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10

OLDER ADULTS' SLEEP

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10.1 Introduction: sleep in the ageing population

The prevalence of sleep problems in older adults (65 years and older) is cited as between 30 and 43% and appears to be even higher in those living with co-morbidities (Ancoli-Israel 2009). Studies have demonstrated that older adults commonly experience a decrease in total sleep time and sleep quality (Cole and Richards 2007). Decreases in sleep quantity and quality are largely associated with natural changes in sleep architecture* and the higher prevalence of medical co-morbidities in the ageing population (Cole and Richards 2007). Logically, this may not cause much concern for active, well, older adults; however, with increased co-morbidities and advanced age the ability to remain resilient in spite of sleep problems can be compromised. This chapter focuses primarily on the sleep issues of older adults with multiple co-morbidities who are most vulnerable, least able to communicate their needs and present more complex intervention challenges to health care providers. (Problems relating specifically to dementia are discussed in Chapter 14.)

Sleep deficiency in older adults can hinder function and significantly impact quality of life. In older adults, poor sleep has been identified as a risk factor for morbidity, falls, diabetes, cardiovascular problems, depression, physical injury, increased use of medication, altered cognition, pain perception, certain dementias and poor psychosocial functioning (Cricco, Simonsick and Foley 2001; Foley *et al.* 2004; Lunde *et al.* 2010; St George *et al.* 2009; Stone, Ensrud and Ancoli-Israel 2008; Wolkove *et al.* 2007a). Furthermore, sleep problems can have a significant effect on participation in occupations, healthy routines and self-identity. Older adults are seldom referred to occupational therapy for sleep problems; however, sleep problems are so prevalent that therapists should be aware of basic sleep physiology, the relationship between sleep and ageing, and the importance of incorporating sleep-screening questions into assessments, regardless of the client's presenting condition.

This chapter presents contributing factors for sleep problems in older adults, reviews sleep assessment for older adults and presents a range of evidence-based non-pharmacological sleep interventions. At the end of the chapter there is an appendix of resources to provide further information. A case study (see Box 10.1) is provided to illustrate occupational therapy involvement in identifying and intervening in typically occurring older adult sleep problems.

During the course of adulthood there are naturally occurring changes that contribute to greater difficulty in achieving restorative sleep: an increase in non-rapid eye movement* stages N1* and N2* is seen while stage N3 decreases (see Chapter 3). Consequently, there is less of the deep sleep required for physiological healing and neurochemical production (Cole and Richards 2007). The production of sleep-inducing melatonin* also decreases with age, further altering circadian rhythms (Ancoli-Israel 2009). These changes in older adults typically lead to increased difficulty in initiating and maintaining sleep and in achieving sufficient restorative sleep. Additionally, older adults can develop early-to-bed–early-to-rise sleep patterns that, while adaptive in traditional agrarian societies, are problematic in more industrialized settings where social and leisure activities are often scheduled after the end of the

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workday (Ancoli-Israel 2009). It can be particularly difficult when older adults want to be involved in social activities with family members who are busy at work or school during the day. In this way early-to-bed patterns can unintentionally contribute to social isolation and diminished function and well-being.

Older adults often have coexisting ailments and use multiple medications which can contribute to or compound sleep deficiency (Cooke and Ancoli-Israel 2006; Foley *et al.* 2004; Song *et al.* 2010). Sleep disruption and co-morbid conditions often assume a bidirectional relationship such that many health conditions interfere with restorative sleep while, at the same time, non-restorative sleep is a risk factor for numerous adverse health conditions (Cole and Richards 2007).

The most common sleep problem experienced by older adults is the same as in younger persons: insomnia. Insomnia is characterized by difficulty falling asleep and/or maintaining sleep, or having poor sleep that affects daytime functioning (Wolkove *et al.* 2007b). Insomnia often manifests as restless nights, daytime fatigue and daytime napping, and can affect multiple domains of daily life including cognitive and physical ability, emotional management and mental health (Ancoli-Israel 2009). Insomnia is classified as *primary insomnia* or *secondary insomnia* and can be further categorized based on presenting features. As highlighted in Chapter 7, categorizing primary and secondary insomnia is somewhat problematic and there is some controversy. In general, primary insomnia is considered as an entity in its own right, as opposed to secondary insomnia which arises as a consequence of an existing circumstance (Wolkove *et al.* 2007a). For example, pain from illness or disturbed sleep as a side effect of specific medications can result in secondary insomnia. Secondary insomnia is suggested to be more prevalent than primary insomnia among the ageing population and is reported more in women than in men (Byles, Mishra and Harris 2005; Cricco *et al.* 2001; Nau *et al.* 2005). Insomnia affects multiple areas of functioning and a comprehensive assessment is necessary to determine what factors are interfering with the client's ability to have restful and restorative sleep.

10.2 The role of occupational therapy

Occupational therapists should aim to incorporate basic sleep-screening questions into all assessment regardless of the reason for referral. Although sleep disturbances are experienced by 40–65% of community-living older adults and an estimated 80% of those living in institutions, primary care physicians do not often ask patients about sleep (Ancoli-Israel 2009). A 2012 survey of over 2000 Canadian health care professionals specializing in older adult care found that very few were aware of sleep assessment tools or the range of evidence-based non-pharmacological sleep interventions appropriate for this group (Brown *et al.* 2014). Additionally, as many as 70% of all adults with insomnia do not discuss their poor sleep with a health care professional (Reeve and Bailes 2010). Reeve and Bailes (2010) suggest that this reluctance to seek help results in reduced likelihood of early detection of sleep-related medical conditions, increased risk of self-medicating with alcohol and over-the-counter remedies, and ultimately may exacerbate existing sleep problems. Other researchers have also noted this reluctance to seek medical help for sleep problems and similar forms of self-medication (Ellis, Hampson and Cropley 2007; Morin *et al.* 1993; Venn and Arber 2012).

Falls prevention programmes are an example of one area of practice where occupational therapists could, and should, integrate basic sleep screening and apply their knowledge of the bidirectional relationship between sleep and other health conditions that affect mobility. Falls often result in functional impairments and diminished well-being. Falls are well documented to be associated with sleep disturbances and sleep problems are an identified risk factor for falls (St George *et al.* 2009; Stone *et al.* 2008). For example, in one study older adults experiencing poor sleep were found to be three times more likely to experience recurrent falls (St George *et al.* 2009). Fear of falling can cause avoidance of daily activities and consequently decrease an individual's functioning and quality of life. Additionally, fear of falling or the consequences of falling can exacerbate poor sleep because of pain, decreased daylight exposure, medication and altered environment (e.g. hospitalization or decreased mobility in the home).

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A recent study in Philadelphia found that older adults were unlikely to discuss their sleep problems with physicians and most commonly used watching television, listening to the radio and reading to help them fall asleep. Nearly half of the participants had used alcohol or over-the-counter sleeping aids at some point to manage their sleep deficiency (Gooneratne *et al.* 2011). Many participants (40.1%) reported using pain medication to help them sleep and stated that prescription medication that was specifically intended for sleep was the most effective. The authors pointed out that many medications can have side effects and can contain caffeine, which has detrimental effects on the sleep and health of older adults. Although pharmacological intervention can be beneficial for managing short-term insomnia in some instances, the risk of side effects and negative functional consequences can be significant. A recent study of long-term care facility residents found that the side effects of non-benzodiazepine sleep medication included decreased mobility and increased risk of falls and fractures (Berry *et al.* 2013). Other authorities in the field have identified that night-time wandering, impaired cognitive functioning, confusion, anxiety, depression, excessive sedation and daytime fatigue are also potential side effects (Ancoli-Israel 2009). Medication side effects can also be compounded by environmental factors. For example, night-time noise and staff activity in long-term care facilities can serve to further disorient a resident experiencing confusion as a medication side effect. Environmental factors are often simple to modify and should be considered when addressing medication regimes. (The influence of the environment is discussed in depth later in this chapter and in greater detail in Chapter 18 .) Additional factors that can compound some sleep medications' negative side effects include daytime fatigue, diminished attention and poor memory as well as decreased activity and participation in daily activities. Finally, some older adults' use of alcohol as a sleep aid separately or in conjunction with medication can present a further sleep challenge, decrease cognitive acuity and increase the risk of adverse medication interactions (Gooneratne *et al.* 2011).

Non-pharmacological sleep interventions should be employed even when sleep medication is indicated (David *et al.* 2010; Reeve and Bailes 2010). Non-pharmacological approaches may also correspond better with older adults' belief systems. For example, Venn and Arber (2012) found that study participants aged 65 years and older believed that relying on sleep medication was a form of addiction and thus immoral. They also found that those who took sleep medication often felt a diminished sense of control. Researchers propose that health care providers' apparent lack of awareness about evidence-based non-pharmacological alternatives contributes to the underuse of these pragmatic interventions (Brown *et al.* 2013; Gooneratne *et al.* 2011; Nau *et al.* 2005).

10.3 Factors affecting sleep occupational performance

Sleep involves multiple, interacting biopsychosocial components. One way that can help occupational therapists organize their understanding and intervention so as to make the best use of the opportunities afforded by a complex biopsychosocial system like sleep is by applying the Model of Human Occupation (MoHO) (Kielhofner 2008). This model can be used to frame the relationship between sleep, occupational performance and well-being. The case study of Mrs Wilson (introduced in Box 10.1) illustrates the application of the MoHO to sleep and is discussed in more detail below.

BOX 10.1 Case study: part 1

Mrs Wilson is a 79-year-old woman who lives with her husband in a three-bedroom home that they have owned for the past 50 years. She has three children (and four grandchildren) who have moved to different cities across the country. Mrs Wilson has been referred to occupational therapy by her family physician for a home assessment due to recent falls. During the home visit Mrs Wilson reports that in the past year, her energy and ability to concentrate have significantly declined. She says that even with drinking coffee and taking a nap, she barely has enough energy to make it through the day. The therapist notes that Mrs Wilson looks upset as she states that recently she's really been feeling her age. She says that she used to be active, lively and social, but now she is not.

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Mrs Wilson shows the therapist around her house. In the bedroom, the bedside table has several coffee mugs, medication bottles, newspapers, a book, a television remote control and a plate. Her bed has numerous pillows and three blankets. There is a space heater on Mrs Wilson's side of the bed and a fan on her husband's side. There are thin curtains covering the window that overlooks a busy street. On the dresser, there is a television and a telephone. The therapist decides she should investigate further to see if poor sleep may be contributing to Mrs Wilson's falls and decreased well-being. The therapist decides to follow this up in more detail at the next visit.

Components of the Model of Human Occupation

Volition

Volition is the subsystem of the MoHO that relates to the drive or motivation of an individual to participate in an activity. The volitional domain contributes to decision-making leading to action or inaction (Kielhofner 2008). To engage with Mrs Wilson around volition the occupational therapist would explore her interests, values and the activities that might relate to unhealthy sleep practices. Older adults, in the same manner as everyone else, may disregard the effects of poor sleep or unfavourable sleep habits in favour of other activities such as late-night television viewing and decreased daytime activity.

The therapist would also explore sleep self-efficacy with Mrs Wilson: Does she feel like she has any control in her sleep practices? Does she become frustrated and anxious when bedtime approaches because she feels insomnia is inevitable? Does she avoid going to bed at a set bedtime and stay up until she falls asleep on the couch?

The culture and social values of industrialized countries can also contribute to the prevalent, but incorrect, belief that sleep problems are just a part of ageing and there is nothing to be done (Ellis *et al.* 2007; Morin *et al.* 1993; Venn, Meadows and Arber 2013). The social undervaluing of sleep may cause people to dismiss the issue, delay seeking help, or attempt to self-treat; however, the ability to practise one's values and maintain control over one's life can be a significant motivation for addressing sleep problems. Venn and Arber (2012) found that older adults delayed seeking help for disrupted sleep until the point where it interfered with their ability to maintain independence and autonomy in their lives. Like people in other age groups, older adults' restorative sleep is highly influenced by their own sleep practices. To establish sleep-supporting practices older adults need both the information and the motivation to guide their decision-making. Occupational therapists should remember that changing long-standing sleep practices is not easy, and learning new techniques to promote better sleep takes time and support. Because change is motivated by values and beliefs, volition can play a significant role in any sleep management strategy.

Habituation

Habits are behaviour patterns formed through repetition that eventually become second nature in daily routine. Habituation is highly context dependent and affected by personal, social and cultural expectations (Kielhofner 2008). Habits can be a good indicator of health. For instance, Ohayon and Vecchierini (2005) found that a short sleep duration (less than 4.5 hours), late bedtime (after 1 a.m.), early waking time (before 5 a.m.), long sleep duration (greater than 9.5 hours) and long sleep onset latency* (greater than 80 minutes) were associated with poor health in older adults. Individuals may not intentionally engage in behaviours that have negative consequences for their sleep but, over time, habits can form which have significant implications for an older adult's ability to achieve restorative sleep.

Discussing habits and preferences with clients also provides insight into a person's sense of identity. As Kielhofner (2008) points out, most people develop sets of behaviours and habits that support their occupational performance needs and role demands. For example, in the case study (see Box 10.1 and 10.2), while Mrs Wilson was still in the workforce she woke up at 5 a.m., drank coffee throughout the day and worked long hours. In retirement, her habit of waking at 5 a.m. continued even though she did

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not need to follow a work schedule. Additionally, she began taking hour-long naps during the afternoon. Her husband was concerned that the long naps indicated that she was not well. Mrs Wilson declared, however, that she was not sick and, as a retiree, could finally rest when and how she pleases. Midday napping became habituated into her daily routine because of her belief that rest was part of retirement and the value she placed on having this autonomy over her daytime activities.

In order to maximize any intervention's success it is helpful for the therapist to first help the client understand basic sleep biology and science. When clients understand the scientific rationale for recommendations they are better able to generalize the information to other circumstances and assume more control for changes to promote their own healthy sleep habits and practices. Therapists should also consider the important influence that environmental cues and triggers have on the success or failure of behaviour change (Marteau, Hollands and Fletcher 2012). Older adults' beliefs and habits built over long periods of time may require careful attention to best support sleep-friendly changes. For example, older couples that have been sleeping in the same bed for the majority of their lives may be reluctant to try sleeping separately even though sharing a bed interferes with each other's sleep. Values related to marriage and social norms may be perceived as conflicting with the sleep-promoting choice of separate bedrooms. Participating in new sleep-promoting habits may become especially challenging for older adults when they are simultaneously adjusting to major life changes (e.g. life after retirement, moving to supportive housing, loss of a partner through divorce or death) (Wolkove *et al.* 2007b). To help clients establish and sustain sleep-supporting habits the therapist should consider including other family members in sleep education and problem-solving.

Performance capacity

Performance capacity is an individual's ability to execute the activities that make up occupation (Kielhofner 2008). The ability to execute activities involves objective components (i.e. performance of bodily systems) and subjective experiences. In older adults symptoms associated with certain conditions (such as arthritis, dementia, cancer, cardiopulmonary diseases, diabetes, mental health conditions, obstructive sleep apnoea and parkinsonism), or medications (such as antidepressants, beta-blockers, chemotherapy, analgesics, antipsychotics and blood pressure medications), can significantly contribute to sleep problems (Ancoli-Israel 2009); therefore, physical and psychiatric diagnoses, and effects of medication, should be assessed for their contribution to sleep disruption. For example, a common condition in older men and women is *nocturia* which is a frequent night-time waking caused by the need, or sensation of need, to pass urine (Wolkove *et al.* 2007a). Wolkove *et al.* (2007a) conclude from their review of the literature that nocturia frequently leads to disordered sleep, increased risk of falls, daytime fatigue and decreased health-related quality of life. They also point out that obstructive sleep apnoea (OSA), more prevalent in the ageing population, males and people with obesity, is highly associated with nocturia.

OSA is characterized by a disruption of airflow during sleep due to the base of the tongue or the palate obstructing the airway and is associated with hypertension, stroke, ischaemic heart disease and non-restorative sleep. In addition, night-time blood oxygen desaturation, known as 'nocturnal oxygen desaturation', commonly occurs with OSA. Chronic desaturation is associated with cognitive impairment in older adults (Wolkove *et al.* 2007a). Researchers repeatedly comment that OSA is under-diagnosed (Ancoli-Israel 2009; Punjabi 2008) and particularly in the older adult population (Bombois *et al.* 2010). Also older adults may not seek assessment and treatment for OSA because the features of OSA (fatigue, daytime drowsiness, decreased concentration and morning headache) may be mistaken for those of other common conditions such as cardiac problems and diabetes. Consequently, many treatable cases of OSA go undiagnosed and untreated. Sleep companions may be the best source of information and often report hearing loud snoring followed by periods of silence. Continuous positive airway pressure (CPAP) is generally used to treat clinically significant OSA, but for some older adults the CPAP mask is uncomfortable, too complex to use or a nuisance (Wolkove *et al.* 2007a). Occupational therapists can play a role in helping clients with OSA to problem-solve around these

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comfort issues. For example, an older adult (and possibly the spouse) may need additional help in breaking down the steps in caring for the equipment so that the task is less daunting.

These medical conditions and OSA are examples of only a few of the many physiological age-related changes that threaten sleep quality and quantity such that an older adult's sleep-wake cycle becomes out of synchronization with the individual's environment (Ancoli-Israel 2009). For example, in the case study Mrs Wilson tells the therapist that she often experiences early awakenings (between 3 and 5 a.m.) and she believes this is related to arthritic aches and pains. Waking this early can cause discord in scheduling for the rest of the day and Mrs Wilson now needs to rest mid-afternoon to manage the feeling of tiredness she experiences.

Emotional well-being also contributes to performance capacity and healthy sleep. Issues that are common to older adults include spousal death, retirement and social isolation. These factors also increase the risk for depression which, as mentioned previously, is highly associated with insomnia (Wolkove *et al.* 2007a).

Older adults in institutional settings commonly experience sleep disturbances that can be attributed to the organizational and physical environment. The organizational environment includes matters relating to policies and procedures such as cleaning schedules, meal times and night-time toileting routines that can to a great extent negatively affect a resident's ability to have proper sleep (AMDA 2007). Features of the physical environment that commonly interfere with restorative sleep include light, noise, temperature, air quality and sleeping equipment (e.g. bed, pillows, blankets). Because bright, blue-light exposure, activity, noise and temperature are critical variables in effective sleep, therapists should consider these features of the environment to be of primary importance for evaluation and remediation. Evidence-based guidelines for designing effective institutional sleep environments for sound (Berglund, Lindvall and Schwela 1999) and light (Society of Light and Lighting 2008) exist, and occupational therapists should work in consultation with architects and design engineers to achieve effective outcomes. Several organizations around the world focus on developing best practice guidelines to assist in institutional design promoting more effective sleep. These organizations include the Society of Light and Lighting in the UK and the Centre for Health Design in the US (see Appendix 10.1 and Chapter 18 for more discussion).

10.4 Assessing sleep in older adults

Sleep assessments and tools to identify beliefs, habits and behaviours that interfere with sleep are not, in themselves, age specific; however, older adults often have more complex sleep problems as a consequence of the increasing co-morbidities and changing life circumstances that accompany ageing. This section reviews some of the widely used and accessible assessment tools that may be of use to occupational therapists. New tools are constantly in development and therapists should check periodically for these emergent resources.

The prevalent, but inaccurate, belief in industrialized societies is that poor sleep is the norm for older adults and that there is nothing that can be done. Consequently, therapists should not assume clients will initiate discussion of sleep-related problems. Rather, occupational therapy assessments for all conditions should include one or two basic screening questions to determine whether the client feels his or her sleep is restorative or whether they feel there are any sleep-related problems. The responses may then prompt additional information gathering (for example, the 12 sleep-history questions listed in the 'Sleep history' section below). Responses to this more detailed information may, in turn, trigger a formal assessment and/or referral to another health care provider. In the case study, for example, when the occupational therapist asked Mrs Wilson about her sleep she stated, 'No one has ever asked me about sleep before. I just assume I have to put up with all this up and down at night. I would be so happy if there was something that could be done to help.' Based on this information the therapist was able to develop a more formal assessment plan.

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Common assessment tools

The following section gives a brief introduction to the most common and accessible tools to assess components of sleep in various domains. No single tool addresses all of the biopsychosocial domains, and therapists would benefit from being familiar with the options most relevant to their client's context and occupational performance needs.

Glasgow Sleep Impact Index

The Glasgow Sleep Impact Index (GSII) is similar to the Canadian Occupational Performance Measure (Law *et al.* 1992) that many occupational therapists use in daily practice. The GSII, however, is designed for interdisciplinary use and specifically for sleep issues (Kyle *et al.* 2013).

Abbreviated version of the Dysfunctional Beliefs and Attitudes about Sleep Scale

The brief version of the Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS-16) consists of 16 statements about sleep and the client self-reports how strongly they agree or disagree with each item on a scale of 1 to 10 (Morin, Vallières and Ivers 2007).

Nocturia, Nocturnal Enuresis and Sleep-interruption Questionnaire (NNES-Q)

The Nocturia, Nocturnal Enuresis and Sleep-interruption Questionnaire (NNES-Q) is a brief assessment that looks at the severity and impact of nocturia (see Appendix 10.1 for details) (Bing *et al.* 2006).

Pittsburgh Sleep Quality Index

The Pittsburgh Sleep Quality Index (PSQI) is a psychometrically tested questionnaire with 19 self-report questions about duration, wakening and subjective perceptions of sleep quality, with five questions for the client's bed partner (if applicable) (Buysse *et al.* 1989). (See Chapter 8 for more details and Appendix 10.1 for the PSQI online version's URL.)

Actigraphy

Actigraphy uses a wristwatch-size monitor that records sleep/activity/light exposure data that are downloaded into a software program for analysis. Actigraphy reports incidence of wake after sleep onset and sleep efficiency (the percentage of time in bed actually spent asleep). Actigraphy also has clinical usefulness as a proxy measure of sleep latency (how long it takes to fall asleep once settled for the night); however, this is of course mediated by the accuracy of recording the time the patient settles in bed for the night and if the patient is able to sustain an unusually high degree of inactivity although still awake. While polysomnography* is considered to be the gold standard for assessment, actigraphy is more pragmatic and affordable within the occupational therapy clinic. Actigraphy has been used with increasing frequency with reliable results for older adults, including those with dementia (Beaudreau *et al.* 2008; Lunde *et al.* 2010).

Sleep diaries

There are numerous downloadable versions of sleep diaries for older adults or their caregivers to complete and therapists can do an internet search for one that has the relevant degree of detail for their client group. An example can be found on the How to Sleep Well as You Age website (Robinson, Kemp and Segal 2012 in Appendix 10.1). These self-report instruments are useful to identify patterns of variables that potentially impact restorative sleep as well as how clients perceive their sleep. These are

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both important dimensions of sleep that are not reflected in actigraphy and other standardized assessment tools.

Sleep history

A sleep history gathers information regarding sleep habits such as sleep onset, duration, frequency of night-time awakenings, timing of going to bed, aggravating or alleviating factors, medication, substance use and family history. Bloom *et al.* (2009, p.764) developed a list of sleep-related screening questions to guide health care workers in primary care:

1. What time do you normally go to bed at night and wake up in the morning?
2. Do you often have trouble falling asleep at night?
3. About how many times do you wake up at night?
4. If you do wake up during the night, do you usually have trouble falling back asleep?
5. Does your bed partner say (or are you aware) that you frequently snore, gasp for air, or stop breathing?
6. Does your bed partner say (or are you aware) that you kick or thrash about while asleep?
7. Are you aware that you ever walk, eat, punch, kick, or scream during sleep?
8. Are you sleepy or tired during much of the day?
9. Do you usually take one or more naps during the day?
10. Do you usually doze off without planning to during the day?
11. How much sleep do you need to feel alert and function well?
12. Are you currently taking any type of medication or other preparation to help you sleep?

Assessing the environment

Ideally the occupational therapist should conduct a home visit in order to observe the sleeping environment for its conduciveness to sleep. An alternative is to ask clients to provide digital images of their sleep environment and carry out basic readings of light, sound and temperature levels themselves or with the assistance of a family member. Lux (light intensity) and decibel levels (sound) can now be measured with smartphone apps, and a number of low-cost options that work with different operating systems are available. Lux and decibel level readings can be interpreted as acceptable or problematic by referring to existing standards for sound from the World Health Organization (Berglund *et al.* 1999) *Guidelines for Community Noise* and the ‘Recommended Light Level’ table in the online magazine *Engineering ToolBox* (see Appendix 10.1 for access details). The evidence-based rule of thumb is that sounds greater than 30 decibels can interfere with sleep and increase physiological arousal (Berglund *et al.* 1999), and light intensity at 30 lux and higher will suppress the production of the sleep-promoting hormone melatonin (Wood *et al.* 2013). The environment and aspects of occupational performance capacity can also be assessed during a thorough sleep history.

10.5 Interventions to promote healthy sleep in older adults

As previously discussed, occupational therapy can play an important role in recommending non-pharmacological sleep interventions to promote healthy sleep in older adults (Brown *et al.* 2013).

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Because environmental modifications are often the most pragmatic and least stressful changes for older adults and/or their caregivers to implement, it is appropriate to address these non-pharmacological sleep interventions first. (The URLs to resources are provided in Appendix 10.1.)

Environmental interventions

A growing number of non-pharmacological sleep interventions are documented in the literature and a critical review of the methodological quality of the evidence (Brown *et al.* 2013) found that there is the clearest evidence base for light-based therapies (Alessi *et al.* 2005; Ancoli-Israel *et al.* 2002; Burns *et al.* 2009; Skjerve, Bjorvatn and Holsten 2004; Riemersma-van der Lek *et al.* 2008; Sloane *et al.* 2007). Light-based therapy involves controlling the light in the environment such that persons are exposed to levels of at least 1000 lux (the equivalent of a cloudy day) during the daytime. Lighting of this intensity suppresses melatonin and facilitates the production of neurochemicals, such as serotonin, that promote alertness. Conversely, reducing light exposure in the evenings to less than 30 lux can be used to trigger the production of hormones such as melatonin and thus facilitate sleep. Light-exposure therapies can be designed using light boxes, natural daylight exposure and controlling the timing of exposure to blue-spectrum light from electronic devices such as televisions and computers.

Behavioural changes also mediate the effectiveness of environmental interventions. For example, increased daytime activity can contribute to increased daylight exposure. There is a moderate evidence base for the use of activity, such as walking and social groups, to promote daytime wakefulness (Richards *et al.* 2001, 2005). Integrating evening activities, such as bathing or using a hot water bottle, can also influence the physical environment to induce a sleep-supporting physiological response. Behaviours that modify the ambient temperature or core body temperature are important to sleep as seen in the research on passive body warming to promote sleep for clients with dementia (Mishima *et al.* 2005) and, to a lesser degree, Parkinson's disease (Rutten *et al.* 2012). Passive body warming involves using a warm bath, heating pad or other temporary heat source to artificially raise an individual's core temperature slightly about 60 minutes before bedtime. Because core-temperature cooling triggers feelings of sleepiness, when the heat source is removed core temperature drops and sleep may be more easily initiated. (More details about the evidence and use of the interventions can be found on the Sleep and Dementia Resources website listed in Appendix 10.1.)

Provision of pragmatic evidence-based environmental sleep interventions aligns well with occupational therapists' skills in activity analysis and environmental modification. The international group SomnIA compiled an overview of evidence-informed guidelines and illustrative examples of environmental changes that can be made in both community and institutional settings. (Their report can be accessed through the URL in Appendix 10.1.)

Sleep education

Occupational therapists can support their clients and their clients' caregivers or family members to make better-informed decisions and increase autonomy through providing evidence-based education. Various useful and accessible resources are available (see Appendix 10.1).

Sleep education can include information regarding co-morbidities, age-related changes, medication, sleep abnormalities, sleep hygiene and the importance of bedtime routines and schedule. In the ageing population, it is particularly important to incorporate medication education because of the high prevalence of polypharmacy and risk for adverse medication interactions and side effects. Methods of education should be tailored to clients' learning styles and abilities and, when possible, include family members. While information and understanding are critical components to adopting healthy behaviours, the physical and social environments are strong influences on habits; therefore, it is recommended to educate all household members so as to support good habits and behaviour change.

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Sleep hygiene

Sleep hygiene refers to incorporating behaviours conducive to restorative sleep into a client's routine. There is no standard protocol for sleep hygiene and it is often used in conjunction with other interventions. Components of sleep hygiene may include, but are not limited to, physical activity, night-time rituals, sleep scheduling, reduced caffeine, nicotine and alcohol before bed, and controlling the light, sound and temperature in the sleep environment. (Sleep hygiene principles are discussed in more depth in Chapter 8 and therapists can also download sleep hygiene handouts designed with older adults in mind from the American Psychological Association and from the US Geriatric Mental Health Foundation.)

Cognitive behavioural therapy for insomnia

Cognitive behavioural therapy for insomnia (CBT-I) usually includes a number of components (see Chapter 8) including a focus on adapting thoughts, beliefs and cognitions that interfere with healthy sleep behaviours. Negative thoughts and subsequent behaviours can create stress for an individual, often making it even more difficult to fall asleep. For example, in Mrs Wilson's case, her belief that afternoon napping is a positive aspect of retirement is causing some discord between her and her husband and also leading to delayed bedtime with the consequence of feeling unrested and lethargic in the morning. In some studies (for example, Jacobs *et al.* 2004) CBT-I has been shown to be as effective as pharmacotherapy in achieving sleep onset in working-age adults.

Nocturia reduction and safety issues

Occupational therapists can provide information about what types of beverages are more likely to contribute to frequent awakenings because of acting as night-time diuretics and irritants to the bladder. (Information about foods and beverages that have an irritating effect on the bladder, such as asparagus, cabbage, grapes, caffeine and salt, can be found on the Cleveland Clinic website listed in Appendix 10.1.) If this is a significant issue, occupational therapists should work in consultation with a dietician to ensure that a sound dietary plan is developed. Occupational therapists can also help clients problem-solve about safety issues when waking at night. For example, clients may be in the habit of leaving a light on all night so they can safely navigate to the bathroom; however, this persistent light source can trigger suppression of melatonin and consequently interfere with restorative sleep. A sleep-friendly alternative would be to install a motion-activated nightlight that comes on only when the client is getting out of bed.

Obstructive sleep apnoea interventions

Sleep apnoea (discussed in more detail in Chapter 7) has significant health and quality-of-life consequences. Occupational therapists can assume a role in identification of possible sleep apnoea and in referring their clients for further investigation. Scott *et al.* (2003) highlight that the prevalent, but incorrect, societal belief that snoring is not an indication of a potentially serious underlying condition and that nothing can be done to address snoring, continues to dissuade persons from seeking treatment. This research-to-practice gap indicates that occupational therapists, as well as all team members, need to assume a more active role in screening for the possibility of apnoea. Reasons for adhering to continuous positive airway equipment and problem-solving to help clients maintain a side-lying position to reduce airway collapse during sleep can be discussed with older adults by occupational therapists. Simple pragmatic interventions, such as body pillows to support side lying, or having a small ball placed in a pocket sewn onto the back of a pyjamas top so that lying on the back is not comfortable, may be quite effective in helping some clients. (More details about positioning can be found on the University of Maryland Medical Center website; see Appendix 10.1.)

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10.6 Summary and conclusion

This chapter reviews common sleep problems experienced by older adults and frames the complex nature of sleep within the occupational therapy Model of Human Occupation. The case study of Mrs Wilson, woven through the chapter and concluded in Box 10.2 below, illustrates the occupational process. A list of resources to assist the occupational therapist in assuming an active role in sleep problems with older adults is also provided. The small body of evidence for managing sleep-related problems experienced by older adults is growing rapidly. Currently, the evidence base is sufficiently strong so that occupational therapists can confidently apply their skills in environmental modification, activity, educational approaches and cognitive behavioural techniques to help manage sleep issues of older adults and their caregivers. Research and knowledge-exchange activities to develop non-pharmacological sleep interventions for older adults is an exciting new area, and the opportunities for occupational therapists to advance practice and clinical research in this area are extensive.

BOX 10.2 Case study: part 2

The occupational therapist identified sleep as a potential problem during her first visit to Mrs Wilson's home. Before she meets with Mrs Wilson again, the therapist prepares a list of screening questions to ask that will help her identify any patterns or changes of circumstance that may indicate the need for more formal assessment. The specific questions are as follows:

1. Does Mrs Wilson have any strategies intended to help reduce her fear of falling at night? Is she taking a sedating medication that could make her less alert when she gets up to toilet during the night? Does she leave lights on so that she feels safer at night but which also interfere with sound sleep?
2. Why was there a decline in her energy? Does Mrs Wilson report any changes to her sleep practices or patterns over that time? For example, in the past 3 years has there been a change to her routine, health or environment that could have negative sleep consequences?
3. How many caffeinated beverages does she drink a day and at what times?
4. When, and for how long, does she nap during the day?
5. What is her current sleep routine?
6. What are her beliefs regarding sleep? (The therapist plans to use the standardized Dysfunctional Beliefs and Attitudes about Sleep scale [Morin, Vallières and Ivers 2007] to gather this information.)
7. What medication does she take and when does she take it? (The therapist will review these medications to see if any influence sleep and alertness. What she finds may indicate the need for a referral to a clinical pharmacist or contacting Mrs Wilson's physician.)
8. Does she or her husband snore?

The therapist also recognizes some additional factors that may be contributing to poor sleep for Mrs Wilson:

- The extra blankets and heater may indicate the bedroom temperature is kept too high for her core body temperature to drop sufficiently to maintain effective sleep.
- The television, fan, heater and other electronics in the bedroom are all possible sources of disturbing noise at night.
- The number of activities on Mrs Wilson's night-table indicate she is not habituated to associate her bed with sleep.
- Pain or discomfort are indicated by medication bottles and the number of extra pillows.
- Light from the street, television and other electronics are sources of melatonin-suppressing blue-spectrum light.

The therapist identifies several possible adaptations to Mrs Wilson's sleep environment that could promote better sleep:

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- Install a timer on the heater and television that will shut the electronics off after a certain amount of time to allow for sleep-promoting bedroom cooling and prevent ongoing blue-spectrum light exposure and noise from the television.
- Install thicker curtains to reduce light and noise.
- Purchase a supportive mattress and use wedges for positioning.
- Do leisure activities in the living room instead of the bed and do not go to bed until ready to go to sleep.

When the therapist discusses sleep problems with Mrs Wilson and how they may be related to her falls, she learns more about Mrs Wilson's sleep practices and beliefs. This information presents the therapist with an opportunity to introduce a number of small, pragmatic sleep-promoting changes to Mrs Wilson. Having many options allows Mrs Wilson to have more control and make healthy changes at her own pace and in ways that she sees as relevant to her own context. For example, Mrs Wilson likes to have a cup of tea while video chatting with her grandchildren before bed. She then has a second cup and a light snack while watching television in bed until she is tired enough to fall asleep. When the therapist said there was free software (stereopsis.com/flux) that would help filter melatonin-suppressing bright blue light from her computer screen when she video-chatted with her grandchildren, Mrs Wilson was keen to try this. She was also interested in using a timer to turn off the electronics when she went to sleep.

The therapist and Mrs Wilson made a plan to review a list of other sleep-promoting changes Mrs Wilson could make. They will discuss these changes at the next home visit. These strategies include:

- Learn more about how sleep changes with age and what people can do to promote better sleep.
- Consult the pharmacist about possible adverse drug interactions that could contribute to poor sleep, motivation and/or concentration.
- Create a regular bedtime routine and establish a set time to get up every day.
- Limit liquid consumption before bedtime and have decaffeinated beverages.
- Get as much natural light exposure during the day as possible and learn more about why this matters.
- Avoid watching television in the bedroom, especially before sleeping.
- Limit naps to no more than 30 minutes early in the day.
- Complete a sleep diary to monitor changes in sleep based on recommendations.
- With her grandchildren, play the online sleep awareness games on the Science: Human Body & Mind – Sleep, BBC interactive website (see Appendix 10.1). Mrs Wilson selected this activity so that the whole family could enjoy themselves while learning more about how to have healthy sleep.

Appendix 10.1 Further resources

- Age UK: insomnia and ageing plain-language article and podcast (Sept 2012; www.ageuk.org.uk/health-wellbeing/conditions-illnesses/getting-a-good-nights-sleep)
- American Academy of Sleep Medicine: *Practice Guidelines* (www.aasmnet.org/practiceguidelines.aspx)
- American Psychological Association: *Psychology Topics: Sleep* (www.apa.org/topics/sleep/why.aspx)
- Canadian Sleep Society: *Sleep in Older Adults* (http://giic.rgps.on.ca/files/sleep_aging.pdf)
- Carrier, J., LaFortune, M. and Drapeau, C. (2012) *Sleep in the Elderly: When to Reassure, When to Intervene. Insomnia Rounds* (http://css-scs.ca/downloadfolder/150-004_Eng.pdf)
- Centre for Health Design (US) (www.healthdesign.org)
- Cleveland Clinic: information about diuretic foods (http://my.clevelandclinic.org/disorders/overactive_bladder/hic_bladder_irritating_foods.aspx)
- College of Occupational Therapists' free resource, 'Living well through activity in care homes: the toolkit' (www.cot.co.uk/living-well-care-homes)
- Joseph Rowntree Foundation: *Supporting Older People in Care Homes at Night* (www.jrf.org.uk/sites/files/jrf/night-care-older-people.pdf)

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- Nocturia, Nocturnal Enuresis and Sleep-interruption Questionnaire (NNES-Q) (www.urosource.com/fileadmin/user_upload/european_urology/PIIS0302283805008328.pdf)
- Pittsburgh Sleep Quality Index: University of Pittsburgh Sleep Medicine Institute (www.sleep.pitt.edu)
- Recommended Lighting Levels (*Engineering Tool Box*; www.engineeringtoolbox.com/light-level-rooms-d_708.html)
- Science: Human Body & Mind – Sleep: BBC interactive website (www.bbc.co.uk/science/humanbody/sleep)
- 'Science of Sleep': documentary, CBS network (www.cbsnews.com/video/watch/?id=4181992n)
- Sleep and Dementia Resources (www.sleep-dementia-resources.ualberta.ca)
- Sleep hygiene resources: American Psychological Association (www.apa.org/pi/aging/resources/guides/insomnia.aspx#) and the US Geriatric Mental Health Foundation (www.gmhfonline.org/gmhf/consumer/factsheets/hlthage_sleep.html)
- Smith M., Robinson, L. and Segal, R. (2014) *How to Sleep Well as You Age: Tips for Overcoming Insomnia and Sleeping Better Over 50* (www.helpguide.org/articles/sleep/how-to-sleep-well-as-you-age.htm#why)
- Society of Light and Lighting (UK) (www.cibse.org/index.cfm?go=page.view&item=68)
- SomnIA: *Optimising Quality of Sleep Among Older People in the Community and Care Homes: An Integrated Approach* (www.somnia.surrey.ac.uk/pdf%20and%20word%20documents/ndafindings.pdf)
- University of Maryland Medical Center: Sleep apnea background and positioning information (http://umm.edu/health/medical/reports/articles/obstructive-sleep-apnea)

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