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What is occupational therapy's role in addressing sleep problems among older adults?

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Abstract

Sleep problems, prevalent among older adults, are associated with poor outcomes and high healthcare costs. In 2008, *rest and sleep* became its own area of occupation in the AOTA Occupational Therapy Practice Framework. This scoping review examined a broad context of sleep research in order to highlight efficacious interventions for older adults that fall within the occupational therapy scope of practice and present an agenda for research and practice. Four sleep intervention areas clearly aligned with the Practice Framework, including cognitive behavioral therapy for insomnia, physical activity, and multi-component interventions. Occupational therapy is primed to address sleep problems by targeting the context and environment, performance patterns, and limited engagement in evening activities that may contribute to poor sleep. Occupational therapy researchers and clinicians need to work collaboratively to establish the evidence-base for occupation-centered sleep interventions in order to improve the health and quality of life of the older adult.

Keywords

insomnia; sleep disturbances; scoping review; older adults

Introduction

Older adults have significantly higher rates of sleep difficulty than younger age groups (Ohayon, Carskadon, Guilleminault, & Vitiello, 2004). It is estimated that 40-70% of older adults have problems sleeping (Foley, Ancoli-Israel, Britz, & Walsh, 2004; Jaussett et al., 2011), which can result in social isolation, decline in function, increased risk of falling, impaired cognitive function, and increased morbidity and mortality (Dew et al., 2003; Nebes, Buysse, Halligan, Houck, & Monk, 2009; Stone et al., 2014). Accordingly, this

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public health issue has significant biological, physiological, and psychosocial implications for older adults' health and quality of life (Ancoli-Israel, 2009; Lam & Ip, 2010; Stranges, Tigbe, Gomez-Olive, Thorogood, & Kandala, 2012). Moreover, poor sleep is associated with greater healthcare utilization with annual healthcare costs being \$1,143 higher for older adults with insomnia compared to those without (Ozminkowski, Wang, & Walsh, 2007). Cumulatively, in the context of the aging population, these poor outcomes underscore the growing need for health professionals to address poor sleep among older adults.

In 2008, the AOTA Occupational Therapy Practice Framework (the *Framework*) reclassified *rest and sleep* as its own area of occupation, no longer categorizing it as an activity of daily living (American Occupational Therapy Association, 2008). Qualitative studies by Green (2008) and O'Donoghue and McKay (2012) have illustrated the pervasive impact poor sleep has on quality of life and occupational engagement. For example, they found that individuals with poor sleep restricted engagement in social activities, limited driving, and experienced a loss of intimacy with significant others (Green, 2008; O'Donoghue & McKay, 2012). Although occupational therapy is primed to address the sleep needs of older adults and the *Framework* has clearly identified *rest and sleep* as a critical occupation, there is a paucity of evidence documenting the efficacy of occupational therapy sleep interventions. By addressing impairments in this essential occupation, occupational therapists can better promote health and quality of life for the aging population (Green, 2008). Therefore, the purpose of this study was to examine existing evidence on sleep interventions for older adults that fall within the scope of occupational therapy practice and provide suggestions for future directions in occupational therapy research and practice.

Methods

We conducted a scoping review, which is a systematic summary of the literature related to a clearly defined question. This method identifies current evidence, distinguishes gaps in the literature, and outlines a future research agenda (Arskey & O'Malley, 2005). A scoping review, as opposed to a systematic review, is appropriate since the role occupational therapy has played in sleep intervention research in older adults is not clear due to the paucity of occupational therapy research in this area.

Guided by Arksey and O'Malley's (2005) methodology, we searched PubMed, Cochrane Library, and AgeLine databases for articles published in the last 15 years. Search terms included *sleep*, *sleep intervention*, older adults, physical activity, exercise, occupation, occupational therapy, and *activity*. Articles were included if they were written in English, examined sleep interventions for older adults (i.e., samples with an average age 60+ years), and used sleep as the primary outcome. Systematic reviews and meta-analyses were included. We manually inspected citation lists of extracted articles. Studies that did not evaluate intervention efficacy (e.g., cost-effectiveness studies), interventions outside the scope of occupational therapy (e.g., pharmaceutical trials), and research that focused solely on patients with neurodegenerative diseases (e.g., dementia) were excluded. This patient exclusion was selected based on the rationale that the approaches and integration of sleep interventions into existing care models may differ for these groups, even if the broad principles of the intervention may apply. Articles were categorized by type of sleep

intervention. Discrepancies regarding inclusion were deliberated among the researchers until consensus was achieved.

Results

Our search resulted in an initial sample of 994 articles. In reviewing their titles and abstracts, 70 studies met our initial selection criteria. After reviewing these manuscripts in full, 36 were excluded for these reasons: did not evaluate an intervention (n=19), already included in a systematic review in our sample (n=9), employed interventions outside the scope of occupational therapy (n=5), or exclusively assessed either medication efficacy (n=2) or cost-effectiveness (n=1). The final sample of 34 articles represented four intervention areas within the scope of occupational therapy: cognitive behavioral therapy for insomnia (CBT-I; n=11), physical activity (n=11), multi-component interventions (n=9), and other sleep strategies (n=3). Summaries of each article are presented in Tables 1-4.

Cognitive Behavioral Therapy for Insomnia

CBT-I targets insomnia, one of most common sleep problems, (Montgomery & Dennis, 2009) by modifying dysfunctional perceptions of sleep and unsuitable sleep behaviors (Morgan, Gregory, Tomeny, David, & Gascoigne, 2012). Stimulus control (i.e., restricting activities in bed to sleep and sexual activity and adapting nightly routines to decrease stimuli) and sleep restriction/compression (i.e., complying with a predetermined, limited sleep schedule) are core components of CBT-I (Montgomery & Dennis, 2009). Other complementary techniques are commonly integrated into CBT-I interventions including sleep education, light therapy, and relaxation techniques (e.g., diaphragmatic breathing).

Eight of the 12 CBT-I articles were randomized controlled trials (RCTs); the remaining four included a case study, pre/post study, and two systematic reviews (Table 1). Ten studies employed both sleep restriction/compression and stimulus control as the core interventions and the remaining two studies used either sleep restriction/compression or stimulus control. For clients struggling to comply with the sleep restriction schedule, Fiorentino and Martin (2010) recommended clients engage in activities to properly fill new out-of-bed time (e.g., reading, chores). Other supporting techniques used in conjunction with core components of CBT-I included sleep hygiene education (n=9), relaxation strategies (n=5), and light therapy (n=2). Sleep hygiene education informed clients about habits and routines that are conducive to sleep, such as minimizing fluid consumption after dinner and limiting television use in the bedroom (Morgan et al., 2012; Morgenthaler et al., 2006). A variety of relaxation techniques were used, such as guided imagery and diaphragmatic breathing to address anxiety associated with sleep problems. Light therapy included exposure to sunlight or artificial light using light boxes.

CBT-I treatment lengths varied from one session to eight weekly sessions, with durations of 30 to 60 minutes. Ten of the studies concluded that there was a positive treatment effect for CBT-I based on the hours of continuous sleep or self-reported quality of sleep, which were quantified using standardized sleep assessments, including actigraphy, sleep diaries, and the Pittsburgh Sleep Quality Index (PSQI). Both systematic reviews concluded CBT-I was effective (McCurry, Logsdon, & Vitiello, 2007; Montgomery & Dennis, 2009).

Furthermore, McCurry and colleagues (2007) concluded that stimulus control alone without sleep restriction/compression was not efficacious.

Physical Activity Interventions

Eleven studies (six RCTs, three pre/post studies, one systematic review, and one crossover design) examined the relationship between physical activity and sleep (Table 2). Wide ranges of physical activities, such as resistance training and dancing, were prescribed. Physical activity intervention dosage varied from a single session to six sessions per week, with durations of 30 to 90 minutes per session. Intervention intensity ranged from low intensity (e.g., stretching) to high intensity (e.g., running). Among the eight studies examining outcomes immediately after intervention, seven found favorable results for enhancing sleep, whereas the systematic review of yoga reported mixed results. Three of the four studies examining long-term outcomes found a sustained treatment effect up to six months. The two most common standardized outcome measures for sleep were the PSQI, a standardized self-reported sleep quality assessment, and actigraphy, which objectively quantified continuous hours of sleep and awakenings.

Multi-component Interventions

Multi-component interventions utilized multiple sleep intervention strategies to target the various factors impacting sleep; five RCTs and two systematic reviews were included (Table 3). CBT-I strategies were integrated with physical activity and environmental modifications in four of the seven intervention studies. Institution-based sleep interventions, such as the work by Alessi and colleagues (2005), included adjustments to nighttime staff work activities to promote an environment of sleep (e.g., reduced noise). Actigraphy and the PQSI were the most common outcome measures used. Four of the five RCTs found a positive treatment effect for sleep.

Other Sleep Strategies

Three articles that did not fit the other categories were placed in a miscellaneous group (Table 4). These articles examined bright light therapy and strategies to enhance the sleep environment (i.e., earplugs, eye masks, or sleep-inducing music). Two of the studies were RCTs and one was a post-test quasi experiment. Ryu and colleagues (2012) found the combined use of a sleep mask and sleep-inducing music was effective in improving self-reported sleep quality using the Verran and Synder-Halpern sleeping scale. In contrast, Richardson et al. (2007) and Royer and colleagues (2012) found no treatment effect when using a sleep mask and ear plugs with no music and bright light therapy alone, respectively.

Discussion

This scoping review identified four sleep intervention areas (i.e., CBT-I, physical activity, multi-component interventions, and other sleep strategies) that improved sleep, all of which fall within occupational therapy's scope of practice. Across these categories, there was a consistent emphasis on modifying existing habits and routines to support sleep quality, participating in physical activity, and initiating engagement in activities that comply with sleep restriction/constriction recommendations (e.g., Fiorentino & Martin, 2010; Freburger,

Callahan, Shreffler, & Mielenz, 2010; Germain et al., 2006; McCrae, McGovern, Lukefahr, & Stripling, 2007). To directly show how the four intervention areas fit within the scope of occupational therapy, we discuss the foci of the interventions using the *Framework* language and outline an agenda for future sleep research and practice in each area.

Performance Patterns

Performance patterns, including habits, roles and routines, are the avenues by which clients engage in desired occupations. Occupational therapists work with clients to modify these performance patterns to maximize engagement (American Occupational Therapy Association, 2008). Based on the findings of this scoping review, occupational therapists could use CBT-I interventions to help individuals modify their sleep performance patterns by adhering to fixed sleep schedules, minimizing nighttime stimuli, and reserving the bedroom for sleep and sexual activity (Friedman et al., 2000; Morin et al., 2006).

The sleep restriction/compression component of CBT-I programs were, at times, problematic, as older adults faced challenges in complying with the programs due to boredom and an absence of evening activities in which to engage (Fiorentino et al 2010). However, this obstacle to compliance can be overcome with a patient-centered occupation-based approach. Occupational therapy researchers and clinicians can work together to evaluate interventions that facilitate habits, roles, and routines that utilize meaningful evening occupations to promote desirable sleep behaviors and compliance with a sleep restriction/ compression program. Occupational therapy can serve a pivotal role in CBT-I sleep interventions by targeting performance patterns thereby addressing the challenges older adults encountered in complying with the CBT-I program.

Context and Environment

This scoping review also highlighted the importance of a sleep-conducive environment. Sleep occurs in a physically and socially constructed context (American Occupational Therapy Association, 2008). Efficacious interventions that modified the context and environment were reflected in stimulus control as part of the CBT-I and the multi-component interventions. Environmental modifications were simple changes, such as moderating bedroom temperature, (e.g., Friedman et al., 2000) or more complex modifications as reflected in the institution-based interventions that altered nightly nursing routines and limited interruptions in order to promote a supportive sleep environment (e.g., Alessi et al., 2005).

Occupational therapy clinicians and researchers can advance this area of sleep research by evaluating individuals' occupational abilities and limitations within the physically and socially constructed context and environment to facilitate quality sleep. This is particularly salient in healthcare institutions, where research has focused on the organizational environment and made systematic changes (e.g., staff routines). Furthermore, sleep research has begun to examine individuals within the context of the healthcare setting by addressing environmental stimuli with the use of eye masks, music, and headphones, yet the results are mixed (Richardson, Allsop, Coghil, & Turnock, 2007; Royer et al., 2012; Ryu, Park, & Park, 2012). To effectively address the sleep needs of patients in a healthcare setting, it is

essential to examine the interplay between the individual's context and environment and their engagement in this pivotal occupation. Occupational therapy is uniquely situated to address this gap in knowledge by executing research interventions that integrate the patient's abilities and sleep needs within their context and environment in order to facilitate improved sleep.

Supporting Occupations

Occupational therapists have the expertise to facilitate social participation and engagement in activities of daily living and instrumental activities of daily living (American Occupational Therapy Association, 2008). Furthermore, researchers have demonstrated the efficacy of occupational therapy interventions that facilitate engagement in patient desired occupations and its benefit on health outcomes (e.g., Clark et al., 1997; Hwang, 2012). Current occupational therapy research has not yet focused on its benefits for sleep. Relatedly, this scoping review showed that physical activity engagement is associated with improved sleep; however, occupation-based activities were not addressed. Physical activities utilized in the intervention studies dictated which activities participants engaged in and were therefore not necessarily meaningful to the participant. This gap indicates a need to evaluate whether participation in personally valued, occupation-based activities has a similar positive effect on sleep outcomes.

Limitations

Studies in this review were limited to sleep interventions targeting older adults and within the scope of occupational therapy practice. Further, we limited our search to articles published in the last 15 years and eliminated older studies that may warrant further discussion. We identified evidence through bibliographic searches; alternate search terms may have resulted in additional articles. Moreover, articles may have been omitted inadvertently. The purpose of a scoping review is to summarize existing literature, identify gaps in knowledge, and to inform future research (Arksley & O'Malley, 2005). Therefore, this study did not evaluate the quality of the studies and readers should be cautious when interpreting the findings of individual studies.

Conclusion

In light of the aging population and prevalence of sleep problems in late adulthood, it is essential for occupational therapists to address sleep problems in older adults. This scoping review highlights efficacious sleep intervention areas that align with the *Framework* (i.e., CBT-I, physical activity, multi-component interventions, and other miscellaneous interventions) and supports the integration of sleep interventions throughout the care continuum. Regrettably, none of the reviewed interventions were led by occupational therapists. Important gaps such as a lack of occupation-based activity interventions and patient-centered environmental modifications were apparent. This lack of evidence documenting occupational therapy's role in *rest and sleep* emphasizes an imperative to address this important occupation through collaboration between occupational therapy researchers and clinicians. There is a need to evaluate the effectiveness of occupational therapy interventions targeting sleep in older adult populations. Considering the

interventions reviewed in this study, clinicians can help older adults with their sleep problems by ensuring a sleep-conducive environment, address evening routines that incorporate desired sleep behaviors, and modify daily routines to include appropriate activity participation. Occupational therapy practitioners are uniquely positioned to address sleep problems among older adults in a holistic manner in order to promote the health and quality of life.

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Table 1**Cognitive Behavioral Therapy-Insomnia (CBT-I) (n=12)**

Article	Setting & Sample	Design	Intervention	Results
El Kady 2012	I; n=210	Pre-test Post-test	SH, STM, behavioral and routine modification	Significant change in subjective sleep
Epstein 2012	C; n=179	4 arm RCT	IG1: STM IG2:SR/C IG3: STM and SR/C CG: waitlist control	Compared to the CG, all IGs had significant and equal benefit on sleep
Fiorentino 2010	C; n=1	Case Study	SR/C, SH, STM, LT, RT	Sleep outcomes improved.
Germain 2006	C; n=35	2 arm RCT	IG: SR/C, SH, STM CG: information only	IG sleep outcomes significantly improved compared to the CG at 1 month.
Harvey 2002	C; n=90	2 arm RCT	IG1: SR/C, STM, SH, imagery and RT CG: delayed treatment	IG sleep outcomes significantly improved compared to the CG at 12 months
Hoch 2001	C; n=21	3 arm RCT	IG1: SR/C and SH IG2: SH CG: no treatment	IGs showed significant benefit at 8 weeks, only IG1 outcomes were sustained at 52 weeks
McCrae 2007	C; n=20	2 arm RCT	IG: SR/C, STM, SH CG: SH	Sleep outcomes improved significantly in IG group over the CG at 8 weeks post-treatment.
McCurry, 2007	n=20	Systematic Review	SR/C alone, CBT-I, and STM alone.	SR/C alone & CBT-I were efficacious, STM alone needs more evidence
Montgomery 2009	n=6	Systematic Review	CBT-I, SH, SR/C, STM, and RT	Meta-analysis concluded CBT-I is effective
Morgan 2012	C; n=202	2 arm RCT	IG: mailed 6 self-help booklets (SR/C, STM, SH) and access to self-help phone line CG: usual care	IG sleep outcomes significantly improved compared to CG at 3 months and persisted at 6 months.
Sivertsen 2006	C; n=46	3 arm RCT	IG1: SR/C, SH, STM, RT IG2: sleep medication CG: placebo	IG1 demonstrated significantly greater improvement in sleep outcomes IG2 or CG at 6 months
Vitiellio 2009	C; n=51	2 arm RCT	IG 1: SR/C, STM, RT, SH, LT CG: stress management and wellness education	IG1 showed significant improvement in sleep outcomes compared to CG after 1 year.

I= Institution-based Population C=Community-based Population RCT= Randomized Control Trial SH= Sleep Hygiene SR/C= Sleep Restriction/Compression STM= Stimulus Control IG= Intervention Group CG= Control Group LT= light therapy RT= Relaxation Therapy

Table 2

Physical Activity (PA) (n=11)

Article	Setting & Sample	Design	Intervention	Results
Benloucif 2004	C; n=12	Repeated measure cross over	Physical/ social activities (e.g., stretching, walking, or dancing) in either morning or afternoon	Both morning and evening combined social/physical activity sessions improved subjective sleep
Chen 2009	C; n=128	2 arm RCT	IG: yoga CG: existing senior center activity schedule	Significant difference in subjective sleep between IG and CG at 3 and 6 months, favoring IG
Chen 2012	C; n=55	2 arm RCT	IG: Qigong exercise CG: no treatment	Qigong significantly improved subjective sleep, compared to control at 12 weeks
Freburger 2010	C; n=346	2 arm RCT	IG: exercise program (e.g., strength and endurance) CG: delayed treatment	Exercise significantly improved subjective sleep at 8 weeks, compared to control, not sustained at 3 and 6 months
Khalsa 2004	C; n=20	Pre-test Post-test	Yoga	Statistically significant improvements in subjective sleep after 8 week intervention
Li 2004	C; n=118	2 arm RCT	IG: tai chi CG: seated exercise	Significant improvements on subjective sleep in IG compared to CG at 6 months
Lira 2011	C; n=14	Pre-test Post-test	running	Sleep outcomes improved significantly after 6 months
Manjunath 2005	C; n=69	3 arm RCT	IG1: yoga IG2: An herbal supplement CG: waitlist control	IG1 had significant improvement in sleep outcomes, compared to IG2 and CG
Patel 2012	C; n=649	Systematic Review and Meta-Analysis	Yoga compared to other exercise interventions.	Relationship between sleep measures and yoga is mixed
Tanaka 2002	C; n=11	Pre-test Post-test	nap and moderate evening exercise	There were significant changes in objective sleep measures post intervention
Viana 2012	C; n=40	2 arm RCT	IG: resistance training session CG: no exercise	Mixed results for sleep outcomes

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Table 3

Multi-Component Interventions (n=7)

Article	Setting & Sample	Design	Intervention	Results
Alessi 2005	I; n=118	2 arm RCT	IG 1: SR/C; sun exposure; PA; STM; modify environment CG: usual care	IG significantly decreased daytime sleep compared to CG
La Reau 2008	I; n=59	2 arm Pilot RCT	IG: SH, RT, altered nighttime interruptions (e.g. weights, baths) CG: usual nighttime care	IG group reported significantly higher subjective sleep than CG.
Martin 2007	I; n=100	2 arm RCT	IG: SR/C, SH, BL, PA, STM, altered nighttime care routine CG: usual care	IG showed a benefit to objective measure of sleep
Morin 2006	n=37	Systematic Review	STM, SR/C, SH, RT, muscle relaxation, anxiety and stress management	STM,RT,SR/C, are efficacious
Ouslander 2006	I; n=107	2 arm RCT	IG: PA, SR/C, SH, BL, altered nighttime care routine CG: delayed intervention	No significant differences in objective sleep measures
Rybarczyk 2001	C; n=243	2 arm RCT	IG: RT, PA, and nutrition, meditation, and cognitive strategies. CG: waitlist control	IG showed significant change in subjective sleep compared to CG
Tamrat 2013	n=13	Systematic Review	RT, SH, and BL	RT and BL improved sleep quantity

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Table 4

Other Intervention Strategies (n=3)

Article	Setting & Sample	Design	Intervention	Results
Richardson 2007	I; n=64	Two group post-test quasi experiment	IG: Earplugs and eye mask CG: no earplugs or eye mask	No significant differences in sleep outcome
Royer 2012	I; n=28	2 arm RCT	IG: Light exposure CG: Placebo	No significant differences in sleep outcome
Ryu 2011	I; n=58	2 arm RCT	IG: Sleep-inducing music and sleep mask CG: headphones with no music and sleep mask	Subjective sleep measures significantly favored IG over GC

I= Institution RCT= Randomized Control Trial CG= Control Group IG= Intervention Group BL= Bright Light