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Nursing Home Eligible, Community-Dwelling Older Adults' Perceptions and Beliefs About Sleep: A Mixed-Methods Study

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Abstract

Sleep disturbances are highly prevalent in older adults; little is known about sleep in those who remain living in the community despite qualifying for nursing home placement. We conducted a concurrent, nested, mixed-methods study to describe sleep characteristics and sleep disturbances in this population. Our final sample ($n = 40$) was Black (100%), female (85%) older adults with a mean ($\pm SD$) age of 72 ± 9.5 years. Of these, 35 had objectively measured short or long sleep duration, and 30 had subjectively reported poor sleep quality. Our evidence suggests that sleep disturbances are common in this group, and these older adults had adjusted their expectations and adapted to their sleep disturbances. Given that at-risk older adults may not perceive their sleep disturbances as problematic, clinicians must proactively assess sleep and educate about the importance of sleep. These results reveal modifiable factors with potential to improve health outcomes in this vulnerable population.

Keywords

sleep; sleep-wake disorders; aged; frail elderly; mixed methods

Introduction

One half to two thirds of older adults have at least one sleep-related complaint (Foley et al., 1995; Miner et al., 2018). The vast majority of older adults have two or more chronic medical conditions (Lochner & Cox, 2013) and have limitations in daily function (Jindai, Nielson, Vorderstrasse, & Quinones, 2016). Older adults with chronic conditions and functional limitations are more likely to suffer from sleep disturbances compared with healthy older adults (Foley, Ancoli-Israel, Britz, & Walsh, 2004). Healthy sleep is critical for

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maintaining functional independence, optimizing quality of life, and potentially delaying institutionalization (Alessi & Vitiello, 2011; Foley et al., 1995).

Sleep disturbances, defined as a broad term that captures global sleep complaints and refers to any sleep disruption, including sleep fragmentation, insufficient sleep, or impairment of sleep quality or quantity (National Institutes of Health, 2011), can potentiate chronic conditions and functional limitations. Furthermore, sleep disturbances may add to the complexity of aging in place (i.e., a person living in their residence of choice) as well as the cost of managing chronic conditions (Bloom et al., 2009). For example, a review of literature revealed the risk of falls was higher among older adults with insomnia (Avidan et al., 2005), reduced sleep efficiency (Stone et al., 2008), nighttime sleep problems (Brassington, King, & Bliwise, 2000), and daytime sleepiness (Teo, Briffa, Devine, Dhaliwal, & Prince, 2006). Sleep disturbances, overall, are strongly linked to poorer well-being and quality of life (Stranges, Tigbe, Gomez-Olive, Thorogood, & Kandala, 2012) and can lead to poor overall health, a decrease in physical function, and premature death (Ancoli-Israel, 2009).

Despite age-related difficulties that challenge successful aging in place, 90% of older adults prefer to live independently in their homes as long as possible (American Association of Retired Persons, 2010; Bronstein, Gellis, & Kenaley, 2009). Health care providers advocate for the older adult population remaining at home, and policy makers support this goal to avoid costs associated with institutionalization (Farber, Shinkle, Lynott, Fox-Grage, & Harrell, 2011). Programs of All-Inclusive Care for the Elderly (PACE) endorse this key goal by keeping Medicare and Medicaid dual-eligible older adults who are qualified for nursing homes living in their homes. PACE members are similar to nursing home residents in terms of functional limitations (average of three limitations) and comorbid conditions (average of eight conditions; National PACE Association, 2017). Older adults are PACE eligible if they have demonstrated an inability to address a health-related care need or need assistance with activities of daily living. They may live alone, but must provide evidence of caregiver support. While a significant body of literature describes sleep disturbances in healthy, independently living (Chen et al., 2015; Martin, Sforza, Barthelemy, Thomas-Anterion, & Roche, 2014) and institutionalized older adults (Fung et al., 2012; Ye & Richards, 2018), little is known about sleep disturbances in nursing home eligible older adults who remain living in the community.

Only two studies described sleep disturbances in a population comparable with PACE members. These studies enrolled primarily male older veterans from a Veterans Affairs (VA) Adult Day Health Care (ADHC) program who needed assistance with activities of daily living and had physical limitations and multiple chronic conditions (Hughes & Martin, 2015; Song et al., 2015). Findings indicated mean total sleep time of 7.7 hours, sleep efficiency of 83.7%, mean Pittsburgh Sleep Quality Index (PSQI) score of 6 (scores >5 indicate poor sleep quality; Song et al., 2015); two thirds reported sleep disturbances; and 38% met International Classification of Sleep Disorders–2 (ICSD-2) diagnostic criteria for insomnia (Hughes & Martin, 2015). Only about half of the participants who met insomnia criteria (10/19) had spoken to their providers about their sleep disturbance (Hughes & Martin, 2015). These studies included a predominantly male veteran population; thus, more research is needed to understand sleep disturbances in PACE members, a female dominated

population (Cacchione, Eible, Gill, & Huege, 2016; National PACE Association, 2017). The purpose of this study was to describe sleep and sleep characteristics in 40 nursing home eligible, community-dwelling older adults.

Conceptual Framework

This study was guided by a modified version of the diathesis-stress model, also referred to as the “3-P” model (Spielman, Caruso, & Glovinsky, 1987). In the original 3-P model, Spielman postulated that there are predisposing, precipitating, and perpetuating factors that play a role in the development and maintenance of insomnia. We took a more global view of sleep disturbance, conceptualizing the predisposing, precipitating, and perpetuating factors as causes of sleep disturbances in general, rather than focusing on insomnia. Dysfunctional beliefs, defined as faulty expectations and perceptions about sleep (Morin, Stone, Trinkle, Mercer, & Remsberg, 1993), are presumed to perpetuate sleep disturbances (Spielman et al., 1987). Positive coping mechanisms include relaxation techniques and positive attitudes toward the sleep environment (see Figure 1).

Method

We used a concurrent nested design (QUAL + quan; Creswell & Plano-Clark, 2006). Our goals to: 1) understand older adults’ perceptions about sleep quality and beliefs about sleep, 2) describe objective and self-reported sleep characteristics and sleep disturbances, and 3) describe older adults’ recognition and interpretation of sleep disturbances warranted the use of mixed methodology.

Qualitative data were obtained by semi-structured interviews and prioritized given the focus on understanding older adults’ perceptions and beliefs about sleep. Objective sleep measures were obtained via actigraphy, and subjective measures included standardized sleep surveys. The quantitative data augmented qualitative data and allowed us to describe sleep in a manner that is comparable with results from other populations. Qualitative and quantitative data were integrated in the analysis phase to elucidate older adults’ recognition and interpretation of their sleep disturbances.

Setting and Sample

After Institutional Review Board approval from both the academic institution and the health system, 40 participants were recruited from one urban PACE Adult Day Center. Access to the day center was established during a previous pilot study and approved by the Director of Research. All participants provided written informed consent.

Participants were eligible for inclusion if they were aged ≥ 55 years, cognitively intact, or with mild cognitive impairment (Montreal Cognitive Assessment [MoCA] ≥ 20), resided (independently or cohabitated) in the community, and were able to speak and write in English. Exclusion criteria included moderate or severe cognitive impairment (MoCA <20).

Maximum variation sampling, a purposive sampling technique, was used to obtain heterogeneity on specific attributes known to affect sleep characteristics (i.e., age, sex, self-perceptions of good or poor sleep; Subramanian et al., 2011; Unruh et al., 2008; Vitiello,

Larsen, & Moe, 2004; Zilli, Ficca, & Salzarulo, 2009). A sample size of 40 was warranted to allow for depth in our data collection (Teddle & Yu, 2007). We targeted adults aged 55 to 65 years, 66 to 75, and >76 years to include young-old through old-old adults and enrolled both females and males. We asked, “Do you feel you sleep well or poorly?” to classify the participant as a good or poor sleeper. Participants were able to answer the question freely; those who were unable to choose between good or poor were labeled as undecided.

Procedures

The MoCA was administered to any PACE member with Mini Mental Status Exam (MMSE) scores greater than 26, which provided preliminary evidence of intact cognition. Participants were assessed for eligibility and then enrolled in the study after providing informed consent. There were two data collection visits. The first data collection session consisted of three sleep surveys, a qualitative interview, and instructions for Actiwatch and sleep diary. In a second session 7 to 10 days later, the participant returned the Actiwatch and diary and received a US\$25 gift card as compensation for their time. The participant received two phone calls during the week she or he was wearing the watch and completing diary to ensure there were no problems with the watch or diary. Demographic and clinical data were obtained from electronic health records.

Qualitative Data Collection

Perceived sleep quality and beliefs about sleep were explored qualitatively in one-on-one, face-to-face, audiotaped interviews lasting approximately 30 minutes to 1 hour. The interview was conducted in a private setting using a semi-structured interview guide with theoretically derived questions and probes based on the 3-P conceptual model, existing literature, and the team’s clinical experiences. Open-ended questions provided structure while allowing participants to freely communicate their own perceptions (Sandelowski, 2000) (e.g., Tell me about a typical night’s sleep; tell me about the quality of your sleep). Probing questions helped focus the conversation and elicit additional elaboration (e.g., Tell me what you do before you go to bed; describe how well you sleep on a regular basis).

Quantitative Data Collection and Measures

The MoCA assesses multiple cognitive domains; total possible score is 30 points. Using a cut-point score of 23, the MoCA exhibited excellent sensitivity (96%) and specificity (95%) (Luis, Keegan, & Mullan, 2009). However, evidence suggests that normative data cut points vary based on sample characteristics and demographics (Rossetti, Lacritz, Cullum, & Weiner, 2011). After screening 35 members with MMSE scores 28 or greater, more than half scored less than 23 on the MoCA. Due to low enrollment, expert opinion, and using normative data from a sample with comparable demographics (Rossetti et al., 2017), we used a MoCA cut point of 20 for study inclusion.

Age, gender, race, medications, and chronic conditions were collected from electronic health records. Clinical data were used to score the Cumulative Illness Rating Scale (CIRS) to quantify comorbidity and clinical burden. The CIRS evaluates 14 biological systems on a 0 (*no disease in selected system*) to 4 (*acute organ dysfunction requiring emergency treatment*) (Miller et al., 1992; Salvi et al., 2008). Scores are summed and range from 0 to 56; higher

scores indicate higher level of comorbidity. The CIRS has good intrarater reliability (intraclass correlation [ICC] = .86) and interrater reliability based off both patient interview and chart review (ICCs = .81 and .78, respectively) (Hudon, Fortin, & Vanasse, 2005).

The PSQI (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) is a self-report measure of sleep quality, latency, duration, habitual sleep efficiency, use of sleep medications, disturbance, and daytime dysfunction over the last month. A global score (0–21 points) is obtained by summing domain scores; higher scores indicate poorer sleep quality. Psychometric properties are well recognized; PSQI has good sensitivity (89.6%) and specificity (86.5%) to distinguishing “good” (< 5) versus “poor” (>5) sleepers (Buysse et al., 1989). Global PSQI scores were internally consistent in our sample ($\alpha = .77$).

The Insomnia Severity Index (ISI; Morin, 1993) is a 7-item self-report measure of insomnia symptoms rated from 0 (*no problem*) to 4 (*severe problem*). Scores are summed with a total score ranging from 0 to 28, absence of insomnia (0–7), subthreshold insomnia (8–14), moderate insomnia (15–21), severe insomnia (22–28) (Morin, Belleville, Belanger, & Ivers, 2011). The ISI has well-recognized psychometric properties (Gagnon, Belanger, Ivers, & Morin, 2013; Sierra, Guillen-Serrano, & Santos-Iglesias, 2008) and was internally consistent in our sample ($\alpha = .90$).

Wrist actigraphy was the objective measure of sleep used in conjunction with a sleep diary. Participants wore the Actiwatch-2 device (Koninklijke Philips, N.V.), a piezoelectric accelerometer, on their nondominant wrist for one week. Movement data were sampled at a rate of 32 Hz, and activity counts were recorded in 60-second epochs. Wrist actigraphy monitoring is reliable as a method of objectively monitoring sleep–wake cycles in ambulatory individuals (Mullaney, Kripke, & Messin, 1980). Actigraphy correlates with polysomnography (PSG), the gold standard for sleep assessment, in older adults (Blackwell et al., 2008). Sleep diary in conjunction with actigraphy provides the most reliable representation of sleep habits; both actigraphy and sleep diary are validated for 7-day use in older adults (Ancoli-Israel et al., 2003; Morgenthaler et al., 2007).

Actigraphy data were automatically scored (0 = *wake*, 1 = *sleep*) for each 60-second epoch using a validated scoring algorithm in the Philips Actiware v.6.0.8 software. Each epoch was scored as wake if the algorithm yielded a score at or above the low threshold (20); epochs below the threshold were designated as sleep. The low threshold setting is more likely to score movement epochs as wake, which has been found to be most accurate and consistent with PSG in studies of older adults, who have less activity (Blackwell et al., 2008; Sivertsen et al., 2006; Taibi, Landis, & Vitiello, 2013). We used sleep diary, ambient light, and activity levels to hand score rest intervals and correct the automated scoring algorithm when warranted. We derived four variables from actigraphy and sleep diary: total sleep time, sleep latency, wake after sleep onset, sleep efficiency. Total sleep time refers to the actual time a person is asleep in the nighttime sleep window. Sleep latency is the time it takes a person to fall asleep, starting from first intention to sleep. Wake after sleep onset refers to time awake during the night, starting from the time the person falls asleep. Sleep efficiency is the percentage of time spent in bed that a person is asleep. All variables were averaged over a 1-week period.

Qualitative Analysis

Interviews were transcribed verbatim, with accuracy confirmed, and coded using ATLAS.ti version 7.5.16. Thematic content analysis was used beginning with a line-by-line review that yielded clusters of data. Clusters were labeled into brief headings, based on an a priori code list generated from the conceptual model. Additional codes derived from the data were linked to interview questions to yield coding categories. Summarization of coding categories was performed within cases, then across cases, and subsequently cross-classified to yield a descriptive analysis. We identified emerging themes both within and across coding categories and verified fit with the data. Thus, we generated a rich description of perceptions regarding sleep quality and beliefs about sleep developed directly from participants.

Quantitative Analysis

Descriptive statistics were used to characterize the sample, with measures of central tendency and variation for continuous measures, and frequencies and percentages for dichotomous and categorical variables. Relationships among self-report and objective measures of sleep disturbances were analyzed using nonparametric Spearman rho due to the small sample size. An a priori significance level was set at $p < .05$. Analyses were done using Stata v.14.1 (College Station, Texas).

Integrated Data Analysis

Data were integrated in the final step of analysis. First, we compared actigraphy and sleep survey data with qualitative data. We anchored results on perceived sleep quality as described during qualitative interview. This key variable was obtained by examining qualitative interviews and categorizing each person as perceiving his or her sleep to be good, poor, or undecided. We compared this categorization with the response on the initial sleep screening question. Thereafter, themes that emerged from the qualitative data, responses to sleep surveys, and total sleep time from actigraphy were integrated to further describe sleep in this population. We compared the qualitative categorization with scores on the sleep surveys (PSQI > 5 indicated poor sleep quality; ISI > 8 indicated insomnia symptoms) and total sleep time (< 420 min indicated short sleep and > 480 min indicated long sleep). We examined congruence between data sets by determining whether quantitative data supported the qualitative data. The quantitative data were used to augment the qualitative data by enhancing our understanding of how participants perceived, recognized, and interpreted sleep disturbances.

Ensuring Quality

Methodological rigor was ensured through the following steps: (a) enhanced credibility via member checking (Lincoln & Guba, 1985), (b) established confirmability via audit trails and regular team meetings (Teddle & Tashakkori, 2009), (c) established reliability of coding by using a second person to code a subset ($n = 2$) of interviews ($> 95\%$ agreement was achieved), and (d) increased credibility and dependability via triangulation during data integration (Creswell & Plano-Clark, 2006).

Results

Screening and Baseline Characteristics

We screened 76 potential participants and enrolled 40; 21 were not eligible, 14 declined participation, and 1 withdrew consent. The final sample was Black (100%) and primarily female (85%) (Table 1). The participants' ages ranged from 59 to 92 years (mean 72 ± 9.5). The desired age cohorts were obtained: age 55 to 65 (14, 35%), age 66 to 75 (18, 45%), age 76 (10, 25%).

Qualitative Findings

Perceived sleep quality—Participants described sleep quality as getting or not getting enough hours of sleep, ability to fall or stay asleep, and next-day effects. They commonly judged a night of sleep based on their feelings in the morning, “My body feels good if I slept good, but if I didn’t sleep good, my body is tired.”

Participants described their sleep quantity as adequate (40%), inadequate (45%), or were ambivalent (15%). Poor sleepers described inadequate sleep duration, and good sleepers were happy with their sleep duration. Desired sleep duration ranged from 4 to 10 hr; thus, perceptions of how much sleep quantity were necessarily varied. Some participants believed that more sleep was required with aging (e.g., “I think when you’re older, you need more rest”), whereas others believed that less sleep was necessary (e.g., “I don’t think older adults require all the sleep that you would require ... we’re not as active”).

Those who had regular sleep disturbances described difficulty falling and maintaining sleep, early morning awakenings, and next-day consequences. They often attributed the onset of the disturbance to illness. A few participants mentioned night shift, death of a loved one, and getting older as precipitating sleep disturbances.

Beliefs about sleep—Beliefs about sleep centered on the importance of sleep and personal and external factors that affect sleep. Most (90%) participants believed sleep was extremely important and expressed this in terms of how sleep affects them the next day. They talked about consequences of poor sleep and positive effects of good sleep (e.g., “It’s important because you feel better ... you’re ready to meet the day. You got a smile on your face because you had a nice good night’s rest”).

A few poor sleepers described ambivalence about sleep importance explaining that they need less sleep, “... the older you get the less sleep you need ...” or there were no consequences of sleeping poorly, “It would seem to me I would need more sleep to get through the day ... but apparently I don’t.” Participants mentioned even though sleep was important, they do not sleep and described adapting to less sleep, “I don’t even pay no attention ... I got used to it ... I just sleep for a couple hours and wake up.”

Less than a quarter of the sample had concerns about their sleep. Poor sleepers who did not worry about sleep had adjusted to their sleep disturbances, “I don’t feel worried or concerned about it ... I don’t go to work or anything ... I don’t have to worry about it.”

Participants believed internal (i.e., their own role in affecting sleep) and external factors (i.e., role of their care provider and sleep medication) influenced sleep. Some participants believed they could do things to improve sleep, whereas others believed nothing could improve their sleep or they were not aware of opportunities to improve sleep. Personal strategies for improving sleep included increasing daily activity, avoiding stress, and following a routine. Participants who believed nothing could be done described “trying everything” without any success or wished they knew what could be done (e.g., “If there was something I think I could do, I would do it to sleep ... there is nothing I think I can do”). Others believed their sleep was so good and there was no room for improvement.

Participants generally believed that daily activities affect sleep, “Usually, I am so worn out within the course of the day until it makes me sleep even better. I prefer to be worn out.” Some poor sleepers believed even though they should be tired with increased activities, they still do not sleep well, “I do activities and try ... sometimes I can be tired ... still don’t go to sleep.”

Most participants believed the care provider would simply prescribe sleep medication, “... only thing they gonna do, they gonna give me like Ambien and stuff ... I don’t want it.” Twenty (50%) participants had negative beliefs about sleep medication; these were reflected in comments about adding another medication to their list, wanting to fall asleep naturally, fear of death, addiction, and grogginess. Positive beliefs were expressed by four (10%) participants who used prescription sleep medication and felt it was effective, “It’s [sleeping pill] very important. I take it every night, as I say, clockwork ... if I don’t, I know what I’m headed for.”

Quantitative Findings

On the screening question, participants self-identified as good (40%), poor (50%), or undecided (10%) sleepers. The majority had poor sleep quality, and more than half reported insomnia symptoms (see Table 2). Most participants did not get the recommended (420–480 min or 7–8 hr) sleep at night for the week they were studied, 75% did not get enough sleep, and 12.5% got more than the required amount. The only variables that were correlated were age and the screening sleep question ($r = -.38$; $p = .02$) and the PSQI ($r = -.34$, $p = .03$), indicating that older aged individuals reported better sleep quality.

Integrated Results

Recognition and interpretation—We identified concordance and discordance in participants’ recognition and interpretation of sleep disturbances. Three participants who self-identified on screening as having poor sleep quality reported good sleep quality during the interviews. Lack of concordance can be illustrated by one male who initially reported he was a poor sleeper but during the interview said, “I sleep pretty good ... I feel good in the mornings when I wake up ... sleep problems, I just don’t have any.” Responses of the other 37 participants on the screening question aligned with their interviews. Anchoring on interview ratings of sleep, there were 19 good sleepers, 17 poor sleepers, and 4 undecided sleepers.

Good sleepers—Participants perceived their sleep quantity to be good, yet most (16/19) had objective total sleep time outside the recommended range. This discordant group tended to have negative beliefs about sleep medications, believed their sleep was so good there was no room for improvement, or they had the option to sleep during the day. Participants both overestimated and underestimated sleep duration. There was also discordance between interviews and scores on PSQI in 42% of the good sleepers. Scores on the ISI were primarily concordant among this group (89%) (see Table 3).

Poor sleepers—The majority (82.4%) of poor sleepers had total sleep time outside the recommended range of 7 to 8 hr (78.6% short sleep duration; 21.4% long sleep duration) on actigraphy. The three self-identified poor sleepers who actually got adequate sleep had long periods of wake after sleep onset and poor sleep efficiency. Participants who grossly underestimated their sleep, yet got an adequate amount, had dysfunctional beliefs that likely perpetuated their sleep disturbances (e.g., “I get so mad with myself sometimes cuz I can’t sleep. I hate to see the night coming ... I can’t sleep ... I watch the clock”). All poor sleepers reported poor sleep quality on the PSQI, and 94% had insomnia symptoms (see Table 3).

Discussion

The purpose of this mixed-methods study was to describe sleep and sleep characteristics in nursing home eligible, community-dwelling older adults. The majority of the sample had poor sleep quality and did not get the recommended amount of sleep, regardless of self-perceptions of sleep quality. We did not find a statistically significant relationship between the different sleep measures, and there was discordance between qualitative and quantitative data. There was evidence that these older adults had adjusted their expectations and adapted to sleep disturbances. Participants generally believed that sleep was important.

Few participants got the recommended quantity of sleep during the 1-week monitoring period. Many had long periods of wakefulness after sleep onset, sleep efficiency was poor, and a majority reported poor sleep quality. Our sample had worse sleep than a nationally representative sample of community-dwelling older adults (Chen et al., 2015) and worse sleep than a sample of community-dwelling older veterans enrolled in a VA ADHC program (Song et al., 2015). The sleep characteristics in our sample of PACE enrollees were most aligned with those living in assisted living facilities who had insufficient total sleep time (6.3 hr), poor sleep efficiency (77%), and subjectively reported poor sleep quality (total PSQI mean score of 8; Fung et al., 2012).

There were no significant relationships between sleep survey and actigraphy data. This discordance has been noted in other studies and highlights the importance of using multiple methods to measure sleep (Lund, Rybarczyk, Perrin, Leszczyszyn, & Stepanski, 2013; McCrae et al., 2005; O’Donnell et al., 2009; Van Den Berg et al., 2008). Our results are consistent with other studies of older adults that found those labeled as poor sleepers and those with a diagnosis of insomnia tend to subjectively underestimate objective total sleep time (Lund et al., 2013; McCrae et al., 2005), whereas healthy older adults and good

sleepers tend to overestimate total sleep time (McCrae et al., 2005; O'Donnell et al., 2009; Van Den Berg et al., 2008).

There was discordance between qualitative and quantitative findings, primarily in the good sleeping group. Despite objective sleep disturbances, qualitative interviews revealed these participants believed their sleep was good. One explanation is they may not have recognized their objective sleep disturbances or they had adapted. They may have become accustomed to age-related sleep changes and may not perceive them as a disturbance (Unruh et al., 2008; Vitiello et al., 2004; Zilli et al., 2009). This explanation could hold true for the good sleepers who underestimated their sleep as well, such that they may have adjusted their perceptions of acceptable sleep quantity. In addition, it could be that if a person did not feel an immediate consequence (e.g., morning headache), she or he may not recognize short sleep duration as a problem and therefore may have self-identified as a good sleeper. Interestingly, the good sleeper group believed their sleep was so good that it could not get any better, had negative beliefs about sleep medications, or had the option to nap during the day. These factors may also explain the interpretation of sleep disturbances by this group.

Those who endorsed their sleep disturbances but had no concerns may have also adjusted to the disturbances. Although some poor sleepers wanted to improve their sleep, among the group as a whole, there was a sense of having adapted. This finding is consistent with other research in healthy older adults that found older adults tend to adapt their perception of what is "acceptable" sleep and do not necessarily complain even in the face of compromised sleep quality (Buysse et al., 1992; Vitiello et al., 2004). In addition, older adults may not worry about a sleep disturbance because they have fewer daytime demands and performance requirements which may be met with less sleep (Unruh et al., 2008). This conclusion is supported by our qualitative results where participants described being able to choose what they do the next day.

Consistent with the 3-P model (Spielman et al., 1987), precipitating factors of sleep disturbances described by our sample included illness, consequences of illness, and grief. Insomnia symptoms were the most common disturbances reported, consistent with the literature (Ohayon, 2002). A few participants were concerned with deleterious effects of poor sleep on health. It was difficult to discern whether their worry was so problematic that it perpetuated the sleep disturbance. Rather, most participants were not worried about their sleep, even in the face of a disturbance. Positive coping strategies, recognized by our sample to be increasing activity, avoiding worry, and following a routine, all promote good sleep and can lead to symptom resolution. Increasing positive coping and decreasing dysfunctional beliefs and maladaptive strategies can be modifiable targets for intervention (Morin et al., 1993).

Participants believed sleep was important and sleep greatly affected their next day. Beliefs about how much sleep older adults need varied among the participants. Although the National Sleep Foundation recommends 7 to 8 hours of sleep for older adults (Hirshkowitz et al., 2015), participants believed they should get between 4 and 10 hours of sleep. Variations could be due to previous experience, knowledge deficit, perceived consequences, or adjusted expectations.

Limitations

Our sample was primarily female and Black, so these results are only generalizable in other PACE settings with comparable population demographics. We only asked one question during screening to determine self-perceptions of sleep and did not screen for specific sleep disturbances. We also looked globally at sleep disturbances and cannot make conclusions regarding specific sleep disorders. In addition, the most widely used sleep research instruments were developed in younger adults, and we found discordance between subjective interviews and sleep surveys. Actigraphy was our objective sleep measure, but it only measures movement, which is relatively low in this population. Therefore, we may have overestimated the sleep variables. Finally, although there were no associations between number of medications and any of the sleep variables, we did not look at specific medications such as those prescribed for mental health.

Implications

Our sample had objective sleep disturbances, regardless of whether or not they recognized the disturbance. Detrimental health consequences associated with sleep disturbances are well documented in the literature. Insomnia is a risk factor for new onset and recurrent medical and psychiatric illness and increases older adults' susceptibility to illnesses that occur with advancing age (Bloom et al., 2009; Chesson et al., 2000; Sateia, Doghramji, Hauri, & Morin, 2000). For example, evidence supports an increased risk of developing heart disease (Schwartz et al., 1999) and depression (Cole & Dendukuri, 2003; Jaussent et al., 2011; Lee et al., 2013; Perlis et al., 2006; Pigeon et al., 2008; Suh et al., 2013) in older adults with insomnia symptoms. Given that this population is at a high risk for nursing home placement and these individuals may not complain of sleep disturbances, providers must proactively assess sleep in this group. At a minimum, clinicians should use screening questionnaires that can provide preliminary insight into sleep disturbances. When warranted, additional assessments may include prospective sleep monitoring, referral to a sleep clinic, and PSG. This is critically important as this opens a door to mitigate potential negative consequences of untreated sleep problems. Furthermore, a clinician asking about sleep may also trigger the patient to take notice of potential sleep issues.

Further research is needed in this population, specifically regarding relationships between sleep disturbances and other factors such as specific comorbid conditions. Longitudinal studies are needed to clarify associations between sleep disturbances and chronic conditions and the direction of causality. In addition, determining whether or not sleep disturbances play a role in PACE members transitioning to institutionalization is necessary. More research is necessary to develop, test, and validate sleep measures that are more suitable for use in at-risk older adults. Finally, interventions are needed to improve sleep quality in this population. Modifiable targets for intervention development and testing include physical, social, or cognitive activity. These older adults recognized that daily activity facilitated sleep, as noted by others (Varrasse, Li, & Gooneratne, 2015). Social participation (Chen, Lauderdale, & Waite, 2016) and cognitive training (Haimov & Shatil, 2013) are also associated with better sleep quality. Taken together, we believe that targeting activity—broadly defined—may improve sleep quality in this population.

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Figure 1. Modified 3-P model.

Note. There are predisposing, precipitating, and perpetuating factors that play a role in the development of a sleep disturbance. Predisposing factors increase one's susceptibility to sleep disturbance. Precipitating factors are events that may push one over a hypothetical threshold to experience sleep disturbances. Perpetuating factors are maladaptive strategies that maintain the sleep disturbance and transition it into a clinical sleep disorder, whereas positive coping mechanisms can lead to symptom resolution; 3-P model = diathesis–stress model.

Table 1.

Baseline Demographic and Clinical Characteristics of the Sample of 40 Older Adults.

	Overall sample
Demographic variables	
Age (years)	72.4 ± 9.5
Gender	
Female	34 (85%)
Male	6 (15%)
Race/ethnicity	
Black	40 (100%)
Non-Hispanic	40 (100%)
Living arrangement	
Alone	30 (75%)
With others	10 (25%)
Bed partner	0 (0%)
Assistive device (<i>n</i> = 39)	
None	18 (46%)
Cane	3 (8%)
Walker	14 (36%)
Wheelchair	4 (10%)
Clinical variables	
Montreal Cognitive Assessment	24.05 ± 2.44
Cumulative Illness Rating Scale	15.55 ± 5.91
Total no. of medications	10.58 ± 3.63
Medical comorbidities	8.75 ± 3.0
Mental illness	17 (42.5%)
Depression	13 (32.5%)
Anxiety	9 (22.5%)
Schizophrenia	3 (7.5%)
Bipolar	2 (5%)

Table 2.Sleep Characteristics of Older Adults ($n = 40$).

Variable	Overall sample N (%); $M \pm SD$	Score interpretation
Subjective responses		
Screening question		
Good sleeper	16 (40%)	Qualitative response to "Do you feel you sleep well or poorly?"
Poor sleeper	20 (50%)	
Undecided sleeper	4 (10%)	
Global PSQI	9.25 $\pm$ 5.07	
Good sleeper	12 (30)	Good sleep (score ≤ 5)
Poor sleeper	28 (70)	Poor sleep (score >5)
PSQI raw scores		
Sleep duration	344.25 $\pm$ 125.27	Normal: 420–480 min
Sleep latency	48.75 $\pm$ 69.69	Normal: <30 min
Insomnia severity		
No insomnia symptoms	18 (45%)	No insomnia (0–7)
Insomnia symptoms	12 (30%)	Insomnia symptoms (8–14)
Clinical insomnia	10 (25%)	Clinical insomnia (15–28)
Actigraphy variables		
Total sleep time	393.59 $\pm$ 78.33	Normal: 420–480 min
Short sleeper	30 (75%)	<420 min
Long sleeper	5 (12.5%)	>480 min
Sleep latency	23.22 $\pm$ 18.45	Normal: <30 min
Long sleep latency	11 (27.5%)	Long: ≥ 30 min
Wake after sleep onset	107.93 $\pm$ 50.11	Normal: <30 min
Long WASO	39 (97.5%)	Long: ≥ 30 min
Sleep efficiency	72.98 $\pm$ 9.30	Normal: $>85\%$
Poor SE	35 (87.5%)	Poor: $<85\%$

Note. PSQI = Pittsburgh Sleep Quality Index; WASO = wake after sleep onset; SE = sleep efficiency.

Table 3.

Concordance and Discordance Between Qualitative and Quantitative Data in Older Adults, With Illustrative Quotes ($n = 36$).

Sleep group	Construct (instrument)	Concordant group	Discordant group	Overall M (SD)/normal values
Good	Total sleep time (actigraphy)	3/19 (12.5%)	16/19 (87.5%)	386.12 $\pm$ 87.89 min
	$M \pm SD$	465.01 $\pm$ 9.65 min	377.57 $\pm$ 90.84 min	Normal TST is 420–480 min
	Qualitative exemplar	“I sleep well ... regular amount of sleep.”	“My night’s sleep are great.”	
	Sleep quality (PSQI)	11/19 (57.9%)	8/19 (42.1%)	5.26 $\pm$ 2.40
	$M \pm SD$	3.64 $\pm$ 1.21	7.50 $\pm$ 1.46	Normal score is <5
	Qualitative exemplar	“On a regular basis ... I sleep well.”	“I sleep pretty good.”	
	Insomnia (ISI)	17/19 (89.5%)	2/19 (10.5%)	3.37 $\pm$ 3.20
Poor	$M \pm SD$	2.65 $\pm$ 2.45	9.5 $\pm$ 2.12	Normal ISI < 8
	Qualitative exemplar	“I’ll just fall right asleep.”	“Sometimes I get to sleep too fast.”	
	Total sleep time (Actigraphy)	14/17 (82.4%)	3/17 (17.6%)	
	$M \pm SD$	401.88 $\pm$ 70.88 min	460.24 $\pm$ 5.60 min	412.18 $\pm$ 67.91 min
	Qualitative exemplar	“Terrible ... I don’t think I get enough sleep.”	“I toss and turn all night ... seems like I don’t sleep no time.”	Normal TST is 420–480 min
	Sleep quality (PSQI)	17/17 (100%)	0/17 (0%)	
	$M \pm SD$	13.53 $\pm$ 3.86		13.53 $\pm$ 3.86
	Qualitative exemplar	“It’s [sleep quality] terrible.”		Normal score is <5
	Insomnia symptoms (ISI)	16/17 (94.1%)	1/17 (5.9%)	
	$M \pm SD$	15.65 $\pm$ 5.16	7	15.65 $\pm$ 5.16
	Qualitative exemplar	“... wakin’ up about 3:30, 4:00 in the morning.”	“I don’t sleep straight through.”	Normal ISI < 8

Note. M and SD are presented for the quantitative data, and illustrative quotes are presented for the qualitative data. Concordant refers to interviews that aligned with the quantitative data, such that good sleepers had good sleep metrics on the quantitative measures, and poor sleepers had poor sleep metrics on the quantitative measures; discordant refers to interviews that did not align with quantitative data, such that good sleepers had poor sleep metrics on the quantitative measures, and poor sleepers had good sleep metrics on the quantitative measures. TST = total sleep time; PSQI = Pittsburgh Sleep Quality Index; ISI = Insomnia Severity Scale.