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Health and demographic discriminators of an insomnia identity and self-reported poor quantitative sleep☆

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ABSTRACT

Objectives: To identify factors that most saliently characterize the profile of individuals who complain of chronic insomnia, with or without quantitative sleep impairment.
Design: Community-dwelling adults reported on their demographics and functioning via questionnaires and completed 2 weeks of sleep diaries.
Setting: Shelby County in the Memphis, TN, area.
Participants: Population-based sample, stratified by sex and age to maximally represent sleep and health across the life span.
Measurements: Participants were classified into 4 groups according to whether or not they endorsed a chronic insomnia complaint and whether they demonstrated good or poor quantitative sleep on diaries. Discriminant analysis determined which of the following variables significantly maximized spread among the sleep groups: age, sex, race, body mass index, household education, number of medications, frequency of substance use, number of medical conditions, depression, anxiety, fatigue, daytime sleepiness, and daytime insomnia impact.
Results: On the most powerful discriminant function, participants with more medical conditions, greater depression and anxiety, and older age were more likely to complain of chronic insomnia than to not complain and, within these levels, to have poor rather than good quantitative sleep. A second function found African Americans particularly likely to be noncomplaining poor sleepers compared to Whites.
Conclusions: Findings make progress in clarifying the profile of individuals who self-identify as having chronically poor sleep. Notably, general depression and anxiety surpassed sleep-related daytime impairment measures in discriminating complaining sleepers. Negativistic self-appraisals driving diffuse psychological symptoms may thus be viable intervention targets for reducing persistent insomnia complaints independently of sleep-specific concerns.

Insomnia disorder, diagnosed by both a report of quantitative sleep difficulties and a complaint of sleep-related distress and impairment,[1,2] is a widespread and costly public health problem.[3] Research has documented that those who experience distress from sleep do not always display the corresponding quantitative deficits, as assessed using daily sleep diaries[4] or polysomnography (PSG).[5] Epidemiological surveys[4,6] find that most members of the population do demonstrate synchrony between their endorsement of an insomnia complaint and sleep status, with about 18%-19% of samples classified as complaining poor sleepers and 48%-55% classified as noncomplaining good sleepers. However, a considerable proportion do not show the expected concordance: 16%-23% have no complaint of insomnia despite quantitatively poor sleep (noncomplaining poor sleepers), whereas 10%-11% complain even without evidencing actual sleep disturbance (complaining good sleepers).

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The observation that an impression of poor sleep is separable from night-to-night quantitative deficits suggests that insomnia is a disorder not merely of sleep behavior but also of cognitive appraisals. Investigators have long posited a central role for distorted cognition in perpetuating sleep dysfunction,[7] finding that insomnia is associated with overestimating sleep disturbance,[8] negativistic attitudes concerning sleep,[9] elevated presleep arousal,[10] and excessive attention to sleep-related stimuli.[11] Research has additionally begun to explore the consequences of cultivating a self-evaluation as a poor sleeper that endures even in the face of contradictory evidence such as normative sleep parameters. An entrenched labeling of one's own sleep as impoverished has been termed an *insomnia identity*.[12]

Insomnia identity is distinct from 2 other concepts describing subjective sleep impairment. Sleep state misperception refers to self-described deficiencies in quantitative sleep in the absence of PSG-confirmed problems.[1,13] However, sleep state misperception does not account for the aforementioned uncoupling observed in individuals who *self-report* apparently adequate sleep quantity on diaries but still complain of a chronic sleep problem, or who report poor sleep quantity but do not endorse a chronic sleep complaint. Another condition that could be conflated with insomnia identity is nonrestorative sleep: lack of restoration from sleep upon waking that can occur independently of sleep duration.[2,14] However, nonrestorative sleep specifically entails feeling unrefreshed during the waking period,[14] whereas insomnia identity suggests a more broadly negative judgement of one's ability as a sleeper.

A complaint of chronic insomnia reflective of an insomnia identity is associated with various detriments, including depression, anxiety, fatigue, daytime sleepiness, insomnia functional impact, number of medical disorders, and suicidality. More importantly, these relationships are maintained after accounting for diary- or PSG-defined sleep variables, or they manifest even when the influence of quantitative sleep appears negligible.[5,6,15–19] This suggests that a conviction of poor sleep transcends sleep itself in predicting impairment. It also supports the notion that challenging patients' insomnia identity by dislodging persistent, distorted self-views may be crucial for successful treatment independently of interventions aiming to quantitatively improve sleep, at least for a subset of insomnia sufferers.

In making progress toward clarifying the nature of insomnia identity, there is a need to determine what characteristics maximally distinguish those who complain of chronic insomnia from those who do not, taking into account quantitative sleep status. Several of the aforementioned investigations have already examined a representative epidemiological sample[20] to establish that self-report of insomnia predicts mental health, daytime functioning, and quantity of medical conditions when they are analyzed separately as outcomes.[17–19] The current study pursues an alternative approach to analyzing the dataset, examining these measures in tandem to identify which are the best discriminators among participants classified as noncomplaining good, noncomplaining poor, complaining good, and complaining poor sleepers. Demographic factors were also considered given that several demographics convey risk of insomnia and may be relevant to insomnia identity.[12] Number of medications and frequencies of alcohol, cigarette, and caffeine consumption were similarly considered for their potential relevance to chronic sleep complaints. Thus, demographics, number of health conditions, medication or substance use, and measures of mental health and daytime functioning were assessed for their discriminative power among the 4 sleep groups to determine the factors that most meaningfully characterize an insomnia identity profile.

Participants and methods

Participants and procedures

Archival data were examined from an epidemiological sleep survey conducted in Memphis, TN, from 1997 to 1999.[20] Using random-digit dialing, 3215 households were contacted with an invitation to participate. Of the 1155 people who responded, 771 participants completed all study procedures. Recruitment was stratified by age and sex such that data were collected from at least 50 men and 50 women in each decade of life (20-29, 30-39, … 89+ years). Participants needed to be at least 20 years old and to speak and read English at a seventh-grade level. Only 1 member of cohabitating couples was permitted to partake in the study. Participants provided informed consent after reviewing study procedures and completed a battery of measures over a 2-week sampling period. Materials included 14 daily sleep diaries, a demographic and health survey, and questionnaires tapping mental health and daytime functioning that were filled out once sleep diaries were competed. Participants received financial compensation for their efforts.

A subset of participants from the overall sample was selected for analysis in the present study. First, individuals were excluded if they specified a race other than African American or White ($n = 10$). This allowed for dichotomous examination of race. Next, participants were excluded if they reported a sleep problem other than chronic insomnia ($n = 38$). Participants reporting the following sleep problems were excluded: sleep apnea ($n = 17$), periodic limb movements or restless legs ($n = 6$), narcolepsy ($n = 2$), insomnia occurring for less than 6 months ($n = 5$), hypersomnia ($n = 4$), and other sleep disorder ($n = 4$). Finally, participants were excluded if they had missing data on any measure examined as a discriminator ($n = 115$). Thus, the final analyzed sample comprised 608 participants. The original study and current procedures were conducted in accordance with the ethical standards outlined by the Institutional Review Board of the University of Alabama.

Measures

Demographics and health

An investigator-designed survey collected demographic information, including age, sex (1 = male, 2 = female), race (1 = African American, 2 = White), height and weight (to calculate body mass index; [BMI]), and highest years of education obtained by the participant or their spouse. The survey also prompted for health-related information, including total numbers of medications, alcoholic drinks per week, cigarettes per day, and caffeinated beverages per day. Participants additionally endorsed the presence or absence of common health conditions including heart disease, cancer, hypertension, diabetes, AIDS, gastrointestinal illness, urinary problems, neurological disease, respiratory illness, and pain. A total count of medical problems was calculated as the number of health conditions reported as present.

Complaint of chronic insomnia

The demographic survey was used to assess a complaint of poor sleep experienced for an extended period of time. Participants responded to the following series of prompts: "Do you have a sleep problem? If yes, describe. How long have you had this sleep problem?" Participants who endorsed a sleep problem, selected only "trouble falling asleep" and/or "long or frequent awakenings" to describe their problem, and reported that the problem had lasted at least 6 months were classified as having a chronic insomnia complaint characteristic of insomnia identity. Those who denied a sleep problem were categorized as noncomplaining sleepers. Individuals

who reported a sleep complaint other than chronic insomnia were excluded from analysis (n = 38).

Quantitative sleep impairment

Participants monitored their sleep for 14 days using sleep diaries, which yield estimates of quantitative parameters such as sleep onset latency (SOL) and wake time after sleep onset (WASO). Those reporting 31 or more minutes of either SOL or WASO on at least 3 nights per week during their 2-week sampling period were categorized as poor sleepers, whereas those who did not meet these conditions were categorized as good sleepers. The ≥31-minute criterion chosen for dichotomizing participants into good or poor sleepers has been found to achieve the best balance between sensitivity and specificity in correctly classifying individuals as having insomnia as compared to 3 other quantitative criteria commonly used for insomnia diagnosis in research (≥30, ≥40, and ≥60 minutes).[4]

Presence/absence of an insomnia complaint on the demographic survey and good/poor quantitative sleep on diaries classified participants into 4 sleep groups: noncomplaining good, noncomplaining poor, complaining good, and complaining poor sleepers.

Mental health and daytime functioning

Five questionnaires assessed domains of functional impairment. The Beck Depression Inventory (BDI)[21] is an established measure of depressive cognitions, affect, and behavior. Its 21 items are rated on a 4-point response scale, yielding a total score ranging from 0 to 63 of increasing depression.

The State-Trait Anxiety Inventory, Trait Scale, Form Y (STAI)[22] has established psychometric properties for detecting nervousness, worrying, and tension that denote anxious tendencies. Its 20 items are rated on a 4-point scale, yielding a total score ranging from 20 to 80 of increasing anxiety.

The Fatigue Severity Scale (FSS)[23] measures an individual's degree of fatigue during the day. It contains 9 statements scored on a 7-point scale of agreement, which produce an average from 1 to 7 of increasing fatigue. The FSS taps the fatigue construct independently of daytime sleepiness.

The Epworth Sleepiness Scale (ESS)[24] assesses daytime sleepiness on a 4-point scale measuring likelihood of falling asleep during 8 common activities. Total scores range from 0 to 24, with higher scores reflecting greater daytime sleepiness.

The Insomnia Impact Scale (IIS)[25] assesses insomnia-related distress across physical, cognitive, occupational, social, and emotional domains. It comprises 40 statements concerning the negative impact of poor sleep during the day, each rated on a 5-point scale to yield a total from 40 to 200. Higher score suggest higher perceived insomnia functional impact on functioning.

Statistical analysis

Discriminant analysis determines whether scores on a set of continuous or binary variables, called *discriminators*, are useful in predicting group membership on a categorical variable. One or more orthogonal discriminant functions are produced, each of which finds a linear combination of discriminators that maximizes separation across the groups. Strong discriminators (whose scores differ substantially between participants in the different categories) are weighted more heavily in computing the discriminant function score than weaker ones. A stepwise entry procedure may be specified to identify the smallest combination of discriminators that significantly contribute to distinguishing groups. The overall effectiveness of a set of discriminators can be assessed by how accurately the discriminant functions classify participants into categories.[26]

A stepwise discriminant analysis was conducted to evaluate 15 prospective discriminators (age, sex, White or African American race, BMI, highest years of education obtained by the participant or their spouse, number of medications, number of alcoholic drinks per week, number of cigarettes per day, number of caffeinated beverages per day, total number of medical conditions, BDI, STAI, FSS, ESS, IIS) of the 4 sleep groups (noncomplaining good sleepers, noncomplaining poor sleepers, complaining good sleepers, complaining poor sleepers). Using a forward stepwise procedure, variables were considered for model entry at each step according to how much they minimized the overall Wilks' Λ. A $P = .05$ criterion was designated for variables to be entered, and a $P = .06$ criterion was designated for previously entered variables to be retained in the model. To prevent multicollinearity, discriminators were removed if their entry would result in a tolerance below .40.[27] Data were analyzed using SPSS (version 24.0).

Results

Descriptive statistics and normality

To examine whether the final analyzed sample differed from excluded participants (n = 163), independent-samples *t* tests compared the 2 groups on the 15 examined discriminators, as well as on

Table 1
Demographic, health, and sleep characteristics of the analyzed sample (N = 608)

Variables	n	%
Sex		
Male	302	49.7
Female	306	50.3
Race		
African American	175	28.8
White	433	71.2
Complaint of chronic insomnia		
Yes	200	32.9
No	408	67.1
Endorsed medical problems		
Heart disease	82	13.5
Cancer	37	6.1
Hypertension	166	27.3
Diabetes	45	7.4
AIDS	1	0.2
Gastrointestinal problem	96	15.8
Urinary problem	82	13.5
Neurological disorder	18	3.0
Respiratory problem	63	10.4
Pain problem	173	28.5
	M	SD
Total number of medical problems	1.25	1.38
Age (y)	55.95	19.76
Highest education in household (y)	14.28	2.88
BMI	26.54	5.23
Total number of medications	2.3	2.31
Alcoholic drinks (/wk)	2.38	5.56
Caffeinated drinks (/d)	2.23	2.45
Cigarettes (/d)	3.41	9.00
Daytime functioning (measure score)		
BDI	8.15	6.79
STAI	35.66	10.05
FSS	3.59	1.36
ESS	8.74	4.18
IIS	100.57	23.96
Average daily sleep parameters (min)		
SOL	23.26	18.96
WASO	24.72	27.87
TST	420.11	66.64
SE (% time in bed sleeping)	86.02	9.03

Participants with a complaint of chronic insomnia reported trouble falling asleep or staying asleep lasting at least 6 months. SD = Standard Deviation; BMI = body mass index; BDI = Beck Depression Inventory; STAI = State-Trait Anxiety Inventory; FSS = Fatigue Severity Scale; ESS = Epworth Sleepiness Scale; IIS = Insomnia Impact Scale; SOL = sleep onset latency; WASO = wake time after sleep onset; ;TST, total sleep time; SE, sleep efficiency.

quantitative sleep disturbance (average SOL and WASO) and presence/absence of a chronic sleep complaint. Using a $P = .01$ criterion to connote a significant difference for the 18 comparisons, differences were observed on 3 variables. Analyzed participants were older (mean [M] = 55.95 years, SD = 19.76) than excluded participants (M = 45.69 years, SD = 17.86; $P < .001$), had a higher number of medications ($M = 2.30$, SD = 2.31) than excluded participants ($M = 1.76$, SD = 2.31; ;$P < .01$), and had lower STAI score ($M = 35.66$, SD = 10.05) than excluded participants ($M = 38.52$, SD = 12.44; ;$P < .01$).

Table 1 presents descriptive statistics characterizing the 608 participants in the analyzed sample. Based on insomnia complaint and quantitative sleep categorization, the sample comprised 320 (52.6%) noncomplaining good sleepers, 88 (14.5%) noncomplaining poor sleepers, 69 (11.3%) complaining good sleepers, and 131 (21.5%) complaining poor sleepers.

Several discriminators (sex; race; BMI; years of education; number of medications, alcoholic drinks, cigarettes, and caffeinated drinks; number of medical conditions; and BDI score) were observed to display skewness or platykurtosis greater than 2.0 in 1 or more sleep groups, indicating non-normality in their distributions.[28] This suggests a violation of the multivariate normality assumption of discriminant analysis.[26] However, results from studies considering up to 10 variables have indicated that deviation from multivariate normality has only a small impact on type 1 error.[29–32] In nearly all scenarios, non-normality of variables produced α levels within .02 of the actual α level when significance was specified as .05 or .10. Discriminant analysis is thus robust against normality violations with regard to distorted false-positive error rates.[26] Rather, multivariate non-normality has been observed to inflate type II error, depleting power in proportion to the number of affected groups.[26,32] Because model-entered discriminators reached significance at <.001 in the present analysis (see below), insufficient power did not necessitate data transformation.

Discriminant analysis

Discriminant analysis revealed that 5 of the 15 discriminators were retained in the final stepwise model, $\Lambda = .70$, $F(5, 3, 604) = 15.51$, ;$P <$ .001. Total count of medical conditions, $\Lambda = .85$, $F(3, 604) = 36.40$, ;$P <$ .001; depression score, $\Lambda = .85$, $F(3, 604) = 34.51$, ;$P < .001$; anxiety score, $\Lambda = .88$, $F(3, 604) = 26.61$, ;$P < .001$; age, $\Lambda = .95$, $F(3, 604) = 11.17$, ;$P < .001$; and race, $\Lambda = .96$, $F(3, 604) = 8.06$, ;$P <$ .001, significantly discriminated among the sleep groups. All of the variables displayed tolerance below .40, denoting acceptable levels of multicollinearity. Three discriminant functions were extracted from the final stepwise model, which collectively explained 30.4% (1 – Λ) of the variance between sleep groups. The first function ($\lambda = .35$, $R_c = .51$) accounted for 85.0% of the discriminatory power in the analysis, the second function ($\lambda = .06$, $R_c = .24$) accounted for 14.5%, and the third function ($\lambda = .002$, $R_c = .05$) accounted for the remaining .6%. Only the first 2 functions reached significance ($P < .001$) and are described further.

Figure 1 displays group centroids, which are mean participant scores on the 2 significant discriminant functions within each of the 4 sleep categories.[26] On the first function, the centroids were separated about evenly in the following order: noncomplaining good sleepers (−.47), noncomplaining poor sleepers (−.06), complaining good sleepers (.37), and complaining poor sleepers (1.00). Structural coefficients denoting the loadings of significant discriminators on the first function suggested that participants reporting a higher number of medical conditions ($r = .71$), greater depression ($r = .69$), greater anxiety ($r = .61$), and older age ($r = .38$) achieved higher discriminant scores and were thus more likely to be classified as having a chronic insomnia complaint at the first order and as having poor sleep at the second order. On the second function, the centroid for noncomplaining poor sleepers (−.59) was separated from those for noncomplaining good sleepers (.11), complaining good sleepers (.12), and complaining poor sleepers (.08). Structural coefficients revealed that this spread occurred primarily on the basis of race ($r =$ .81) such that, compared to Whites, African Americans were especially likely to be classified as noncomplaining poor sleepers rather than the other 3 sleep groups.

Fisher classification functions are used to categorize existing or novel participants into the 4 sleep groups according to the significant discriminators in the final stepwise model.[26] Classification functions for the present analysis are given in Table 2, along with counts and percentages of participants categorized into each sleep group based on the discriminant analysis, compared to their actual group membership. Group classification on the functions was correct 52.0% of the time, and model sensitivity and specificity were as follows.

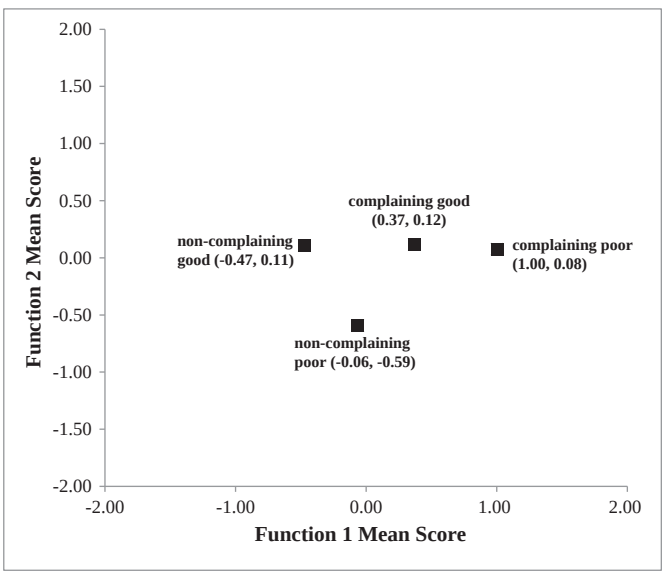

Fig. 1. Sleep group centroids on the 2 significant discriminant functions produced by the discriminant analysis. The x- and y-axis coordinates of each point represent group centroids on the first and second discriminant functions extracted. Centroids are mean scores on the discriminant functions across all participants categorized in each sleep group.

Table 2
Observed and model-predicted classifications of participants into the 4 sleep groups

Observed sleep group membership		Predicted sleep group membership			
	n (%)	Complaining poor	Complaining good	Noncomplaining poor	Noncomplaining good
Complaining poor	131 (100%)	**70 (53.4%)**	26 (19.8%)	19 (14.5%)	16 (12.2%)
Complaining good	69 (100%)	19 (27.5%)	**20 (29.0%)**	12 (17.4%)	18 (26.1%)
Noncomplaining poor	88 (100%)	13 (14.8%)	13 (14.8%)	**40 (45.5%)**	22 (25.0%)
Noncomplaining good	320 (100%)	34 (10.6%)	32 (10.0%)	68 (21.3%)	**186 (58.1%)**

The 2 leftmost columns display the actual observed distribution of complaining poor, complaining good, noncomplaining poor, and noncomplaining good sleepers as classified by chronic insomnia complaint and quantitative criteria for sleep impairment. The next 4 columns display group membership predicted by the discriminant analysis. Percentages across each row reflect the proportions of individuals within each actual sleep group that are classified among the sleep groups by model predictions. Numbers and percentages of participants correctly classified into each sleep group appear in bold text. In total, 52.0% of participants were correctly classified by the model.
The discriminant model classifies participants into groups using Fisher linear classification equations. An individual's discriminator scores are entered into each group's equation, and the individual is classified into whichever group whose equation attains the largest value. Fisher equations for the 4 sleep groups were as follows:

1. Noncomplaining good sleepers = –.82(medical condition count) – .46(BDI) + .76(STAI) + .23(age) + 9.45(race) – 26.41.
2. Noncomplaining poor sleepers = –.83(medical condition count) – .39(BDI) + .75(STAI) + .25(age) + 8.10(race) – 25.44.
3. Complaining good sleepers = –.51(medical condition count) – .41(BDI) + .80(STAI) + .23(age) + 9.63(race) – 29.58.
4. Complaining poor sleepers = –.15(medical condition count) – .39(BDI) + .84(STAI) + .24(age) + 9.51(race) – 31.95.

Classification of individuals as noncomplaining good sleepers was accurate 58.1% of the time, whereas nonclassification was correct 80.6% of the time. Classification as a noncomplaining poor sleeper was accurate 45.5% of the time, whereas nonclassification was correct 76.3% of the time. Classification as a complaining good sleeper was accurate 29.0% of the time, whereas nonclassification was correct 86.8% of the time. Classification as a complaining poor sleeper was accurate 53.4% of the time, whereas nonclassification was correct 86.2% of the time.

Discussion

The most powerful discriminant function maximizing spread across the sleep groups distinguished individuals principally according to whether they endorsed an insomnia identity and secondarily by whether they displayed quantitative sleep impairment. A poor sleep complaint thus superseded actual sleep parameters in being meaningfully separated by analyzed demographic, health, and daytime functioning discriminators. Participants with more medical conditions, greater depression and anxiety, and older age were more likely to endorse a complaint of insomnia than to not endorse a complaint, and within these categories, they were more likely to have poor quantitative sleep than good sleep. Number of medical conditions is likely an index of physical suffering and incapacitation, which would expectedly compromise sleep pattern integrity. It may also color how individuals perceive their sleep functioning, as those in generally poor health might reflexively conclude that they must have insomnia as well. An alternative, characterological interpretation is that people who tend to complain of health issues are more likely to report both sleep and medical problems in general. Compared to medical disease count, increased age was a very modest discriminator of sleep groups. This finding is unsurprising given evidence that sleep quality slowly declines across the life span.[20]

Perhaps more intriguingly, facets of daytime functioning that would presumably be very salient to a complaint of poor sleep (fatigue, sleepiness, insomnia impact) were not significant discriminators of sleep groups when considered in the context of all tested variables. Instead, the stepwise model entered measures signifying overall psychological distress (ie, depression and anxiety). This suggests that long-term convictions of poor sleep may be more closely tied to a diffuse psychological syndrome than to sleep-related impairment per se. If insomnia identity is indeed best characterized by broadly negative appraisals, with implications for functioning as a whole that extend beyond sleep-specific domains, then reductions in depressive or anxious cognition might diminish a “poor sleeper” self-image regardless of other facets of sleep. There is certainly support for the reverse: traditional cognitive-behavioral therapy for insomnia appears to elicit nonsleep benefits in general well-being (eg, more productivity, higher self-esteem, less depression and suicidality).[33] Perhaps this is not merely accomplished by increasing sleep health but by helping patients develop a more confident outlook toward sleep that diminishes negative self-views and thereby reduces insomnia identity. Notably, participants with higher depression reported less change in their expectations about sleep after treatment.[33] Future studies could conversely explore whether psychotherapy targeting pervasively negative patterns of thinking reduces a self-evaluation of chronic insomnia even independently of changes in self-reported quantitative sleep or tiredness during the day. Acceptance and commitment therapy may be a particularly useful paradigm for dislodging rigidly held beliefs about one’s own sleep, as it emphasizes letting go of concrete conceptualizations of the self that cause stagnancy and inhibit growth in the face of shifting experience.[34]

Unexpectedly, a second discriminant function emerged indicating that African Americans were particularly likely to be classified as noncomplaining poor sleepers compared to Whites. It is possible that African Americans tend to apply more stringent criteria in defining insomnia. For example, cultural differences may preclude African Americans from labeling themselves with insomnia unless they suffer sleep symptoms every single night of the week, whereas Whites conclude that they have insomnia when they experience disturbed sleep more intermittently. Alternatively, African Americans may experience more hardship in other domains to which they attribute distress before considering the impact of their sleep pattern. In any case, this finding implies that cultural or socioeconomic differences might have important ramifications for developing an insomnia identity.

Although the discriminant model’s overall classification accuracy of 52.0% was better than the expected random success rate (25.0%), there is nevertheless great room for improvement. Future studies should focus on identifying novel important discriminators, particularly for separating complaining good sleepers from other groups. Given that depression and anxiety were relatively strong discriminators, measures tapping respondents’ degree of emotional instability may prove to be even better at distinguishing those who invariably regard their sleep as poor. For example, greater neuroticism predicts insomnia severity via sleep-related cognitive distortions and presleep arousal[35,36] and may thereby gradually facilitate a lasting insomnia complaint by predisposing individuals to unrealistic sleep beliefs or low tolerance for mild disruptions.

Social comparisons are another potentially fruitful area of exploration, as they influence how individuals conceive of themselves.[37] Those who self-identity as a person with insomnia have likely appraised their habitual sleep as lacking relative to perceived norms. One study[38] found that participants who reported personally

experiencing more fatigue and nonrestorative sleep than what they believed is normal for healthy peers also endorsed greater sleep-related distress and medical or interpersonal support seeking. This relation occurred independently of participants' self-described sleep duration. Perhaps reducing idealized expectations of good sleep (eg, "healthy people get at least seven hours of sleep per night") can ameliorate chronic insomnia complaints by normalizing ordinary sleep problems.

Despite its potential for improvement, the present discriminant model still has clinical implications. Determining whether patients presenting with a chronic sleep problem also display concordant quantitative sleep deficits on 14 daily diaries may be impractical, particularly in primary care environments. By contrast, questionnaires that need only be administered once and measure discriminators of insomnia self-identification (depression, anxiety, tendency to describe or feel overwhelmed by multiple health issues) may offer useful insight into a patient's presenting sleep complaint. For example, scores on such measures might suggest that closer attention to a patient's negative self- or health-related cognitive appraisals and psychosocial stressors is warranted instead of focusing future assessment and treatment planning squarely on a supposed quantitative sleep deficit. Furthermore, race's significance as a discriminator suggests that clinicians should be mindful of how cultural differences may bear on how their patients perceive or report on sleep problems and that research-derived standards of what constitutes "poor" sleep are not necessarily universal.

The present study has several limitations. Firstly, a single question was used to identify and exclude 38 participants with sleep disorders other than chronic insomnia. This may underestimate actual sample prevalence, as population studies have observed considerably higher rates of sleep apnea (3%-7%)[39] and restless legs or periodic limb movements (9.4%).[40] New research should screen for sleep disorders more comprehensively. Additionally, about 16% of the full sample was excluded from analysis because of missing data. Included participants were a decade older on average than excluded ones, had slightly more medications, and experienced slightly less anxiety on the STAI, which may impact the generalizability of findings. Another limitation is that the dataset lacks a quantitative index of daily early morning awakenings, a primary insomnia symptom alongside difficulties initiating or maintaining sleep.[2] Early morning awakening may be important for classifying good vs poor quantitative sleep or have different concordance with insomnia identity compared to other sleep parameters. Finally, participants' quantitative sleep status was determined by self-report diaries rather than objective PSG. Nevertheless, the present results are in a sense *more* impressive because participants' self-reported sleep problem often disagreed with their self-reported daily sleep pattern, reflecting discrepancy between 2 subjective estimates.

Conclusions

The present study makes progress in understanding self-identification as a chronic poor sleeper by highlighting number of medical conditions, depression, anxiety, age, and race as particularly prominent indicators and sets a precedent for more refined investigations in the future.

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