factors fell out of significance when the model was fully adjusted for other factors.

Determinants of discussions (stepwise regression results)

When stepwise regressions included all of the sample characteristics as independent variables, the variable sets for each of the 3 sleep health discussion outcome measures were dominated by insomnia severity and sleep medication use (Table 5). Insomnia severity, sleep medication use, sex, and age were required to model having told a doctor about sleep problems. Insomnia severity, sleep medication use, BMI, sleep duration, income, and education were required to model having had a doctor discuss the importance of sleep schedule. Insomnia severity, sleep medication use, and BMI were required to model having had a doctor discuss the importance of getting enough sleep.

For the second set of stepwise regressions, insomnia severity, snoring, sleep duration, and medication use were omitted from the list of independent variables. These models identified depression as being associated with each of the 3 sleep health discussion outcomes (Table 6). Depression, age, sex, and BMI were required to model having told a doctor about sleep problems. BMI, depression, education, and income were required to model having had a doctor discuss the importance of sleep schedule. BMI and depression were required to model having had a doctor discuss the importance of getting enough sleep.

Discussion

The occurrence of doctor-patient sleep discussions has changed very little since the mid-1990s, with about a third of individuals saying they had ever discussed sleep with a doctor or health care provider. It may be possible to infer, from the wording of the survey questions (eg, "has a doctor ever…" and "have you ever told…") that neither patients nor doctors are initiating sleep-related discussions more than a third of the time over a patient's course of care. Both sociodemographic and health-related factors were associated with occurrence of doctor-patient discussions about trouble sleeping, the importance of sleep

Table 5
Variables associated with doctor-patient sleep discussions (stepwise regressions)

Variable	Category/units	OR	95 % CI	*P*
Talking to doctor about sleep problem ($R^2 = 0.180$)				
Insomnia severity	Per 1 ISI point	1.1	(1.099-1.159)	<.001
Sleep med use	Yes	3.2	(2.300-4.372)	<.001
Sex	Female	1.6	(1.188-2.217)	.002
Age	50-60	Reference		
	41-39	0.9	(0.5-1.6)	.72
	31-39	0.6	(0.4-1.1)	.088
	22-29	0.5	(0.3-0.9)	.01
Doctor discussing importance of sleep schedule ($R^2 = 0.090$)				
Insomnia severity	Per 1 ISI point	1.1	(1.0-1.1)	<.001
Sleep medication use	Yes	1.9	(1.4-2.6)	<.001
BMI	Per 1 BMI point	1.0	(1.0-1.1)	.004
Seep duration	Per 1 h	1.1	(1.0-1.3)	.018
Income	Quintile 5	Reference		
	Quintile 4	0.7	(0.5-1.2)	.200
	Quintile 3	0.6	(0.4-0.9)	.024
	Quintile 2	0.5	(0.3-0.7)	.001
	Quintile 1	0.6	(0.4-0.9)	.021
Education	College			
	Some college	1.6	(1.2-2.3)	.003
	High school	1.7	(1.0-2.7)	.044
	Less than high school	1.3	(0.5-3.2)	.60
Doctor discussing importance of getting enough sleep ($R^2 = 0.051$)				
Insomnia	Per 1 ISI point	1.0	(1.0-1.1)	<.001
Sleep med use	Yes	1.8	(1.3-2.4)	<.001
BMI	Per 1 BMI point	1.0	(1.0-1.1)	<.001

schedule, and the importance of getting enough sleep. Of equal interest is that certain sleep-related factors did not emerge as determinants of doctor-patient sleep discussions, in particular sleep duration, snoring, shift work schedule, not working, and anxiety.

Of particular interest, results of this study indicate that increased ORs relating sociodemographics and other health issues with occurrence of doctor-patient sleep discussions were similar to the OR regarding sleep medication use. For example, several racial/ethnic groups (Black/African American, Hispanic/Latino, and multiracial/other) had about double the odds of discussing sleep with doctors, whereas Asians had about half the odds in comparison to their White/non-Hispanic counterparts. These rival the doubled to tripled odds associated with use vs nonuse of sleep medication. Low-income individuals had lower odds of discussing sleep with doctors, as did younger individuals (age 22-29). In general, odds of doctor-patient sleep discussions trended down with educational level, although groups with some college, high school, and less than high school education all had higher odds of doctor-patient sleep discussions than their college-educated counterparts. Higher BMI was also associated with higher odds of doctor-patient sleep discussions. When sleep parameters were excluded from the list of potential determinants, sex and depression severity also emerged as being associated with doctor-patient sleep discussions. Females and more severely depressed patients had higher odds of discussing sleep with their doctors.

These results, although indicating a relatively low overall occurrence of doctor-patient sleep discussions, may indicate that doctors are discussing sleep as a way to slow or reverse disease progression in patients known to be at increased risk for the negative impacts of poor sleep on cardiovascular and metabolic health (eg, Black/African Americans, Hispanic/Latinos,[34,35] individuals with high BMI[36] and depression[6]). The increased odds for doctor-patient sleep discussions with females may be another indication of proactive preventive care since pregnancy, postpartum, and menopause are associated with inadequate sleep or because sleep complaints are commonly reported among pre- and postmenopausal women.[37] Similarly, the association between increased occurrence of sleep discussion with more severely depressed patients may also indicate an awareness of the connection between poor sleep and depression.[6] The reported increase in sleep-related discussions, however, might also be related to the high co-occurrence of depression with sleep disorders or the fact that the PHQ-9 depression screener contains 1 question about sleep (and another about feeling tired). Nonetheless, it would be interesting to explore what is driving depression severity/sleep discussion association identified here.

The results of this study also raise several concerns regarding attention to sleep in health care settings. First, because economic disadvantage is known to be associated with poor sleep, the low odds of the lowest-income patients discussing sleep with doctors are concerning in light of the trends for lower-income individuals to have poorer overall health outcomes.[38] Second, neither snoring nor sleep duration showed associations with doctor-patient sleep discussions. Snoring is an important (though partial) indication of the presence of obstructive sleep apnea,[39] sleep durations outside of 6-9 hours per day are known to be associated with poor health outcomes,[7,40–42] and 30% of US adults report getting less than 6 hours of sleep per night.[43] Third, it is expected that work schedule, in particular shift work, leads to circadian rhythm sleep disorders,[2] yet neither work schedule (shift work) nor work status (not working) was associated with doctor-patient sleep discussions. And finally, anxiety and rumination contribute to acute and chronic insomnia disorders,[2] yet more anxious patients were not at increased odds of discussing sleep with their doctors.

Limitations

The survey results are self-report from the patient point of view, and therefore, it is impossible to determine whether their recollection accurately represents the doctor's behavior. The questions used to identify occurrence of doctor-patient sleep discussions were framed so that it was not possible to discern when or how the sleep discussions had occurred, or whether patient or doctor initiated the discussion. For example, phrases such as "have you ever told" or "my doctor has discussed" provide no indication of whether the discussions occurred as part of a routine office visit or were related to a particular

Table 6
Variables associated with doctor-patient sleep discussions, excluding sleep variables (stepwise regressions)

Variable	Category/units	OR	95 % CI	*P*
Talking to doctor about sleep problem ($R^2 = 0.091$)				
Depression score	Per 1 PHQ9 point	1.100	(1.076-1.125)	<.001
Age	50-60			
	41-39	0.867	(0.504-1.490)	.605
	31-39	0.639	(0.393-1.040)	.072
	22-29	0.420	(0.262-0.674)	<.001
Sex	Female	1.593	(1.190-2.134)	.002
BMI	Per 1 BMI point	1.024	(1.003-1.046)	.028
Doctor discussing importance of sleep schedule ($R^2 = 0.049$)				
BMI	Per 1 BMI point	1.036	(1.014-1.058)	.001
Depression score	Per 1 PHQ9 point	1.041	(1.019-1.064)	<.001
Education	College			
	Some college	1.736	(1.269-2.376)	.001
	High school	1.790	(1.121-2.860)	.015
	Less than high school	1.400	(0.588-3.338)	.447
Income	Quintile 5	Reference		
	Quintile 4	0.714	(0.451-1.130)	.15
	Quintile 3	0.559	(0.368-0.850)	.006
	Quintile 2	0.479	(0.310-0.740)	.001
	Quintile 1	0.560	(0.352-0.891)	.014
Doctor discussing importance of getting enough sleep (R^2=0.029)				
BMI	Per 1 BMI point	1.044	(1.023-1.065)	<.001
Depression score	Per 1 PHQ9 point	1.041	(1.020-1.063)	<.001

complaint/illness, or who began the discussion. Participants may not have remembered conversations that occurred months or years prior to taking the survey. Further, the term *doctor* used in the survey questions may have been interpreted by respondents to mean *physician*, and therefore, results may not apply to all primary care providers, for example, advanced practice registered nurses (Nurse Practitioners, Clinical Nurse Specialists), physician assistants, licensed psychologists, or other professions who provide primary care.

This was a secondary analysis of a dataset originally intended for a different purpose. Therefore, the questions used to assess doctor-patient sleep discussions were not tested or verified for extracting the exact concept of interest here. Finally, only participants from an urban setting in the northeastern part of the United States were included and therefore may not accurately represent the general population.

Conclusions

Although the rate of doctor-patient discussions about sleep has remained in the 30%-35% range over the past 23 years, promising trends in what determines occurrence of these discussions emerged. Some groups known to be at increased risk for poorer health outcomes related to inadequate sleep had increased odds of discussing sleep with their doctors. However, concerning trends emerged as well. The lowest-income patients, a vulnerable population, had the lowest relative odds of doctor-patient sleep discussions. And, although sleep duration, snoring, shift work, and anxiety are associated with sleep disorders and increased morbidity and mortality, none of these factors were associated with routine doctor-patient sleep discussions.

It is unclear why only about a third of individuals report ever having discussed sleep with their doctors given the importance of adequate sleep in optimizing health. It may be that patients are not accurately recalling their doctors' behaviors. It would be interesting to survey doctors and other primary care providers regarding their practices regarding patient-provider sleep discussions, or to obtain this information from chart reviews. It may also be that primary care doctors have limited education regarding sleep disorders or that they have limited time to assess for sleep disorders in their busy practices. Potential solutions may be to make user-friendly sleep disorders resources readily available and/or to provide an efficient method of quickly screening for sleep disorders. It is also unclear why factors known to cause sleep disorders and degrade health do not influence the odds of doctor-patient sleep discussions. This may be an indication of missed opportunities for preventive care and improved health outcomes. More work is needed to understand these trends and to encourage attention to sleep as part of routine health care.

List of instruments

Instrument	Full name
ASSIST	Alcohol, Smoking and Substance Involvement Screening Test
DHQ	Diet History Questionnaire
GAD-7	Generalized Anxiety Disorder, 7-item version
IPAQ	International Physical Activity Questionnaire
ISI	Insomnia Severity Index
MAP	Multivariable Apnea Risk Index
MSPSS	Multidimensional Scale of Perceived Social Support
NDS	Neighborhood Disorder Survey
NHANES	National Health and Nutrition Examination Survey
PHMC	Philadelphia Health Management Corporation (Household Health Survey)
PHQ-9	Patient Health Questionnaire, 9-item version
SDS-CL-17	Sleep Disorders Symptom Checklist, 17-item version
SF-36	Medical Outcomes Study Questionnaire, short form 36
SPAQ	Sleep Practices and Attitudes Questionnaire
STQ	Sleep Timing Questionnaire
WBA-P	Well-Being Assessment for Productivity

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