Original Article

Subjective-Objective Sleep Discrepancy in Older Adults With MCI and Subsyndromal Depression

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Abstract

Background/Objectives: We investigated the prevalence and correlates of discrepancies between self-reported sleep quality (Pittsburgh Sleep Quality Index) and objective sleep efficiency (actigraphy) in older adults with mild cognitive impairment (MCI) and subsyndromal depression. **Methods:** This was a secondary analysis of a clincial trial with 59 adults aged 60 years and older with MCI and subsyndromal depression. We included baseline data on participants' subjective sleep quality, objective sleep efficiency, depressive symptoms, insomnia diagnosis, and cognitive functioning. **Results:** Pittsburgh Sleep Quality Index subjective sleep quality and actigraphy-measured sleep efficiency were not significantly correlated ($r = -.06$; $P = .64$), with 61% of participants having subjective-objective sleep discrepancies. Correlates of subjective-objective sleep discrepancy included the presence of an insomnia diagnosis and impaired memory, particularly delayed memory. **Conclusion:** These findings are important because subjective underestimation of symptoms in older adults with memory impairments may result in sleep disturbances going unrecognized in clinical practice; on the other hand, an insomnia disorder may be a possible remediable contribution to subjective overestimation of sleep disturbances.

Keywords

older adults, MCI, sleep, depression

Introduction

Aging is associated with a decline in sleep quality, and sleep complaints are widespread among older adults.[1] As many as 40% of older adults report sleep problems, including disturbed or "light" sleep, frequent awakenings, early morning awakenings, and excessive daytime sleepiness.[2] Relative to age-matched cognitively normal controls, older adults with cognitive impairment have changes in the architecture and circadian timing of sleep.[3,4] Therefore, sleep complaints may be particularly prevalent in older adults with cognitive impairment. Indeed, 7% to 49% of older adults with mild cognitive impairment (MCI) report sleep disturbances.[5] Moreover, poor sleep quality in older adults is associated with increased risk of developing cognitive impairment and dementia.[6-8] Implementing effective behavioral (eg, brief behavioral treatment for insomnia and cognitive behavioral therapy for insomnia) and pharmacotherapy (eg, benzodiazepine receptor modulators, sedating antidepressants, melatonin receptor agonists, and orexin receptor inhibitors) treatments may improve sleep quality, which in turn may serve to decrease the progression of decline to dementia.[9-12]

Because of frequent mismatch between subjective reports of sleep quality (reported with self-report measures like the Pittsburgh Sleep Quality Index [PSQI])[13] and objective measures of sleep architecture or movement (assessed with polysomnography or actigraphy), it is frequently challenging for clinicians to know whether patients with self-reported poor sleep are truly

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candidates for treatment or whether those who self-report adequate sleep are overestimating and may in fact benefit from more in-depth assessment of sleep quality.[14-16] For instance, subjective-objective sleep discrepancies have been found to be greater and more variable across nights in older adults who meet diagnostic criteria for insomnia disorder compared to older adults with good sleep.[17] Among older patients with cognitive impairment or MCI, accurate assessment of sleep quality may be especially challenging. Poor cognitive functioning has been shown to result in overestimating sleep duration compared to actigraphy.[16] There is also a well-established relationship among cognitive impairment, sleep complaints, and depressive symptoms which may further complicate clinical assessment.[5,18-21] Since depression has been linked to a negative cognitive bias, its presence may impair self-assessment of symptomatology.[22,23] Therefore, it is unclear to what degree a depressed patient's self-reported poor sleep quality is reflective of a negative cognitive bias associated with depression versus actual sleep disturbance.

Studying correlates of subjective-objective sleep discrepancy (eg, cognition, depression, and diagnosis of insomnia) may help inform treatment planning for older adults with MCI and subsyndromal depression. Using baseline data from the Retaining Cognition while Avoiding Late-Life Depression study,[24] we investigated the prevalence and correlates of discrepancies between self-reported sleep quality (measured with the PSQI)[13] and objective sleep efficiency (actigraphy) in older adults with both MCI and subsyndromal depression. We hypothesized that self-reported sleep quality would not be significantly correlated with objectively measured sleep efficiency.[14] We also hypothesized that (1) cognitive impairments would be associated with positive sleep discrepancy (ie, self-reported sleep quality was good but actigraphy-measured sleep efficiency was poor or average) and (2) presence of depressive symptoms and an insomnia diagnosis would be associated with negative sleep discrepancy (ie, self-reported sleep quality was poor but actigraphy-measured sleep efficiency was average or good).

Methods

This study included baseline data from a project which investigated the efficacy of problem-solving therapy (PST) and combined PST + moderate-intensity physical exercise versus an enhanced usual care condition in preventing depression and anxiety disorders over 12 months in older individuals with MCI and subsyndromal depression.

Participants and Recruitment

Participants were recruited from primary care physician offices, senior centers, community agencies, and the University of Pittsburgh Alzheimer Disease Research Center. To be included in the study, participants had to (a) be aged 60 years or older; (b) have received a score of greater than 1 on the Patient Health Questionnaire (PHQ-9),[25] with at least a score of 1 on question 1 or 2 (ie, depressed mood or anhedonia); (c) not meet criteria for a current major depressive episode or anxiety disorder (except for specific phobia), using the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition)-IV (SCID)[26]; (d) have adequate physical and sensory function to participate in neuropsychological assessment; and (e) be able to engage in moderate-intensity exercise (eg, brisk walking 30 minutes 3 times a week). Exclusion criteria were (a) a lifetime history of schizophrenia or bipolar disorder diagnosed by the SCID, (b) a diagnosis of substance abuse or major depressive disorder in the past year diagnosed by the SCID, (c) the presence of any disorder affecting the central nervous system (eg, multiple sclerosis and stroke), or (d) currently prescribed an antidepressant. Of the 73 eligible participants, 11 did not have baseline actigraphy data (ie, lost to contact, noncompliant with procedures, or withdrew consent), and another 3 were excluded for having less than 72 hours of baseline actigraphy data. Univariate analyses (χ^2 tests, *t* tests) showed there were no significant differences among the demographic or pretreatment outcome scores between the current sample ($n = 59$) and the larger study group ($n = 73$).

A 2-step process was employed to diagnosis MCI. First, participants were administered a cognitive screening battery, which included the Modified Mini-Mental State Exam,[27] Trail Making Tests Parts A and B,[28] Digit Symbol Substitution Test,[29] and the Quick Mild Cognitive Impairment Screen (Qmci)[30]; individuals who scored within the normal range (<1 standard deviation [SD] below normed mean) or dementia range (>2 SD below normed mean) on all 3 tests and/or Qmci were excluded. Those who scored between >1 SD and <2 SD below the normed mean on any test progressed to a comprehensive assessment to confirm MCI status. The comprehensive assessment involved the Wide Range Achievement Test-IV Reading subtest,[31] Repeatable Battery for the Assessment of Neuropsychological Status (RBANS),[32] Delis-Kaplan Executive Function System (D-KEFS) Trail Making and Color-Word Interference Tests,[33] Informant Questionnaire on Cognitive Decline in the Elderly,[34] 3-item version of the Performance Assessment of Self-Care Skills,[35] Clinical Dementia Rating Scale,[36] and the Unified Parkinson Disease Rating Scale.[37] A neuropsychologist, neurologist, and geriatric psychiatrist reviewed results at a diagnostic adjudication conference. The National Alzheimer Coordinating Center comprehensive criteria/Revised Petersen criteria was used to diagnose MCI.[38]

Measures

Sleep quality. Patient-reported sleep quality was assessed with the subjective sleep quality item on the PSQI.[13] Specifically, participants were asked to rate their overall sleep quality during the past month with responses ranging from very good (0) to very bad.[3] Individuals were then classified as having either good (ie, very good or fairly good) or poor (ie, fairly bad or very bad) sleep quality. The internal consistency for the PSQI is high ($\alpha = .83$) indicating each item measures part of a coherent

overall construct. Subjective sleep quality has one of the highest component-total correlation coefficients ($r = .83$, $P = .001$).[13]

We used actigraphy to objectively measure sleep efficiency (Body Media SenseWear, Model MF-SW, Pittsburgh, PA). The device was worn directly on the skin of the left arm triceps. It uses a 3-axis accelerometer which also measures heat flux, skin temperature, and galvanic skin response. Participants wore the device between 4 and 10 days (M = 6.6 days). All data were extracted and analyzed using the SenseWear 7.0 software. Sleep efficiency is the percentage of total sleep time divided by total time in bed. It was calculated on a night-by-night basis and these scores were averaged. Individuals were classified as having (1) good sleep efficiency based on score $\geq$85, (2) poor sleep efficiency based on score $\leq$75, or (3) average sleep efficiency based on score <85 and >75.[13,39]

Insomnia diagnosis. A clinician-administered diagnostic interview was completed to diagnose insomnia (based on the SCID).[26] Participants were categorized as having either threshold, subthreshold, or no insomnia. A value label of "1" was assigned for no insomnia, "2" for subthreshold insomnia, and "3" for threshold insomnia.

Cognition. Memory was assessed with the RBANS.[32,33] Immediate memory was assessed through list learning and story memory tasks. Delayed memory consisted of list and story recall, as well as list recognition and figure recall. The individual test scores are combined into index scores (in this case the Immediate Memory Index and the Delayed Memory Index). Each index is reported as standard score with a mean of 100 (15). Executive function (ie, set shifting and inhibition) was evaluated with the Trail Making Test and the Color Word Interference Test of the D-KEFS, respectively.[33] The Trail Making Test condition 4 (also known as the Number-Letter Switching condition) requires participants to switch back and forth between connecting numbers and letters (ie, 1, A, 2, B, . . . 16, P). Condition 5 is a motor speed condition in which participants trace over a dotted line connecting circles on the page as quickly as possible to gauge their motor drawing speed. Comparing performance on condition 4 (which assesses cognitive flexibility) with performance on condition 5 (which assesses motor speed) removes the motor speed element from the test score to ascertain a more "pure" measure of cognitive flexibility. Color Word Interference condition 3 assesses the ability to inhibit an automatic response (ie, reading words), in favor of producing a response that requires more effort (ie, naming the colors of words). Scaled scores for the D-KEFS tests have a mean of 10 (3).

Depression. The PHQ-9[25] was used to assess depression, with total scores on this measure ranging from 0 to 27. Reliability and validity of the measure have indicated that it has sound psychometric properties.[25] To remove the effect of sleep, the sleep item was subtracted from the total score to create a modified PHQ-9 total score.

Table 1. PSQI and Actigraphy Categories by Subjective-Objective Sleep Discrepancy Group.[a]

Positive Sleep Discrepancy	No Sleep Discrepancy	Negative Sleep Discrepancy
Good PSQI, poor actigraphy (n = 5)	Good PSQI, good actigraphy (n = 20)	Poor PSQI, average actigraphy (n = 8)
Good PSQI, average actigraphy (n = 14)	Poor PSQI, poor actigraphy (n = 3)	Poor PSQI, good actigraphy (n = 9)

Abbreviation: PSQI, Pittsburgh Sleep Quality Index.
[a]Negative sleep discrepancy represents participants whose PSQI subjective sleep quality item indicated worse sleep than actigraphy-measured sleep efficiency; no sleep discrepancy represents participants whose PSQI subjective sleep quality item and actigraphy-measured sleep efficiency were in agreement; and positive sleep discrepancy represents participants whose PSQI subjective sleep quality item indicates better sleep than actigraphy-measured sleep efficiency.

Calculating the Subjective-Objective Sleep Discrepancy Variable

The subjective-objective sleep discrepancy variable was based on the concordance and the direction of discordant responses between PSQI subjective sleep quality and objective sleep efficiency, which included negative sleep discrepancy (ie, PSQI subjective sleep quality was poor but actigraphy-measured sleep efficiency was average or good), no sleep discrepancy (ie, PSQI subjective sleep quality matched actigraphy-measured sleep efficiency), and positive sleep discrepancy (ie, PSQI subjective sleep quality was good but actigraphy-measured sleep efficiency was average or poor; see Table 1). A value label of "1" was assigned for negative sleep discrepancy, "2" for no sleep discrepancy, and "3" for positive sleep discrepancy.

Data Analysis

We used measures of central tendency to describe the demographic and clinical characteristics of the sample as defined by the subjective-objective sleep discrepancy group (ie, positive sleep discrepancy, no sleep discrepancy, and negative sleep discrepancy). We used Pearson product-moment correlation to assess the association between noncategorized self-reported sleep quality and actigraphy-measured sleep efficiency. To examine differences between subjective-objective sleep discrepancy groups, continuous variables were compared using analysis of variances, and categorical variables were compared using χ^2 test. To examine independent correlates of sleep discrepancy, variables that were significantly different across subjective-objective sleep discrepancy groups were entered into a stepwise linear regression model as independent variables with the subjective-objective sleep discrepancy variable as the outcome. Since there was little theory to guide our selection of variables for the model, a stepwise linear regression was chosen to interactively explore which variables seemed to be a good fit. P values of .05 or less were considered

Table 2. Demographic and Clinical Characteristics of the Sample (n = 59) Stratified by Subjective-Objective Sleep Discrepancy Group.

Variable	Subjective-Objective Sleep Discrepancy Group			Statistical Test; *P* Value
	Positive Sleep Discrepancy, n = 19 (32.2%)	No Sleep Discrepancy, n = 23 (39.0%)	Negative Sleep Discrepancy, n = 17 (28.8%)	
Age	74.3 ± 8.1	73.2 ± 8.4	76.7 ± 9.5	$F = .7$; $P = .42$
Gender				$\chi^2 = 4.1$; $P = .13$
Female	11 (39.7)	12 (32.4)	14 (37.8)	
Male	8 (36.4)	11 (50.0)	3 (13.6)	
Race				$\chi^2 = 3.3$; $P = .19$
White	12 (27.3)	20 (45.5)	12 (27.3)	
Non-white	7 (46.7)	3 (20)	5 (33.3)	
Education	14.2 ± 3.1	15.4 ± 2.3	15.5 ± 2.4	$F = 2.3$; $P = .14$
Qmci	54.5 ± 11.7	56.5 ± 9.2	56.8 ± 6.5	$F = .02$, $P = .56$
PHQ-9 score	5.0 ± 1.8	4.3 ± 2.2	6.1 ± 2.7	$F = 1.8$; $P = .19$
Insomnia diagnosis				$\chi^2 = 21.5$; $P < .001$
Threshold	3 (15)	4 (20)	13 (65)	
Subthreshold	10 (47.6)	8 (38.1)	3 (14.3)	
Not present	6 (33.3)	11 (61.1)	1 (5.5)	
Sleep variable[a]				
Total time in bed	49.7 ± 10.4	57.4 ± 15.0	48.5 ± 13.3	$F = .03$; $P = .86$
Total sleep time	37.6 ± 9.2	50.1 ± 13.1	41.4 ± 12.2	$F = 1.0$; $P = .32$
Memory				
Immediate	90.1 ± 12.7	93.9 ± 11.5	101.3 ± 15.4	$F = 6.6$; $P = .01$
Delayed	87.0 ± 13.4	92.2 ± 11.7	97.2 ± 11.6	$F = 6.5$; $P = .01$
Executive functioning				
Trail making	8.7 ± 3.3	9.8 ± 3.6	9.2 ± 3.4	$F = .3$; $P = .61$
Color Word Inference	9.3 ± 3.2	10.2 ± 3.9	9.5 ± 4.9	$F = .03$; $P = .85$

Abbreviations: Qmci, Quick Mild Cognitive Impairment Screen; PHQ-9, Patient Health Questionnaire.
[a]The PHQ-9 was used to assess depression, with total scores ranging from 0 to 24. Memory was reported as standard scores with a mean of 100 (15). Executive functioning was reported as normed scaled scores with a mean of 10 (3).
[b]Average number of hours across the days the participant wore the device (M = 6.6 days).

significant. All analyses were conducted using SPSS version 21.0 for Windows.

Results

The demographic and clinical characteristics of the participants are presented in Table 2, stratified by subjective-objective sleep discrepancy group. This sample of older adults (mean age in years = 74.5 [8.6]) was largely female (62.7%), white (74.6%), and had an average of 15 years of formal education. All of the participants had subsyndromal symptoms of depression (PHQ-9 mean score = 5.0 [2.3]). About 34% of the sample was considered to have threshold insomnia, and an additional 36% met criteria for subthreshold insomnia. Participants had a mean score of 55.9 on the Qmci, which supports a diagnosis of MCI. These participants also performed at the low end of the average range on Immediate (M = 94.8 [13.6]) and Delayed (M = 91.9 [12.7]) Memory Index scores and on measures of executive functioning (Trail Making Task: M = 9.3 [3.4]; Color Word Interference Task: M = 9.7 [4.0]). There was little night-by-night variability in sleep efficiency (average SD = .09), and scores did not vary as a function of average time wearing the device ($F[1,56] = .47$, $P = .50$).

Prevalence of Subjective-Objective Sleep Discrepancy

Pittsburgh Sleep Quality Index subjective sleep quality and actigraphy-measured sleep efficiency were not significantly correlated ($r = -.06$; $P = .64$), with 61% of participants having subjective-objective sleep discrepancies (positive sleep discrepancy = 32.2%; negative sleep discrepancy = 28.8%). The remaining 39% of older adults had no sleep discrepancy between self-reported sleep quality and actigraphy-measured sleep efficiency (Table 1).

Correlates of Subjective-Objective Sleep Discrepancies

Participant demographics (ie, age, gender, race, and educational attainment), depressive symptoms, and executive functioning (set-shifting and inhibition) were not significantly different across subjective-objective sleep discrepancy groups. Insomnia diagnosis ($\chi^2 = 21.5$, Cramer V = .43, $P < .001$), Immediate Memory ($F[1,57] = 6.6$, $P = .01$), and Delayed Memory ($F[1,57] = 6.5$, $P = .01$) were significantly different across subjective-objective sleep discrepancy groups. Participants with threshold insomnia (65%) were more likely to have negative sleep discrepancy (ie, PSQI subjective sleep quality was poor but actigraphy-measured sleep efficiency was

average or good) than those with subthreshold insomnia (14.3%) or no insomnia (5.5%). Participants with positive sleep discrepancy (ie, PSQI subjective sleep quality was good but actigraphy-measured sleep efficiency was average or poor) had significantly lower Immediate (90.1 ± 12.7 vs 101.3 ± 15.4; $t = 2.4$, $P = .02$) and Delayed (86.9 ± 13.4 vs 97.2 ± 11.6; $t = 2.5$, $P = .02$) Memory Index scores than those with negative sleep discrepancy. Compared to the no discrepancy group, both the positive and negative sleep discrepancy groups were not significantly different in Immediate and Delayed Memory Index scores (all P values > .05). Subsequent stepwise regression analyses (insomnia diagnosis, immediate memory, and delayed memory entered into the model) revealed that insomnia diagnosis ($\beta = -.37$, $P = .002$) and delayed memory ($\beta = -.27$, $P = .03$) explained 24% of the variance in subjective-objective sleep discrepancy groups ($F[2,56] = 8.8$, $R^2 = .24$, Cohen $f2 = .31$, $P < .001$).

Discussion

This is the first study to explore subjective-objective sleep discrepancy in older adults with MCI and subthreshold depression. We found that self-reported sleep quality was not significantly correlated with actigraphy-measured sleep efficiency.[14] This observation supports that these subjective and objective assessments—while both provide valuable information—are measuring different aspects of sleep. Of the 59 older adults in our sample, approximately 39% had no sleep discrepancy between their self-reported sleep quality and actigraphy-measured sleep efficiency. Interestingly, in a study using the same approach to categorize subjective-objective sleep discrepancy, concordance rates were 19.4% in a sample of cognitively intact older adults.[39] Presence of an insomnia diagnosis and impaired memory, particularly delayed memory, may be significant explanatory variables in understanding subjective-objective sleep discrepancy in this population.

Limitations of earlier studies that explored the role of cognition as a determinant of subjective-objective sleep discrepancy is that brief cognitive screeners, such as the Montreal Cognitive Assessment[40] or Mini-Mental State Examination,[41] were used as an indicator of overall cognitive functioning. Compared to these brief cognitive screeners, the RBANS and D-KEFS are more specific and therefore are better at characterizing cognitive status.[42] Our results suggest that impairments in executive functioning may not interfere with a person's ability to evaluate sleep disturbances over the past month. However, both immediate and delayed memory functioning may contribute to a positive discrepancy. The opposite pattern has been found in cognitively intact older adults.[39] Therefore, impaired memory, which interferes with accurate recollection, may explain this mismatch between self-reported sleep quality and actigraphy-measured sleep efficiency.[43,44]

A large proportion of our MCI sample was considered to have threshold (34%) or subthreshold (36%) insomnia. In support of our hypothesis and consistent with prior research,[17] we observed that the presence of an insomnia diagnosis was associated with negative sleep discrepancy. On the other hand, people who are not diagnosed with insomnia tend to have the opposite pattern.[45,46] It is plausible that actigraphy failed to capture poor sleep in participants with insomnia[9,17]; for example, a person who lies awake but remains physically still when in bed is often considered to be asleep with actigraphy. There is also variability among the different actigraphy devices and the variety of algorithms used to evaluate actigraphy data.[47,48] Additionally, negative sleep discrepancy has been linked to heightened brain activity during polysomnography[49] suggesting that underlying sleep disturbance may accurately be perceived by patients but require more refined objective measures.[50]

Contrary to our hypothesis, the presence of depressive symptoms was not associated with negative sleep discrepancy. Prior research showed that mood status upon awakening explained the magnitude of difference between subjective and objective sleep measurement.[51] Baillet and colleagues suggested that slow wave sleep may adversely affect mood leading to the underestimation of total sleep duration.[51] One explanation for our null findings is that there was not enough variability in depressive symptomatology in our sample since participants were required to have subthreshold depressive symptoms and those with a formal diagnosis of major depressive disorder within the past year were excluded. Post hoc exploratory analyses showed that PHQ-9 total scores were significantly correlated with PSQI subjective sleep quality ($r = .31$, $P = .02$). Additionally, participants with negative sleep discrepancy had significantly greater depression (6.1 ± 2.7 vs 4.3 ± 2.2) than those with no sleep discrepancy, $t = 2.3$, $P = .03$. Therefore, the PSQI may describe typical sleep complaints, which may be more indicative of a negative cognitive bias and general dissatisfaction associated with depression, than physiological sleep disturbances, as measured with actigraphy.[14]

Limitations

The study participants were mildly cognitively impaired older adults who were largely female, white, and well educated with subsyndromal depression. Therefore, generalizability of results may be specific to community-dwelling older adults with these demographic and clinical features. Our sample size was also relatively small; therefore, null findings may be due to insufficient power.[52] Another limitation is the temporal difference in the sleep assessments from a 1-month retrospective account with the PSQI to a present measurement with actigraphy.[13] However, the Consensus Sleep Diary (CSD),[53] which assesses sleep efficiency in the present moment, has been found to be strongly associated with PSQI sleep quality.[39] Such findings suggest that sleep quality does not change significantly from the month preceding actigraphy recordings. Perhaps, the most significant limitation is that our approach to categorization of subjective-objective sleep discrepancy precluded an estimation of concordance for participants with average actigraphy-measured sleep efficiency. Even though this method to

categorize subjective-objective sleep discrepancies has been used in a previous study,[39] it is still an imperfect approach. While we are not able to describe the correlation between average sleep efficiency with average self-reported sleep quality, our focus on describing concordance for participants with good and bad sleep efficiency still has implications for clinical care and advances our understanding of this phenomenon. We encourage future studies of concordance between subjective-objective measures to consider taking a continuous approach to analysis. Future studies may also consider using more thorough subjective (eg, CSD) and objective (eg, polysomnography) measures to explore the subjective-objective discrepancy on a variety of sleep outcomes (eg, total sleep time, sleep onset latency, and wake time after sleep onset) in older adults with MCI.

Clinical Implications

These analyses shed new light on the prevalence and correlates of subjective-objective sleep quality discrepancies in older adults with MCI and subsyndromal depression. More than half of our sample had discrepancy between subjective sleep quality and objective sleep efficiency. Correlates of subjective-objective sleep discrepancy included the presence of an insomnia diagnosis and impaired memory, particularly delayed memory. Our findings suggest that clinicians assessing sleep complaints in older adults with memory impairments may consider conducting a more thorough subjective and/or objective sleep evaluation, such as administering the complete PSQI, using polysomnography, and acquiring collateral information on sleep from a caregiver or spouse. Due to the risk profile of many sedative hypnotics, there is a significant and growing body of evidence that these medications should be used sparingly or avoided in older adults[54,55] and should be considered only as a secondary option confined to brief treatment periods. Rather, cognitive and/or behavioral treatments, such as brief behavioral treatment for insomnia and cognitive behavioral therapy for insomnia, are the recommended interventions for sleep disturbances.

It remains unknown whether PSQI subjective sleep quality reflects disturbances specific to sleep that are distinct from depression. Therefore, it is unclear to what degree a patient's self-reported poor sleep quality is reflective of a negative cognitive bias associated with depression versus actual sleep disturbance.[14] Nevertheless, self-report of sleep disturbances should be used along with patients' other clinical information to inform symptom management. Additional research is needed with a more clinically depressed sample to elucidate the role of depression in subjective-objective sleep discrepancy. Regardless, depression and insomnia frequently co-occur, particularly in older adults with MCI.[20,56] Therefore, it is recommended that clinicians assess for and treat depressive symptoms in older adults with sleep complaints while continuing to be mindful that negative cognitive bias may interfere with the patient's ability to self-assess and report their symptomology.

Authors' Note

The attitudes expressed are those of the authors and do not necessarily reflect those of the Pittsburgh VA Healthcare System, Department of Veterans Affairs, or US government. Dr DiNapoli, Dr Gebara, and Ms Kho were responsible for the study concept, data analyses, and interpretation of data. Dr Karp oversaw all aspects of the study. Acquisition of subjects and/or data came from a clinical trial that was run by Drs Butters, Gildengers, Albert, Dew, Karp, and Reynolds. Dr Erickson assisted with the collection and interpretation of actigraphy data. All authors assisted with the preparation of the manuscript. The funding source (P30 MH90333 and P50 AG 005133) had no involvement with the design, methods, subject recruitment, data collections, analysis or preparation of paper.

Declaration of Conflicting Interests

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