TREATMENT OF LATE-LIFE
INSOMNIA

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Characteristics of Older Adults With Insomnia

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Purpose

The goals of this chapter are (a) to describe the characteristics of three groups of healthy, independent, community dwelling older adults: good sleepers and poor sleepers with and without insomnia complaints; (b) to present a working operational definition of insomnia that is based on both sleep/wake parameters and distress experienced; and (c) to explore the multifaceted nature of the insomnia complaint in older adults. In particular, we will show that at least the following aspects of the insomnia experience must be taken into consideration both when conceptualizing insomnia and during assessment and treatment:

1. Nocturnal sleep/wake experiences such as total sleep and wake times
2. Nocturnal cognitive arousal, activity, and tension
3. Psychologically laden sleep variables such as sleep-related distress

4. Aspects of daytime psychological adjustment, such as low levels of anxiety and depression
5. Self-reported as well as objective aspects of daytime functioning and performance (e.g., fatigue, sleepiness)

To arrive at an operational definition of insomnia in older adults, we will discuss what is meant by "older adults" and will briefly examine how existing classificatory systems deal with definitions of insomnia. We will then evaluate the daytime and nocturnal components of the insomnia complaint, examine characteristics of older adults with and without insomnia, and explore how insomnia and related complaints are measured and evaluated.

Methodological and Conceptual Problems in Determining Whether Increasing Age Causes Insomnia

Studies show age-related changes in sleep architecture and in the prevalence of insomnia (Dement et al., 1985; Kales, 1975; Miles & Dement, 1980; Morin, 1993; Morin & Gramling, 1989; Prinz, Vitiello, Raskind, & Thorpy, 1990; Williams, Karacan, & Hursch, 1974). Does this mean that increasing age causes insomnia? Not necessarily. There are five major confounds in the literature that prevent definitive statements: Much of the data reflect prevalence rather than incidence, the effects of illness and medications are often not taken into account, studies are cross-sectional rather than longitudinal, age ranges of older adults studied vary widely, and diverse and sometimes inconsistent definitions of poor sleep and insomnia are used.

Prevalence Rather Than Incidence and the Effects of Illness and Medications

The bulk of the findings reflect the prevalence of insomnia (e.g., "do you have" or "have you ever had") rather than its incidence (e.g., "did you develop during the past year") (see Morgan, Chapter 1, this volume, for an extended discussion of this topic). Thus, the available data con-

cerning age and insomnia may reflect the chronicity of sleep complaints rather than the rate at which new sleep problems develop.

A variety of other changes occur with age, and factors such as deteriorating physical health, the adverse effects of many prescription and over-the-counter drugs on sleep, and high rates of sleep apnea and restless legs syndrome/periodic limb movements in sleep (RLS/PLMS) all contribute to confounding the findings (e.g., Ancoli-Israel & Coy, 1994; Edinger et al., 1989; Jacobs, Reynolds, Kupfer, Lovin, & Ehrenpreis, 1988; Libman, Creti, Levy, Brender, & Fichten, 1997; Reynolds et al., 1980).

Cross-Sectional Rather Than Longitudinal Investigations

The widely held assumption that aging causes insomnia may not be supported by the available evidence on older healthy adults. For example, although increases in sleep disturbances with increasing age have been found in non-elderly samples (Janson et al., 1995; McGhie & Russell, 1962; Weyerer & Dilling, 1991), a reexamination of studies from the 1960s as well as more recent investigations suggests that rather than accelerating after age 65, insomnia problems appear to peak considerably earlier—in the 50 to 60 age group (Hammond, 1964; McGhie & Russell, 1962; Mellinger, Balter, & Uhlenhuth, 1985). In addition, epidemiological studies of older individuals have demonstrated that when health problems were controlled for or when studies were longitudinal, insomnia complaints generally showed no age-related increases (Bliwise, King, Harris, & Haskell, 1992; Foley et al., 1995; Hoch et al., 1994; Monjan & Foley, 1995). Moreover, both cross-sectional and longitudinal studies that examined healthy, well-functioning seniors have demonstrated exceptionally low levels of sleep complaints (Kronholm & Hyyppa, 1985; Morgan, Healey, & Healey, 1989). Some studies of sleep patterns in aging populations have found that when older individuals were divided into "young old" and "old old" categories, sleep quality did not decline with age (Frisoni et al., 1993; Gislason, Reynisdottir, Kristbjarnarson, & Benediktsdottir, 1993; Kronholm & Hyyppa, 1985; Libman et al., 1998; Schmitt, Phillips, Cook, Berry, & Wekstein, 1996). Similar results are reported by Hoch et al. (1994), who used both physiological and self-report assessment. When older subjects are divided into good and poor sleep-

ers, some longitudinal studies have even suggested that sleep quality can improve over time (Libman et al., 1998; Mellinger et al., 1985; Mendelson, 1995; Monjan & Foley, 1995; Morgan et al., 1989). Such findings suggest that insomnia does not necessarily develop as a consequence of increasing age, per se, in older adults.

Age Ranges Vary Widely

An additional confound relates to "older adults" having been defined in a variety of ways in the literature. The lower limit may be 55, 60, or 65 years of age. The upper limit is usually not specified, but frequently there are 90-year-old participants, as is the case in our research. Thus, it is entirely possible that findings on "older adults" reflect data on individuals aged 55 to well over 90. Not only does this age range span 35 or more years, but it also involves two generations—two distinct cohorts— of older adults. This vast age range, along with comorbidities such as illness and iatrogenic effects of medications, may contribute to findings of large numbers of older adults with insomnia. To further knowledge in this realm, we must be clear whom we are talking about.

Most studies of insomnia exclude individuals age 55 and over. This is due, in part, to differences between younger adults, on one hand, and middle-aged and older adults on the other, both in sleep architecture and in the nature of insomnia complaints. Whereas younger individuals generally have problems falling asleep (sleep onset insomnia), older adults are also likely to have problems maintaining sleep (sleep maintenance insomnia) (e.g., Gislason & Almqvist, 1987). As noted earlier, studies of older adults often use age 65 as the cutoff. Thus, data on the fastest growing segment of North American society—people aged 55 to 65—are especially scarce. Future research should target this group for evaluation. Studies should be longitudinal, if possible, and evaluate both the prevalence and the incidence of poor sleep and insomnia.

Varied Definitions

Another confound relates to the diagnostic criteria for insomnia. There are three popular classificatory systems for sleep disorders: the Di-

agnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994), the International Classification of Sleep Disorders or ICSD (American Sleep Disorders Association, 1990), and the International Classification of Diseases (ICD-10; World Health Organization, 1992). These are described in detail by Morgan (Chapter 1, this volume). When it comes to defining insomnia, each classificatory system has important weaknesses, leading to considerable confusion about the definition of poor sleep and insomnia in both the clinical and research literatures. These classification systems not only differ in the categories they use but also utilize different diagnostic criteria to define insomnia (Edinger et al., 1996). For example, whereas the ICD-10 provides both a frequency criterion (at least 3 nights per week) and a duration criterion (at least 1 month), the DSM-IV contains only a duration requirement (at least 1 month), and the ICSD contains neither.

All three systems are consistent in that a diagnosis of primary insomnia is made only after excluding insomnia associated with (a) a mental disorder (e.g., major depressive disorder, generalized anxiety disorder), (b) a general medical condition (e.g., hyperthyroidism), (c) another sleep disorder (e.g., narcolepsy), or (d) the physiological effects of substance abuse or medication. All three nosologies include criteria for daytime "consequences" of poor sleep and require the presence of a complaint of insomnia, rather than merely poor sleep. In fact, the DSM-IV and ICD-10 both include a "clinical significance" criterion of distress related to the sleep problem as a central feature of primary insomnia. Unfortunately, none of the classificatory systems has operationalized how to evaluate or measure "distress" or "complaint."

Research definitions of insomnia also use the exclusion criteria noted above. Because the existing nosologies are not entirely consistent with one another and because some criteria are only loosely operationalized, however, variations in definitions abound. This problem has been especially serious in epidemiological investigations, where sleep-related questions formulated by non–sleep specialists are frequently used.

The most popular research definition involves 30 minutes of undesired awake time at least 3 nights per week with a problem duration at least 6 months. The distress criterion usually is not formally included, in part because there is no generally acceptable measure for the construct. Often, research relies on self-selection—if someone volunteers for an in-

somnia study or is referred to a sleep laboratory and meets the other selection criteria, he or she is assumed to have insomnia rather than merely poor sleep.

We contend that the failure to use a uniform definition across studies and the universal lack of research attention to the distress component of insomnia have allowed a false picture to emerge about poor sleep and the complaint of insomnia in older adults. Younger adults who do not have insomnia frequently experience uninterrupted sleep during the night. Most older adults, including those who report sleeping well, experience at least one awakening during the night (Libman, Creti, Amsel, Brender, & Fichten, 1997). Therefore, whereas older adults may indeed experience disrupted sleep with lengthy nocturnal awake times, the individual may not find this experience especially distressing and thus may not be *suffering* from insomnia. As one research participant told us, "Yes, I stay up for a while. But it is really quiet, and I can get many things done. I do my best baking in the middle of the night."

High- and Low-Distress: Poor Sleepers

Reports such as this, coupled with the difficulties with definitions of insomnia noted above, forced us to identify and distinguish two groups of older poor sleepers whose sleep parameters were very similar: poor sleepers who were highly distressed about their sleep and those who were minimally distressed about it (Fichten et al., 1995; Libman, Creti, Amsel, et al., 1997). There had already been hints in the literature that some "insomniacs" fail to experience high levels of anxiety, tension, or arousal (Chambers & Kim, 1993; Seidel et al., 1984; Stepanski et al., 1989), and others have discussed noncomplaining poor sleepers (Dorsey & Bootzin, 1997; Lavidor et al., 1996; Mellinger et al., 1985; Mendelson, Garnett, Gillin, & Weingartner, 1984; Ohayon, Caulet, & Guilleminault, 1997).

We clearly identified, categorized, and described these two types of poor sleepers—those who are highly distressed by their sleep problem and those who have similarly serious sleep disturbance but are minimally distressed about it. The "low-distress poor sleeper" group consists of people who are relatively untroubled by the psychophysiological changes in sleep architecture that accompany aging. This group is critical to understanding successful coping with age-related changes in

sleep. For example, comparisons of good sleepers with high- and low-distress poor sleepers show that where quantitative sleep parameters are concerned, such as total sleep time, total wake time, and sleep efficiency, high- and low-distress poor sleepers are fairly similar to each other and very different from good sleepers. On measures of distress related to sleep disruption, however, there is greater similarity between good sleepers and low-distress poor sleepers than there is between the two poor sleeper groups. This finding mirrors the pattern of results obtained on personality and psychological adjustment (Fichten et al., 1995; Lavidor et al., 1996).

Contributors to the Insomnia Complaint

The requirement that insomnia be defined not merely through sleep and wake parameters, such as total sleep and wake times or sleep efficiency, but also through presumed daytime consequences poses additional difficulties both for assessment and for treatment.

Presumed Daytime Consequences: Impaired Daytime Performance

People who complain of difficulty falling asleep or staying asleep during the night often complain of being impaired in their ability to function during the day. For example, they report feeling unrefreshed, sleepy, and tired, and they report problems with memory and concentration (Alapin et al., 2000; Hauri & Fisher, 1986; Zammit, 1988). Most cite fatigue (tiredness, lethargy) as a greater problem than drowsiness (feeling sleepy, struggling to stay awake) (Chambers & Keller, 1993; Stepanski, Zorick, Sicklesteel, Young, & Roth, 1986).

Despite the ubiquity of self-reported complaints about daytime functioning in individuals with insomnia, studies generally have failed to find significant differences between people with insomnia and normal controls on behavioral measures of daytime performance and functioning (e.g., Alapin, 1996; Lichstein, Wilson, Noe, Aguillard, & Bellur, 1994; Mendelson et al., 1984; Seidel et al., 1984).

Correlations between self-reports of feeling sleepy or fatigued and behavioral measures of the same constructs are generally small and

nonsignificant (cf. Alapin et al., 2000; Johnson, Freeman, Spinweber, & Gomez, 1991; Seidel et al., 1984). This lack of consistency between subjective and behavioral measures of daytime "consequences" have played a key role in conceptualizations of the nature and meaning of insomnia as well as of the role of sleep deprivation in the "secondary" symptoms of insomnia such as sleepiness and fatigue (cf. Chambers & Keller, 1993). Indeed, some investigators have gone as far as to posit "that the secondary symptoms reported by patients with primary insomnia are probably not related to their poor sleep per se" (Bonnet & Arand, 1998, p. 359). By contrast, self-reports of poor daytime functioning are related to distress about insomnia as well as to poor scores on measures of psychological adjustment (Fichten, Libman, et al., 1998a, 2000b). This suggests that subjectively experienced daytime performance and the behavioral or biological expressions of these aspects of daytime functioning may not be fully controlled by the same physiological mechanisms. Indeed, it has been suggested that central nervous system (CNS) hyperarousal may provide the mediational link between distress about one's insomnia and self-perceived poor performance during the day (Bonnet & Arand, 1998). To explore this possibility, research is needed that includes both daytime and nocturnal polysomnography (PSG) as well as self-reported and behavioral measures of daytime sleepiness, fatigue, and difficulty concentrating. In such investigations, poor sleepers reporting both high and low levels of distress concerning their sleep difficulty should be studied.

Presumed Daytime Causes: Myths About Lifestyle Factors

The ubiquity of chronic sleep complaints, even in the "well elderly," has prompted a variety of plausible but unsubstantiated causal explanations related to lifestyle factors: irregular schedules permitted by retirement, napping, early bedtimes, overly long periods spent in bed, unrealistic expectations about sleep needs, erroneous beliefs about how well comparable age peers sleep, and major life stresses such as death or illness of a loved one. Given the pervasiveness of such beliefs, there has been a surprising lack of confirmatory data. Our own work (Fichten et al., 1995) as well as studies by others (e.g., Monk, Reynolds, Machen, & Kupfer, 1992) demonstrates that as far as daytime activities and lifestyle are concerned, older individuals with no insomnia complaints lead nei-

ther more regular nor less stressful lives than their poor sleeper counterparts.

Sleep Expectations

It has been suggested that older individuals complaining of insomnia have unrealistic beliefs and expectations about sleep that, when not met, increase anxiety and distress, thereby perpetuating and aggravating the sleep problem (Morin & Gramling, 1989). Our data do not support the hypothesis that older poor sleepers have unreasonable expectations about sleep (Fichten et al., 1995). Poor sleepers in our study were surprisingly optimistic about how their sleep experience compared to that of others; this was true both for poor sleepers who were highly distressed about their sleep problem (highly distressed poor sleepers) and for poor sleepers who were not troubled by their poor sleep (minimally distressed poor sleepers). For example, approximately 50% of both highly and minimally distressed poor sleepers indicated that their sleep was much the same as that of others their age. Good sleepers and highly distressed poor sleepers also wanted similar amounts of sleep—approximately 7 hours—the amount actually obtained by our good sleepers. Minimally distressed poor sleepers wanted somewhat less (6.25 hours).

Sleep Lifestyle Practices

The literature contains suggestions and assertions that poor sleep in older individuals is associated with maladaptive sleep lifestyle practices and poor "sleep hygiene," such as spending excessive amounts of time in bed, going to bed too early, taking frequent naps, and having erratic bedtimes and arising times (e.g., Hoelscher & Edinger, 1988; Marchini, Coates, Magistad, & Waldum, 1983). Our data show that good sleepers and highly distressed as well as minimally distressed poor sleepers were all very similar on these dimensions (Fichten et al., 1995). First, they experienced similarly regular lifestyles; they did not differ on variability in mealtimes or in the times they went to bed or got up in the morning. In addition, all three groups spent similar amounts of time in bed—approximately 8 hours. They also had similar bedtimes (around 11 p.m.) and arising times (around 7 a.m.), and they napped equally frequently—almost twice per week. Our findings indicate no significant differences in either coffee or alcohol consumption between good and poor sleepers

while they are trying to fall asleep or during noctural wake times (Libman, Creti, Amsel, et al., 1997); this is similar to others' findings (e.g., Adam, Tomeny, & Oswald, 1986; Gourash-Bliwise, 1992; Morgan et al., 1989), although Morgan and his colleagues did find a difference in daytime tea, but not coffee, consumption.

Another area of presumed difference between good sleepers and poor sleepers with insomnia revolves around the ease with which they fall asleep outside their bedrooms. Contrary to popular beliefs and clinical lore, which state that poor sleepers fall asleep more easily in locations other than their bedrooms, our data show that only about 20% of both highly and minimally distressed poor sleepers—as well as of good sleepers—indicated that they found it easier to fall asleep in places other than their bedrooms.

Demographics and Daytime Aspects of Lifestyle

Equally important are our consistently negative findings on demographic factors. These show that good sleepers, poor sleepers who are highly distressed about their insomnia, and poor sleepers who are minimally distressed closely resemble each other on all variables examined in our research (Fichten et al., 1995). For example, there were no differences in the diversity of activities engaged in or in perceptions about how fully one's time was occupied. Nor did the three groups in our study—good sleepers and highly and minimally distressed poor sleepers—differ on education or on either income level or its perceived adequacy. Our findings support reports by other investigators who have shown economic dissatisfaction to be unrelated to sleep quality in older individuals (Frisoni et al., 1993). Epidemiological surveys have found that people with low incomes were considerably more likely to experience poor sleep than people with higher incomes (e.g., Tait, 1992). Here, however, other health and psychosocial variables related to poverty must be taken into consideration.

Life Events

Exposure to stressful life events (such as the death of a loved one) was also similar in our three groups (Fichten et al., 1995). Consistent with our results, others also have shown that older good and poor sleepers did not differ on life stress (e.g., Friedman, Brooks, Bliwise, Yesavage, & Wicks,

1995). Although major negative life events have been implicated in the onset of insomnia (Healey et al., 1981; Kales et al., 1984), it seems that large but infrequent stressors are not involved in the maintenance of chronic sleep problems.

Summary of Lifestyle Factors

Our results (Fichten et al., 1995) add to the growing body of evidence (e.g., Gourash-Bliwise, 1992); Morin & Gramling, 1989) that highlights the absence of differences in lifestyle in older individuals with and without insomnia. Evidence on the effectiveness of lifestyle changes in alleviating sleep complaints (e.g., Edinger, Hoelscher, Marsh, Lipper, & Ionescu-Pioggia, 1992) should not be used to justify the assumption that older poor sleepers' maladaptive sleep hygiene and lifestyle practices cause either poor sleep or the complaint of insomnia, just as the efficacy of aspirin in alleviating headaches is never used to infer that lack of aspirin causes headaches.

Personality and Daytime Psychological Adjustment

Of course, diagnosable psychiatric conditions, such as major depression and anxiety disorders, are well known to be associated with insomnia (e.g., Ford & Kamerow, 1989; Henderson et al., 1995; Kales, Caldwell, Preston, Healy, & Kales, 1976; Morgan & Clarke, 1997; Reynolds, Kupfer, Burpse, Cable, & Yeager, 1991; Schramm, Hohagen, Kappler, Grasshoff, & Berger, 1995). Other psychological factors also have been found to be important. For example, numerous studies have shown that healthy older individuals with no psychiatric diagnosis who complain of insomnia experience more negative affect and have poorer scores on a large variety of measures of daytime psychological adjustment than do good sleepers (e.g., Frisoni et al., 1993; Gourash-Bliwise, 1992; Monk et al., 1992; Morin & Gramling, 1989; Morgan, Dallosso, Ebrahim, Arie, & Fentem, 1988; Morgan et al., 1989). Our own work (Fichten et al., 1995; Fichten, Libman, et al., 1998a) also indicates that psychological adjustment (e.g., an anxious worrying "neurotic" personality style and low, subclinical levels of depression) is poorer in healthy older adults with insomnia than in those who sleep well.

As noted earlier, an interesting finding to emerge from our studies has been the identification of substantial numbers of older individuals who, in spite of sleeping badly, are only minimally distressed by their poor sleep. This group of poor sleepers differs relatively little from highly distressed poor sleepers with respect to severity of problematic sleep. These two groups are more easily distinguished by the absence of poor psychological adjustment and negative affect in the minimally distressed poor sleeper group and by the presence of maladjustment and emotional turmoil in the other.

Why are people who are somewhat anxious or depressed more likely to suffer from insomnia than those who are less so? How do personality and daytime psychological adjustment influence nocturnal sleep experiences? Our research suggests that thoughts during the day and during the night may pose a mediational link between personality and psychological adjustment, on one hand, and distress about insomnia on the other (Fichten, Libman, et al., 1998a, 2000). Of course, it is also possible that the underlying root cause is central nervous system (CNS) hyperarousal (Bonnet & Arand, 1998; Lamarche & Ogilvie, 1997; Perlis, Giles, Mendelson, Bootzin, & Wyatt, 1997). Even if this is so, it is still necessary to explain how CNS hyperarousal translates into distress about insomnia. Thus, the CNS hyperarousal formulation is entirely consistent with our view that negative thoughts and experienced cognitive arousal mediate various aspects of the insomnia complaint. This position—that aversive cognitions, including negative thoughts, worry, a poor balance between positive and negative thinking, and high levels of mental "tension" are related both to poor sleep and to distress about one's sleep problem—is developed in subsequent sections of this chapter.

Problems Related
to How Relevant
Constructs Are Measured

Sleep/Wake Parameters:
All ParametersAre Not Created Equal

The most common sleep parameters evaluated are total sleep time (TST), sleep onset latency (SOL), wake time after sleep onset (WASO),

sleep efficiency (TST/time spent in bed), and frequency of nocturnal awakenings (FNA).

TST, SOL, and WASO

Total nocturnal sleep time (TST) is, we believe, the best single indicator of sleep status, in spite of large discrepancies between individual sleep needs (e.g., Hicks, Marical, & Conti, 1991; Hicks & Youmans, 1989; Kripke, Simons, Garfinkel, & Hammond, 1979; Rutter & Waring-Paynter, 1992). TST is easily reported by most individuals, and TST scores are more closely related than are SOL or WASO to a variety of other measures of sleep and wake as well as to psychologically laden sleep variables (cf. Alapin et al., 2000). Moreover, unpublished data show that of all sleep/wake parameters evaluated in our research, the correlation between scores measured via retrospective questionnaire and via daily sleep diary was highest for TST (Libman et al., 1999).

Measures of nocturnal wake times tend to be problematic. For example, sleep onset latency (SOL), generally defined as the interval between lights out and sleep onset, has long been known to be overestimated by poor sleepers (compared to objective evaluation using polysomnography) and underestimated by good sleepers (e.g., Carskadon et al., 1976; Coursey, Frankel, Gaardner, & Mott, 1980; Frankel, Coursey, Buchbinder, & Snyder, 1976; Knab & Engle, 1988; Morin, Kowatch, Barry, & Walton, 1993). But when does one turn the lights out? Some people turn lights out based on a regular sleep schedule, whereas others keep lights on and read, watch TV, or work until they feel sleepy. This can be very late at night. There is a confound because some people keep lights on late into the night precisely because they cannot fall asleep, but this interval is not included in the definition of SOL. Waking after sleep onset (WASO) is even more problematic to evaluate, especially when it is based on self-reports. For example, people may experience several separate nocturnal awake intervals as a single long period of wakefulness. Alternately, people are expected to "sum" several wake periods to come up with a total. The issue of what to do about waking too early compounds the problem, regardless of whether WASO is measured through objective or subjective means. For example, if someone's final awakening occurred at 5 a.m. and that person got out of bed at 8, should the 3 hours spent in bed be considered wake time? What if the

individual fell asleep for 10 minutes just before 8 a.m. or if the 3 hours spent in bed occurred between 8 a.m. and 11 a.m.? In addition, contrary to findings on SOL, where poor sleepers *over*estimate how long it takes them to fall asleep, data indicate that older poor sleepers tend to *under*estimate WASO compared to objective measures (Coates et al., 1983; Libman, Creti, Levy, et al., 1997; Lichstein & Johnson, 1991; Morin, Colecchi, Stone, Brink, & Sood, 1994).

Sleep Efficiency

Sleep efficiency is a ratio calculated by dividing TST by the total time spent in bed (arising time minus bedtime). Although at first glance this appears to be an ideal measure, as it seems to reflect both sleep and wake times, this is not the case. First, there is lack of agreement about what is meant by bedtime and by arising time. If one watches TV, knits, and reads in bed before lights out, is the time spent doing these activities counted? Of course, there is a similar problem defining arising time. What does one do with people who enjoy an hour in bed after awakening before getting out of bed as part of their regular sleep experience?

Perhaps more important, sleep efficiency is a ratio and, as such, is affected by changes in both the numerator and the denominator. Thus, one may achieve a sleep efficiency of 80%—a score widely used as a cutoff for good and poor sleep—by spending 8 hours asleep and 10 hours in bed, as well as by sleeping 2 hours out of 2½. The fact that the score is a ratio poses serious limitations on its use as the single best measure of good and poor sleep (cf. Amsel & Fichten, 1990, 1998).

Frequency of Nocturnal
Awakenings (FNA)

Evaluation of FNA is meaningful in younger adults. In older populations, however, where nocturnal arousals are fairly common, FNA scores are problematic. There are problems both with what scores mean and with measurement modality. For example, one may obtain a low score on FNA by waking up only once but staying awake for 3 hours as well as by waking up once and returning to sleep almost immediately. Indeed, higher scores may reflect better sleep—that is, longer rather than shorter sleep. Another problem relates to how FNA is measured. Self-reports of

FNA by both good and poor sleepers generally are substantially lower than those indicated by polysomnographic (PSG) data (e.g., Carskadon et al., 1976; Knab & Engle, 1988; Morin et al., 1994). It has been suggested that this occurs because poor sleepers may not be aware of having slept (Knab & Engle, 1988). Of course, forgetting is another possibility, as reporting of nocturnal events has been related to retrograde and anterograde amnesia (Lichstein & Johnson, 1991; Wyatt, Bootzin, Anthony, & Bazant, 1994). Whatever the cause of the underreporting, self-reported FNA scores do not appear to be a good index of sleep/wake parameters in older adults.

Sleep/Wake Parameters:
Variations in Technique

Sleep parameters such as TST, SOL, WASO, and sleep efficiency can be measured in various ways. There are two concepts to note here. One is the issue of objective measurement, for example polysomnography (PSG) (cf. Chesson et al., 1997), vs. self-report (interview, questionnaire, daily self-monitoring). The second revolves around how to best measure self-report: through retrospective questionnaires ("generally") vs. ongoing self-monitoring (sleep diaries).

Objective vs. Self-Report Measures

In the sleep literature, polysomnography (PSG) is considered the "gold standard" for assessment of sleep disorders. This is so in spite of a variety of data showing that although PSG may be vital in the diagnosis of sleep disorders such as sleep apnea and restless legs syndrome/periodic limb movements in sleep (RLS/PLMS), it may have little to add to self-report in the case of insomnia (Reite, Buysse, Reynolds, & Mendelson, 1995; Vgontzas, Kales, Bixler, Manfredi, & Vela-Bueno, 1995).

Poor sleepers generally report shorter sleep times and longer sleep onset than comparable PSG data (e.g., Carskadon et al., 1976; Coursey et al., 1980; Frankel et al., 1976; Knab & Engle, 1988; Kryger, Siteljes, Pouliot, Neufeld, & Odgnoki, 1991; Lichstein & Johnson, 1991; Morin et al., 1994; Morin et al., 1993). Nevertheless, correlations between self-reports and PSG are high (e.g., Frankel et al., 1976; Hoch et al., 1987; Knab & Engle, 1988; Kryger et al., 1991; Morin et al., 1993). Whereas the findings suggest

that poor sleepers exaggerate the extent of their sleep problem, paradoxically, poor sleepers have also been shown to underestimate nocturnal wake times compared to objective measures (Coates et al., 1983, Libman, Creti, Levy, et al., 1997; Lichstein & Johnson, 1991; Morin et al., 1994), suggesting a role for information processing rather than motivational factors and bringing into question the exaggeration hypothesis.

Most self-reported poor sleepers differ from good sleepers on PSG-scored sleep parameters (e.g., Morin et al., 1993). Yet a substantial number of self-reported poor sleepers do not have "objective findings" on PSG—a diagnostic entity currently called sleep state misperception (American Sleep Disorders Association, 1990) but referred to by various other names throughout the years, including subjective insomnia, pseudo-insomnia, and normal sleeping insomniacs. Self-reports of poor sleepers with and without "objective findings" tend to be very similar on most sleep-related variables in spite of substantial differences on PSG. For example, the data show little if any difference between the symptoms, prognostic indicators, daytime complaints, or personality factors of self-reported poor sleepers with and without PSG-documented objective findings (Dorsey & Bootzin, 1997; Lichstein et al., 1994; Mendelson, 1995; Mendelson et al., 1984; Salin-Pascual, Roehrs, Merlotti, Zorick, & Roth, 1992; Seidel et al., 1984; Trinder, 1988). For all practical purposes, then, the contribution of PSG in this realm is also negligible.

Moreover, polysomnography, as it is currently practiced in many sleep laboratories, may be altogether inappropriate for the evaluation of insomnia. As an example, in one of our studies we sent some of the participants for the customary 2 nights of testing to our collaborating, research-minded sleep laboratory (Libman, Creti, Levy, et al., 1997) and encountered a variety of problems. First, some subjects never completed testing—they found the atmosphere austere and somewhat intimidating. In addition, they found themselves in a small, sparsely furnished room that had little in common with their bedroom. Certainly, the conditions for sleep in the lab were not typical of participants' natural environments. Such environmental factors can result in first night effects (and reverse first night effects)—that is, people may sleep either worse or better in locales other than their homes (e.g., Edinger et al., 1997; Hauri, 1983; Randazzo & Schweitzer, 1995). Perhaps more important, even 2 nights of PSG may not be representative of highly variable sleep experiences (cf.

Babkoff, Weller, & Lavidor, 1995; Bootzin et al., 1995; Coates et al., 1983; Edinger, Marsh, McCall, Erwin, & Lininger, 1991).

In addition, sleep laboratories may not accommodate insomnia patients. In the case of our collaborating lab, lights were always turned out around midnight, regardless of whether the subject was ready to sleep or not. Similarly, subjects were asked to get out of bed at 6 a.m., again regardless of whether they were ready to get up. Needless to say, this does not give a realistic picture of SOL, WASO, TST, or sleep efficiency. The laboratory experience lacked external validity. Doubtless, the lab's protocol was fine for what typically was studied there: sleep apnea and RLS/PLMS. For the assessment of insomnia, however, such a protocol was clearly inappropriate.

There are suggestions in the literature that the EEG data of people complaining of insomnia show higher levels of cortical arousal (cf. Bonnet & Arand, 1998; Perlis et al., 1997). Most PSG evaluations, however, do not routinely score such criteria. Nor are the etiological or treatment implications of such findings clear at this time.

Although PSG is clearly more "objective" than self-report, it should be noted that the criteria used to define sleep and wake are, to some extent, arbitrary. For example, Hauri and Olmstead (1989) postulated that the traditional PSG-assessed measure of sleep onset (i.e., first epoch scored as Stage 2 sleep) is inappropriate for people with insomnia because of demonstrated random alpha rhythm activity in all sleep stages.

For all the reasons cited above, we concur with the Standards of Practice Committee of the American Sleep Disorders Association (1995) and believe that self-report is a more valid means than PSG of evaluating the complaint of insomnia. People *complain* of insomnia. This is not an asymptomatic or hidden disease entity, like hypertension, which requires indirect tests for verification. Indeed, it is the complaint that is of interest. Minimally distressed poor sleepers do not seek out treatment and, according to virtually all diagnostic nosologies, would not be classified as having insomnia. It is thus a corollary that self-reports of sleep parameters and distress about insomnia are legitimate ways of evaluating the extent and import of insomnia in an individual's life.

That having been said, do we recommend PSG for older adults with insomnia? The answer, in spite of the foregoing, is a firm "Yes." We recommend PSG not to verify the insomnia complaint but to rule out sleep apnea and RLS/PLMS, which are known to be extremely common in

older adults (e.g., Ancoli-Israel & Coy, 1994; Edinger et al., 1989; Jacobs et al., 1988; Libman, Creti, Levy, et al., 1997; Reynolds et al., 1980). These medically treatable sleep disorders are very difficult to detect based on clinical interviews (cf. Libman, Creti, Levy, et al., 1997; McCall & Edinger, 1991).

Retrospective Questionnaire vs. Ongoing Self-Monitoring (Daily Sleep Diary)

When conducting assessment, it is more convenient to administer a single questionnaire about a typical week's sleep than to ask individuals to self-monitor by completing daily sleep diaries for up to 2 weeks. In most clinical evaluations and in much sleep and insomnia research, however, daily sleep diaries are used to evaluate insomnia. Data are reduced by averaging the daily scores. In some studies, only 1 to 3 nights are evaluated, although recent clinical outcome studies often report up to 1 or 2 weeks.

Generally, sleep parameter scores on daily sleep diaries and retrospective questionnaires are highly correlated, with longer administrations of sleep diary yielding higher correlations (Babkoff et al., 1995). For example, in an unpublished study on 156 community-dwelling older adults, we found significant and reasonably high correlations between corresponding scores on a retrospective sleep questionnaire and on 7 days of self-monitoring on a daily sleep diary (Total Sleep Time, $r = .83$; Total Wake Time, $r = .72$; Sleep Efficiency, $r = .77$) (Libman et al., 1999).

When there are discrepancies between a daily sleep diary and retrospective questionnaire scores, it is usually assumed that the daily sleep diaries provide more accurate information. We contend that this is not necessarily the case. For example, self-monitoring may involve an atypical period in the individual's life; this is important because it is well documented that there is significant night-to-night variability in sleep parameters of people diagnosed with insomnia (Bootzin et al., 1995; Edinger et al., 1991). Perhaps more important, it has long been known that self-monitoring can be a reactive process in a variety of contexts and that it may cause either improvement or deterioration (Fichten et al., 1991; Mahoney, 1977; Nelson, 1977), thereby affecting the very variables it is meant to assess.

We believe that retrospective questionnaires provide a useful "snapshot" of the extent of an insomnia problem and that they can be used profitably for research as well as for screening and assessment. Daily sleep diary scores, however, can pinpoint variations in night-to-night sleep experience, shed light on sequences of events, and monitor progress in therapy. Therefore, when undertaking treatment or obtaining a baseline, daily sleep diaries should be used.

Distress Related to Poor Sleep and Insomnia

One of the problems encountered in diagnosing insomnia is difficulty operationalizing distress. As we noted earlier, even though classificatory systems include distress in the criteria for insomnia, there are no well-accepted techniques for operationalizing the construct. In particular, it should be noted that the severity of the sleep problem, as measured by examination of sleep parameters such as TST, WASO, and sleep efficiency, is only moderately related to distress experienced about the sleep problem in older adults (Fichten et al., 1995).

In many insomnia research projects, it is assumed that the people who volunteer for the study must have an insomnia problem if they meet the sleep parameter criteria for a diagnosis of insomnia. This is not the case. For example, in our own research, we were interested in both good and poor sleep; therefore, we accepted all volunteers who fit our nonsleep-related selection criteria. We then offered a brief analog treatment to all individuals who met the criteria for poor sleeper status (i.e., 30 minutes of undesired awake time at least 3 nights per week, problem duration at least 6 months). To our surprise, almost one quarter of poor sleepers who completed our intensive 6-week treatment program were only minimally distressed by their poor sleep (Creti, 1996). This type of finding underscores the need to develop a distress criterion to be used in making a diagnosis of insomnia.

Operationalizing the Distress Criterion of Insomnia

To operationalize the construct for our own studies, we developed two ways of measuring distress related to poor sleep. We asked a single

question using a 10-point Likert-type scale, "How distressed are you about an insomnia problem?" (1 = *not at all*, 10 = *very much*). We also asked a series of three 7-point questions concerning the frequency of experiencing distress related to a sleep problem and summed the scores. Participants were asked, "During a typical week, how many days per week does difficulty falling asleep distress you?" (also difficulty getting back to sleep during the night and difficulty getting back to sleep again after waking up too early). The maximum score was 21, with higher scores indicating more frequent distress episodes experienced during the week. Correlations between the composite frequency of distress score and the single 10-point item evaluating level of distress ranged from .75 to .84; temporal stability data for the single item showed acceptable reliability, with r values ranging from .66 to .73. These psychometric properties suggest that the single item inquiring about one's level of distress may be used in research to quantify the distress criterion.

The Multidimensional Components of Insomnia

The foregoing analysis, based on data both from our own research (Alapin et al., 2000; Fichten, Libman, et al., 1998a) and from that of others (cf. Bonnet & Arand, 1998; Chambers & Keller, 1993; Lichstein et al., 1994), suggests that more or less sleep or wake time does not fully explain either the severity of the insomnia complaint or the accompanying daytime fatigue and impairment that typically are reported. Thus, the question "If sleep deprivation is not the main culprit, what is?" We propose that insomnia complaints in older individuals are multidimensional in nature and have both physiological and psychological components.

Central Nervous System Hyperarousal

The view that insomnia complaints as well as some "secondary symptoms" of insomnia, such as poorer daytime psychological adjustment and functioning, are due to central nervous system (CNS) hyperarousal has recently been gaining ground (Lamarche & Ogilvie, 1997). For exam-

ple, CNS hyperarousal has been invoked as an explanation not only of poor sleep but also of difficulties related to personality and adjustment, negative affect and thoughts, self-reports of poor daytime functioning and performance, and biased time estimation (e.g., Bonnet & Arand, 1998). In addition, a physiological predisposition for certain personality characteristics has been suggested, and high-frequency EEG activity has been linked to cognitive hyperarousal during the sleep onset latency period (cf. Perlis et al., 1997). Indeed, Perlis and his colleagues have implicated both neurological processes (i.e., high-frequency EEG activity at sleep onset) and information and memory processing both in sleep state misperception and in the overestimation of sleep onset latency— phenomena that are both typically observed in people complaining of insomnia.

Personality and Psychological Adjustment

The literature indicates that people who do not have a diagnosable psychiatric disorder and who complain of insomnia generally tend to be more anxious, worrying, "neurotic," and depressed than either those who sleep well or those with poor sleep who are not distressed about their sleep disruption (e.g., Fichten et al., 1995; Fichten, Libman, et al., 1998a; Gourash-Bliwise, 1992; Libman, Creti, Amsel, et al., 1997; Morgan et al., 1989; Morin & Gramling, 1989). Moreover, individuals from nonclinical populations who score higher on measures of anxiety and worry experience poorer sleep on PSG than their non-anxious counterparts (Fuller, Waters, Binks, & Anderson, 1995).

Affect

Sleep disruption itself may have a physical basis in older adults. The observation that a sizable percentage of older adults experience extensive sleep disruption but minimal or no accompanying distress (cf. Dorsey & Bootzin, 1997; Fichten et al., 1995; Henderson et al., 1995; Kales et al., 1976; Lavidor et al., 1996; Mellinger et al., 1985; Mendelson et al., 1984; Morgan et al., 1988; Morgan et al., 1989; Ohayon et al., 1997) illustrates the important contribution of affect to the insomnia complaint in older adults.

Time Estimation

People who complain of insomnia consistently overestimate sleep onset latency compared with polysomnographic data (cf. Borkovec, 1982; Frankel et al., 1976); good sleepers do not do this (Hauri & Olmstead, 1989). Although it is often assumed that poor sleepers are merely exaggerating the extent of their sleep problem, there are also two information processing explanations for this discrepancy: (a) people with insomnia subjectively experience being awake during EEG-recorded Stage 2 sleep, whereas good sleepers do not (Borkovec, Lane, & Van Oot, 1981; Hauri & Olmstead, 1989), and (b) subjective time passes slowly during distressing and unpleasant bedtime experiences (Frankel et al., 1976). We propose that lengthy "empty" time intervals, such as those experienced by poor sleepers, when filled with negative cognitive activity, can make the nocturnal experience aversive. Lengthy wake times can also seem longer than they actually are, and time can be felt to be passing slowly. For example, analog data from our laboratory show that people generally overestimate the duration of "empty" blocks of time and that they perceive empty time as "dragging" (Fichten et al., 1992).

Behaviors

With the exception of our own studies, we know of no systematic evaluation of behaviors engaged in by older individuals during periods of nocturnal wakefulness. To learn about how such behaviors relate to the insomnia complaint, we developed and validated a measure of what people do during the night when they are awake—the Sleep Behaviors Scale: 60+ (Libman, Creti, Amsel, et al., 1997). The study of sleep behaviors suggests that maladaptive and adaptive nighttime behaviors also play a role in the insomnia experience.

Our findings indicate that although good sleepers engage less frequently in virtually all nocturnal behaviors than poor sleepers—because they obviously spend less time awake during the night—they still manifest a similar range of behaviors in a similar rank ordering of frequency. When they find themselves awake during the night, however, good sleepers are most likely to lie in bed quietly or rest and relax. Poor sleepers, on the other hand, most frequently toss and turn and go to the toilet.

Daytime Performance and Functioning

Highly distressed poor sleepers report more daytime fatigue, sleepiness, and difficulty concentrating than do minimally distressed poor sleepers or good sleepers (Alapin, 1996; Alapin et al., 2000; Fichten et al., 1995). This suggests that perceived poor daytime functioning is related to distress about poor sleep (i.e., insomnia) rather than to simple sleep disruption (Chambers & Kim, 1993). With some exceptions (e.g., Hauri, 1997; Hart, Morin, & Best, 1995), scores on behavioral aspects of daytime impairment, such as falling asleep in inappropriate contexts, however, generally fail to distinguish poor sleepers from good sleepers (cf. Alapin, 1996; Nau, 1997; Stone, Morin, Hart, Remsberg, & Mercer, 1994). Perhaps the factors that impede sleep during the night, such as cognitive or physiological arousal, interfere with falling asleep during the day as well; this topic needs further investigation.

Cognitive Arousal and Tension

Sleep researchers and clinicians have increasingly implicated cognitive factors, such as cognitive hyperarousal and distressing and intrusive thoughts, in the etiology and maintenance of insomnia (Borkovec et al., 1981; Coates et al., 1983; Coyle & Watts, 1991; Kuisk, Bertelson, & Walsh, 1989; Lichstein & Fanning, 1990; Lichstein & Rosenthal, 1980; Lundh, Lunqvist, Broman, & Hetta, 1991; Marchini et al., 1983; Morin, 1993; Nicassio, Mendlowitz, Fussell, & Petras, 1985; Perlis et al., 1997; Van Egeren, Haynes, Franzen, & Hamilton, 1983; Waters, Adams, Binks, & Varnado, 1993). Indeed, some have argued that a common mediating mechanism—interruption of negative and intrusive cognitive activity—can best explain the demonstrated effectiveness of a wide variety of cognitive-behavioral interventions in treating sleep problems (cf. Borkovec, 1982; Lacks, 1987; Lichstein & Fischer, 1985). We posit that negative cognitive activity and high levels of mental "tension" during periods of wakefulness contribute to poor sleep experiences and may act as mediators between personality factors and negative affect, on one hand, and self-reported poor daytime functioning and insomnia complaints on the other.

To facilitate exploration of the notion that cognitive factors are involved in the complaint of insomnia, we recently developed and vali-

dated three measures that relate to nocturnal tension and to thinking and behavior during periods of nocturnal wakefulness.

Tension Thermometer

An easy-to-use, reliable, and valid single-item measure evaluates how much tension is experienced during nocturnal wake times: the Tension Thermometer ("When you are lying in bed trying to fall asleep, how tense do you generally feel?"). Responses are made on an 11-point scale: 0 = *not at all tense*, 100 = *very tense*, with ratings made at 10-point intervals. Our data indicate reasonable temporal stability for this item ($r = .67$), and the pattern of correlations between scores on this measure and relevant sleep variables shows logical, highly significant relationships (Fichten et al., 1995; Fichten, Libman, et al., 1998a).

Sleep Self-Statement Test: 60+ (SST: 60+)

Our research has also explored both the nature and the valence of thoughts experienced during periods of nocturnal wakefulness by older adults who are good sleepers as well as those who sleep poorly and are either minimally or highly distressed about this (Fichten et al., 1995; Fichten, Libman, et al., 1998a, 2000). At first we used open-ended thought listing; this helped identify the content areas and provided the impetus to develop an easy-to-use inventory measure: the Sleep Self-Statement Test: 60+ (SST: 60+) (Fichten, Libman, et al., 1998a). The measure contains two valenced subscales—generalized positive thinking and generalized negative thinking—as well as Schwartz and Garamoni's (1986) States-of-Mind (SOM) ratio [Positive/(Positive + Negative)] (for a discussion of SOMs and insomnia, see Amsel & Fichten, 1990, 1998). Our data using this measure indicate that negative thoughts are strongly and significantly related to sleep measures with an appreciable psychological loading (e.g., sleep self-efficacy expectations, distress concerning one's sleep problem). Measures of personality and psychological adjustment were also related to these variables. It is notable, however, that unlike personality and psychological adjustment measures, which were generally unrelated to sleep parameters, negative thoughts were also highly and significantly related to the more "quanti-

tative" aspects of sleep (i.e., total sleep and wake times and sleep efficiency).

Sleep Behaviors Scale: 60+

This measure, which evaluates what people do during periods of sleeplessness, also provides data to support the assumption that cognitive arousal, negative thoughts, and nocturnal tension are important aspects of the insomnia experience (Libman, Creti, Amsel, et al., 1997). For example, when minimally distressed and highly distressed poor sleepers and good sleepers were compared on this measure, the two poor sleeper groups resembled each other on most variables, both differing from good sleepers. This was to be expected, as poor sleepers spend longer periods awake than good sleepers. One exception to this pattern was on the Cognitive Arousal subscale, where the highly distressed poor sleepers had substantially higher scores than minimally distressed poor sleepers, suggesting that items on this subscale are associated with the distress related to insomnia, not merely with the presence of disrupted sleep. Scores on the Cognitive Arousal subscale were also shown to be related to both poor daytime and nighttime adjustment. This is consistent with findings that (a) minimally distressed poor sleepers manifest significantly less psychological maladjustment and negative affect than highly distressed poor sleepers (Fichten et al., 1995; Lavidor et al., 1996), and (b) a higher frequency of cognitive activity, negative activity in particular, characterizes people who complain of insomnia (e.g., Fichten & Libman, 1991; Fichten, Libman, et al., 1998a, 2000; Kales et al., 1984).

A Theoretical View: The Cognitive Model of Insomnia

Multidimensional and interactive aspects of the insomnia complaint are summarized in our Cognitive Model of Insomnia (Fichten & Libman, 1991; Fichten, Libman, et al., 1998a, 2000). This model provides a description of a mediational mechanism by which personality and daytime psychological "adjustment" can influence nocturnal distress (i.e., through negative thoughts and self-statements). It pro-
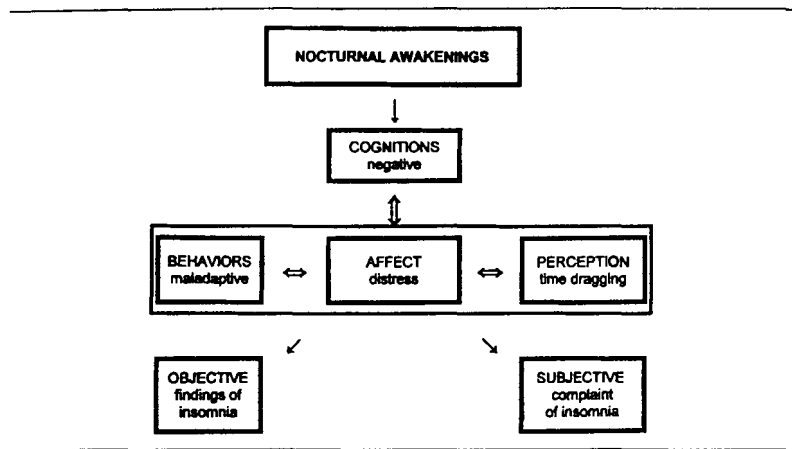
Figure 2.1. Characteristics of Older Adults With Insomnia
SOURCE: From "What Do Older Good and Poor Sleepers Do During Periods of Nocturnal Wakefulness? The Sleep Behaviors Scale: 60+," *Psychology and Aging*, Libman, Creti, Amsel, Brender, and Fichten, © Copyright 1997 by the American Psychological Association. Reprinted with permission.

poses that negative cognitive activity—primarily negative, worrying, and anxious thoughts and self-statements during periods of nocturnal wakefulness—is likely to be an important mediator of insomnia complaints.

Our model begins with the recognition that nocturnal awakenings will occur in most older individuals. It then proposes that negative cognitive activity, such as concerns about the day's events and worry about miscellaneous matters, including the consequences of not getting enough sleep, is associated with other maladaptive nocturnal events that, in turn, both magnify the sleep complaint and contribute to the negative cognitive experiences that interfere with falling asleep or returning to sleep. The model predicts that minimizing negative thoughts is likely to be effective because this targets cognitive activities that may (a) prevent sleep, (b) cause negative affect, (c) result in maladaptive sleep-related behaviors, and (d) contribute to distorted perceptions of the passage of time.

Findings from our studies provide support for heuristic, descriptive aspects of our Cognitive Model of Insomnia and also provide some support for the mediational role of negative thoughts in insomnia-related distress (Fichten, Libman, et al., 2000). For example, the data show that perceived severity of the sleep problem and negative thoughts both make significant and independent contributions to the variability in distress about poor sleep. Indeed, the data show that aversive cognitions, including negative thoughts, a poor balance between positive and negative thinking, and high levels of mental "tension" are all strongly and clearly related both to poor sleep and to distress about one's sleep problem. These cognitive aspects were more closely related to the various components of the insomnia experience than *any* of the state or trait measures of anxiety and adjustment explored in our study, suggesting a specific mediational role for negative thinking during nocturnal awake times. The possibility of CNS hyperarousal (cf. Bonnet & Arand, 1998; Lamarche & Ogilvie, 1997; Perlis et al., 1997) is consistent with this formulation, as are findings showing that when good sleepers are "yoked" (i.e., awakened at the same time as a matched insomnia sufferer) to insomnia patients for 7 days, they do not come to resemble insomnia patients on variables such as mood, daytime metabolic rate, or behavioral performance (Bonnet & Arand, 1996). Nevertheless, the issue of causality in our model needs further research attention; much of the evidence supporting the model has, to date, been correlational in nature.

Whatever the source, the powerful impact of negative thinking on affect and behavior has been amply demonstrated in the vast cognitive therapy literature. Because effective techniques for altering negative thoughts are readily available, our findings have a variety of applied implications for the treatment of insomnia.

Using the Model to Conceptualize Where and How to Intervene

The therapeutic approach clearly suggested by our model and our data is to reduce negative thoughts, worry, and "tension" during nocturnal awakenings. This may be accomplished in a variety of ways. First, individuals may be taught to replace negative thoughts with neutral, "defusing," or positive thoughts and images. Second, people may be instructed to refocus attention away from internal information processing toward externally generated content (cf. Mathews & Milroy,

1994) by, for example, watching TV, reading, or listening to the radio or to audiotapes with verbal content (Creti, Libman, & Fichten, 2000). Third, it is possible to interrupt negative thoughts by engaging in incompatible activities either in bed (e.g., relaxation exercises) or out of bed, as prescribed in Bootzin's popular stimulus control insomnia treatment (Bootzin, Epstein, & Wood, 1991). Finally, our data also implicate daytime contributors to insomnia in otherwise healthy older adults, including subclinical levels of anxiety, tension, and depression and an anxious, worrying personality style. This suggests that an effective therapeutic intervention for insomnia might address the broader goal of modifying maladaptive daytime thoughts and feelings as well by treating subclinical anxiety or depression when these are evident.

Research Issues

An Operational Definition of Insomnia for People With Disrupted Sleep

As sleep researchers, we have been much troubled by the lack of consistency in defining insomnia. As noted earlier, existing classificatory systems do not specify operationalizable criteria. To remedy this problem, we propose an operational definition below.

Exclusion Criteria

This definition assumes that insomnia secondary to other problems such as those noted in the *DSM-IV* (1994) has been excluded: (a) a mental disorder (e.g., major depressive disorder, generalized anxiety disorder), (b) a general medical condition (e.g., hyperthyroidism), (c) the physiological effects of a substance (e.g., medication, abuse of drugs), or (d) another sleep disorder (e.g., sleep apnea, RLS/PLMS, narcolepsy). In older populations, it may be necessary to use polysomnographic evaluation to rule out sleep apnea and RLS/PLMS.

Inclusion Criteria

To diagnose insomnia, we propose that two requirements must be met: individuals must experience poor sleep for at least 1 month (i.e., have Difficulty Initiating or Maintaining Sleep [DIMS]) and must be distressed about their poor sleep.

Poor sleep: Determining the presence or absence of Difficulty Initiating or Maintaining Sleep (DIMS). To designate poor sleeper status, *the individual must self-report at least 30 minutes of undesired wakefulness at sleep onset or during nocturnal awakenings at least 3 nights per week, with a problem duration of at least 1 month.* We do not believe that PSG findings are suitable to meet this criterion, because this would require at least 1 week of polysomnographic (PSG) evaluation either in the sleep laboratory or at home. Sleep during this period would need to be typical of naturalistic circumstances, and the sleep evaluation would have to follow the participant's usual sleep schedule.

Our data show high correlations between scores based on self-monitoring for 7 days and scores on a retrospective questionnaire based on the past typical month. Thus, the constructs related to DIMS may be *evaluated either through 1 to 2 weeks of self-monitoring or through a single retrospective questionnaire based on the last typical month.*

Daily sleep diary. To establish the presence or absence of DIMS, we recommend using the following items on a daily basis for a minimum of 7 consecutive days during a "typical" week:

1	How long did it take you to fall asleep last night?	___hours	___minutes	
2	After you had fallen asleep for the first time, when you woke up during the night, approximately how long were you awake? (If you were awake more than once, write the total amount of time that you were awake.)	___hours	___minutes	___did not wake up
3	Did you have difficulty falling asleep or getting back to sleep?	___yes	___no	

| 4 | (The following item needs to be asked only once:) How long have you had a problem with falling asleep or getting back to sleep? (Indicate duration in weeks, months, or years.) | ___weeks ___months ___years
 ___I do not have a problem. |

Although not required to establish the presence or absence of DIMS, we also recommend obtaining estimates of time slept, bedtime, out of bed time, and time of last awakening. This information is useful for reporting total sleep time (TST) and sleep efficiency [TST/(time spent in bed)] as well as for determining the existence of a problem with waking up too early in the morning (early morning or terminal insomnia). We recommend the following items:

5	Approximately how many hours did you sleep last night?	___hours ___minutes
6	What time did you go to bed last night?	___
7	What time did you wake up this morning (for the last time)?	___
8	What time did you get out of bed this morning?	___

Retrospective questionnaire. An alternative to using a daily sleep diary is to use a retrospective questionnaire that is administered only once. To establish the presence or absence of DIMS, we recommend using the following items. Unless stated otherwise, respondents are instructed to refer to the last typical month.

| 1 | At bedtime, how long does it usually take you to fall asleep? | ___hours ___minutes |
| 2 | After you have fallen asleep for the first time, when you wake up during the night, approximately how long are you usually awake? (If you wake more than once, write the total amount of time that you are usually awake.) | ___hours ___minutes
 ___Do not usually wake up. |

| 3 | During a typical week, how often do you have difficulty falling asleep or getting back to sleep? | ___nights per week |
| 4 | How long have you had a problem with falling asleep or getting back to sleep? (Indicate duration in weeks, months or years) | ___weeks ___months ___years
 ___I do not have a problem. |

As was the case for the daily sleep diary, here, too, we recommend that estimates of total sleep time, bedtime, out of bed time, and time of last awakening be obtained. We recommend the following items:

5	How many hours do you usually sleep per night?	___hours ___minutes
6	What is the usual time you go to bed?	___
7	What is the usual time you wake up in the morning (for the last time)?	___
8	What is the usual time you get out of bed?	___

Scoring. To classify individuals as having DIMS, they have to report, at a minimum:

a. One of the following: 3 nights of sleep onset latency (SOL) equal to or greater than 30 minutes (Question 1), *or* 3 nights of waking after sleep onset (WASO) equal to or greater than 30 minutes (Question 2), *or* 1 night of SOL and 2 nights of WASO equal to or greater than 30 minutes, *or* 2 nights of SOL and 1 night of WASO equal to or greater than 30 minutes, and

b. 3 nights of difficulty falling or staying asleep (Question 3), and

c. Problem duration (Question 4) of at least 1 month—if respondent states two durations, one for sleep onset and one for sleep maintenance, use the longer of the two intervals.

Distress: A necessary criterion for diagnosing insomnia. The definition of insomnia is based on both sleep/wake parameters and experienced distress. We propose that to diagnose insomnia, the individual must meet the criteria for DIMS specified above and must also score above the midpoint (i.e., score equal to or greater than 6) on the following distress item, which has been validated in our laboratory. Again, respondents com-

plete this item only once and base their answers on the last typical month.

| 9 | How distressed are you by an insomnia problem? | 10-point scale, with 1 = not at all and 10 = very much |

Better Sample Specification

When conducting research, we must do a better job of specifying and describing our samples; this refers to age categories as well as to defining comparison groups.

Age

For now, we propose the following possibilities. If the sample is large enough, decade intervals should be used. If possible, data should be obtained for the understudied but fast-growing age group of those aged 50 to 60. Otherwise, researchers should not only specify means, standard deviations, and ranges but also divide the sample, if possible, into "young old" and "old old" groups. "Young old" samples may start as young as age 55. Age 75 and over is a typical age for the "old old" cutoff.

The Comparison Group: Good Sleepers or "Non-Poor Sleepers"?

In our research, we made a concerted effort to have two very different groups—poor sleepers who met the criteria for DIMS proposed above and good sleepers who not only failed to meet the criteria for DIMS but also showed evidence of excellent sleep on a variety of other measures as well. This resulted in two very dissimilar contrast groups; however, we also lost about one-third of our sample because some subjects were neither good nor poor sleepers. Deemed "medium quality" sleepers, these subjects had elements of both good and poor sleep.

Of course, selection criteria for such "good sleeper" status is arbitrary, especially in older adults. We therefore propose that, as is the case in other clinical areas (e.g., depressed and nondepressed, anxious and

non-anxious), the comparison group be defined in future research not in terms of utopia, population means, or an ideal, but in terms of the absence of pathology.

Selection criteria for "non-poor sleepers." We propose the following. For an individual to be designated as a non-poor sleeper, he or she *must (a) fail to meet the criteria for DIMS and (b) if he or she takes sleep medication, it must be no more than twice a week.* Of course, one does not want to include poor sleepers who are "non-poor" only by dint of their sleep medications. This is especially important because hypnotics and other drugs used to induce sleep can have effects on aspects other than sleep, such as psychological adjustment and daytime functioning. The rationale for a maximum of 2 nights per week of sleep medication use is as follows. Everyone occasionally has a bad night, and some people cope by taking medication on these occasions to help them sleep. If medications are taken more frequently, for example 3 times per week, then those 3 nights may mask the 3 bad nights necessary to classify individuals as poor sleepers.

More Precise and Targeted Measurement

It is also necessary to select the right instrument for the right question. For example, instead of lamenting the observed discrepancies between subjective and behavioral measures of the same aspects of daytime functioning, such as sleepiness or fatigue, we should be administering both sets of measures and exploring the reasons for similarities and inconsistencies. Similarly, we should not simply follow typical usage in the literature but should recognize and make use of the strengths and weaknesses of evaluating sleep parameters through retrospective self-reports, daily sleep diaries, and polysomnography (PSG).

Implications for Research and Evaluation

Problems plaguing the literature clearly need to be circumvented. First, more data on incidence rather than prevalence are needed. This is especially important for the "midlife" years, as this seems to be an important time for sleep problems to develop. Samples also need to be better defined. This means that older adults must be separated into more finely grained age groups. Also, standards and criteria for health and ill-

ness as well as for medications that affect sleep need to be elaborated. More longitudinal studies are needed to better understand the factors that predispose, cause, and help maintain sleep problems, as well as factors that help improve or eliminate existing problems. To make findings more comparable across studies, a set of operationally defined definitions must be agreed upon for poor sleep, for the distress component of insomnia, and for "non-poor sleep." In this chapter, we propose such a set of definitions. In addition, future research needs to evaluate the role of cortical arousal and needs to pay more careful attention to the meaning of discrepancies in the daytime "consequences" of insomnia.

Conclusions

Summary of Characteristics of Older Adults Who Sleep Well and Those Who Sleep Poorly

Older adults who sleep poorly may or may not be distressed about their poor sleep. Although their sleep is substantially poorer than that of good sleepers, poor sleepers who are minimally distressed tend to sleep slightly better than their highly distressed counterparts. Older adults who are distressed about their sleep problem are likely to be somewhat more anxious, tense, worrying, and "neurotic" than their minimally distressed poor sleeper counterparts. They are also more likely to manifest subclinical levels of depression. In addition, they are more likely to have negative thoughts during nocturnal awake times and to toss and turn and engage in a variety of maladaptive sleep-related behaviors during the night. Recent research also suggests that these highly distressed individuals may have higher cortical arousal, both during the day and during the night. Although unselected poor sleepers are likely to report impaired daytime performance, such as fatigue, sleepiness, and difficulty concentrating, poor sleepers who are distressed about their sleep problem are likely to report more serious problems in these domains. Such deficits, however, are generally not likely to be evident on behavioral tests of these constructs.

Older adults' lifestyles are often blamed for their insomnia. This is generally unjustified and is the result of a variety of widely held but incorrect assumptions about how good and poor older sleepers differ. Variables that fail to distinguish between good sleepers and highly and minimally distressed poor sleepers include self-reported frequency of nocturnal awakenings, lifestyle practices, demographics, life events, and sleep expectations. For example, there are no differences between groups on usual bedtimes, arising times, naps, ease of falling asleep outside the bedroom, or the variability of nocturnal or daytime (e.g., mealtime) schedules. Nor do they differ in age; demographics such as education, income, and income adequacy (within middle-class populations); diversity of daytime activities; perceptions of how fully one's time is occupied during the day; and life stressors such as illness or death of friends or family members.

Assessment and Treatment

Factors to attend to during the clinical management of insomnia. It is evident from the foregoing that the insomnia complaint is multifaceted and that clinicians need to take the following aspects of the insomnia experience into consideration during evaluation, assessment, and treatment:

- Nocturnal sleep-wake experiences (e.g., self-reports of total sleep times, sleep onset latency, waking after sleep onset, sleep efficiency, frequency of difficulty initiating or maintaining sleep, problem duration, time of last awakening in the morning)—self-reports may be obtained using daily sleep diary or retrospective questionnaire, depending on whether assessment is conducted once or whether it is ongoing throughout therapy.
- Medically based sleep disorders that are common in older adults and are difficult to detect via interview (e.g., sleep apnea, RLS/PLMS) should be evaluated in a sleep laboratory.
- Psychologically laden aspects of sleep and nocturnal wakefulness should be evaluated through paper-and-pencil measures (e.g., distress about sleep, sleep self-efficacy beliefs).
- Aspects of daytime psychological adjustment should be evaluated using standardized measures of anxiety (e.g., Spielberger, Gorsuch, Lushene, Vagg, and Jacobs's [1983] State-Trait Anxiety Inventory), neuroticism (e.g., Eysenck and Eysenck's [1991] measure), and depression (e.g., Beck, Steer, and Brown's [1996] revised edition of the Beck Depression Inventory).

○ Negative thinking and cognitive activity during nocturnal wake times should be assessed (e.g., Self-Statement Test: 60+, Tension Thermometer [cf. Fichten, Libman, et al., 1998a]); an EEG-based measure of cortical arousal may also be of interest.

○ Subjective and behavioral aspects of daytime functioning should be evaluated (e.g., self-reports and behavioral measures of fatigue, sleepiness, difficulty concentrating).

○ Sleep-related behaviors during periods of nocturnal wakefulness could shed light on behaviors and practices that promote or interfere with sleep (e.g., Sleep Behaviors Scale: 60+ [cf. Libman, Creti, Amsel, et al., 1997]).

Paying attention to these aspects is likely to yield more accurate identification of the problem and will permit more targeted therapeutic interventions. In addition, evaluation of these aspects allows the clinician to construct a profile of the older client with insomnia that will indicate the appropriate therapeutic avenue.

We must stress that it is entirely possible that the so-called "consequences" or "secondary symptoms" of insomnia (e.g., daytime fatigue, difficulty concentrating, depression, anxiety) are, in fact, its causes. If this turns out to be the case, then insomnia associated with chronic fatigue syndrome or with low levels of depression or anxiety, for example, may best be dealt with by addressing these problems directly, rather than by targeting sleep parameters.

References

Adam, K., Tomeny, M., & Oswald, I. (1986). Physiological and psychological differences between good and poor sleepers. *Journal of Psychiatric Research, 20,* 301-316.

Alapin, I. (1996). *Daytime functioning among older good and poor sleepers.* Unpublished undergraduate thesis, McGill University, Montréal, Québec, Canada.

Alapin, I., Fichten, C. S., Libman, E., Creti, L., Bailes, S., & Wright, J. (2000). *Sleepiness, fatigue, and concentration problems: Are these due to sleep loss?* Unpublished manuscript, Jewish General Hospital, Montréal, Québec, Canada.

American Psychiatric Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV).* Washington, DC: Author.

American Sleep Disorders Association. (1990). *The International Classification of Sleep Disorders: Diagnostic and coding manual.* Rochester, MN: Author.

Amsel, R., & Fichten, C. S. (1990). Ratios versus frequency scores: Focus of attention and the balance between positive and negative thoughts. *Cognitive Therapy and Research, 14,* 257-277.

Amsel, R., & Fichten, C. S. (1998). Recommendations for self-statement inventories: Use of valence, endpoints, frequency and relative frequency. *Cognitive Therapy and Research, 22*(3), 255-277.

Ancoli-Israel, S., & Coy, T. (1994). Are breathing disturbances in elderly equivalent to sleep apnea syndrome? *Sleep, 17,* 77-83.

Babkoff, H., Weller, A., & Lavidor, M. (1995). A comparison of prospective and retrospective assessments of sleep. *Journal of Clinical Epidemiology, 48,* 1-9.

Beck, A., Steer, R., & Brown, G. (1996). *BDI-II: Beck Depression Inventory manual—Second edition.* San Antonio, TX: The Psychological Corporation, Harcourt Brace & Company.

Bliwise, D. L., King, A. C., Harris, R. B., & Haskell, W. L. (1992). Prevalence of self reported poor sleep in a healthy population aged 50-65. *Social Science and Medicine, 34,* 49-55.

Bonnet, M. H., & Arand, D. L. (1996). The consequences of a week of insomnia. *Sleep, 19,* 453-461.

Bonnet, M. H., & Arand, D. L. (1998). The consequences of a week of insomnia II: Patients with insomnia. *Sleep, 21,* 359-370.

Bootzin, R. R., Bell, I. R., Habisch, R., Kuo, T., Wyatt, J. K., Roder, S. P., & Manber, R. (1995). Night-to-night variability in measures of sleep and sleep disorders: A six night PSG study. *Proceedings: 9th Annual Meeting of the APSS.* Rochester, MN: Association of the Professional Sleep Societies.

Bootzin, R. R., Epstein, D., & Wood, J. M. (1991). Stimulus control instructions. In P. J. Hauri (Ed.), *Case studies in insomnia* (pp. 19-28). New York: Plenum.

Borkovec, T. D. (1982). Insomnia. *Journal of Consulting and Clinical Psychology, 50,* 880-895.

Borkovec, T. D., Lane, T. W., & Van Oot, P. H. (1981). Phenomenology of sleep among insomniacs and good sleepers: Wakefulness experience when cortically asleep. *Journal of Abnormal Psychology, 90,* 607-609.

Carskadon, M. A., Dement, W. C., Mitler, M. M., Guilleminault, C., Zarcone, V. P., & Spiegal, R. (1976). Self report versus sleep laboratory findings in 122 drug-free subjects with complaints of chronic insomnia. *American Journal of Psychiatry, 133,* 1382-1388.

Chambers, M. J., & Keller, B. (1993). Alert insomniacs: Are they really sleep deprived? *Clinical Psychology Review, 13,* 649-666.

Chambers, M. J., & Kim, J. Y. (1993). The role of state-trait anxiety in insomnia and daytime restedness. *Behavioral Medicine, 19*(1), 42-46.

Chesson, A. L., Ferber, R. A., Fry, J. M., Grigg-Damberger, M., Hartse, K. M., Hurwitz, T. D., Johnson, S., Kader, G. A., Littner, M., Rosen, G., Sangal, R. B., Schmidt-Nowara, W., & Sher, A. (1997). The indications for polysomnography and related procedures. *Sleep, 29,* 423-487.

Coates, T. J., Killen, J. D., Silverman, S., George, J., Marchini, E., Hamilton, S., & Thoresen, C. E. (1983). Cognitive activity, sleep disturbance, and stage specific differences between recorded and reported sleep. *Psychophysiology, 20,* 243-250.

Coursey, R. D., Frankel, B. L., Gaardner, K. R., & Mott, D. E. (1980). A comparison of relaxation techniques with electro-sleep therapy for chronic, sleep-onset insomnia: A sleep-EEG study. *Biofeedback Self Regulation, 33,* 615-623.

Coyle, K., & Watts, F. N. (1991). The factorial structure of sleep dissatisfaction. *Behavior Research and Therapy, 29,* 513-520.

Creti, L. (1996). *An evaluation of a new cognitive-behavioral technique for the treatment of insomnia in older adults.* Unpublished doctoral thesis, Concordia University, Montréal, Québec, Canada.

Creti, L., Libman, E., & Fichten, C. S. (2000). *Cognitive behavioral treatment effects in late-life insomnia: Can these really be attributed to therapy?* Unpublished manuscript, Jewish General Hospital, Montréal, Québec, Canada.

Dement, W. C., Richardson, G., Prinz, P., Carskadon, M., Kripke, O., & Czeisler, C. (1985). Changes of sleep and wakefulness with age. In C. Finch & E. L. Schneider (Eds.), *Handbook of the biology of aging* (2nd ed., pp. 692-717). New York: Van Nostrand Reinhold.

Dorsey, C. M., & Bootzin, R. R. (1997). Subjective and psychophysiologic insomnia: An examination of sleep tendency and personality. *Biological Psychiatry, 41,* 209-216.

Edinger, J. D., Fins, A. I., Goeke, J. M., McMillan, D. K., Gersh, T. L., Krystal, A. D., & McCall, W. V. (1996). The empirical identification of insomnia subtypes: A cluster analytic approach. *Sleep, 19,* 398-411.

Edinger, J. D., Fins, A. I., Sullivan, R. J., Jr., Marsh, G. R., Dailey, D. S., Hope, T. V., Young, M., Shaw, E., Carlson, D., & Vasilas, D. (1997). Do our methods lead to insomniacs' madness?: Daytime testing after laboratory and home-based polysomnographic studies. *Sleep, 20,* 1127-1134.

Edinger, J. D., Hoelscher, T. J., Marsh, G. R., Lipper, S., & Ionescu-Pioggia, M. (1992). A cognitive-behavioral therapy for sleep-maintenance insomnia in older adults. *Psychology and Aging, 7,* 282-289.

Edinger, J. D., Hoelscher, T. J., Webb, M. D., Marsh, G. R., Radtke, R. A., & Erwin, C. W. (1989). Polysomnographic assessment of DIMS: Empirical evaluation of its diagnostic value. *Sleep, 12,* 315-322.

Edinger, J. D., Marsh, G. R., McCall, W. V., Erwin, C. W., & Lininger, A. W. (1991). Sleep variability across consecutive nights of home monitoring in older mixed DIMS patients. *Sleep, 14,* 13-17.

Eysenck, H. J., & Eysenck, S.B.G. (1991). *Eysenck Personality Scales.* London: Hodder & Stoughton.

Fichten, C. S., Creti, L., Amsel, R., Brender, W., Weinstein, N., & Libman, E. (1995). Poor sleepers who do not complain of insomnia: Myths and realities about psychological and lifestyle characteristics of older good and poor sleepers. *Journal of Behavioral Medicine, 18*(2), 189-223.

Fichten, C. S., Creti, L., Bailes, S., Weinstein, N., Gay, A., Lennox, H., Tagalakis, V., Amsel, R., Brender, W., & Libman, E. (1992, July). *Time estimation in the experience of insomnia/L'évaluation du temps dans l'expérience de l'insomnie.* Paper presented at the 25th International Congress of Psychology, Brussels.

Fichten, C. S., & Libman, E. (1991). L'insomnie et son traitment chez les personnes âgées: une nouvelles approche. [A new look at the complaint of insomnia and its treatment in older adults]. *Santé Mentale au Québec, 16*(1), 99-116.

Fichten, C. S., Libman, E., Amsel, R., Creti, L., Weinstein, N., Rothenberg, P., Liederman, G., & Brender, W. (1991). Evaluation of the sexual consequences of surgery: Retrospective and prospective strategies. *Journal of Behavioral Medicine, 14*(3), 267-285.

Fichten, C. S., Libman, E., Creti, L., Amsel, R., Sabourin, S., & Brender, W. (2000). *Role of thoughts during nocturnal awake times in the insomnia experience of older adults.* Unpublished manuscript, Jewish General Hospital, Montréal, Québec, Canada.

Fichten, C. S., Libman, E., Creti, L., Amsel, R., Tagalakis, V., & Brender, W. (1998a). Thoughts during awake times in older good and poor sleepers: The Self-Statement Test: 60+. *Cognitive Therapy and Research, 22*(1), 1-20.

Foley, D. J., Monjan, A. A., Brown, S. L., Simonsick, E. M., Wallace, R. B., & Blazer, D. G. (1995). Sleep complaints among elderly persons: An epidemiological study of three communities. *Sleep, 18,* 425-432.

Ford, D. E., & Kamerow, D. B. (1989). Epidemiologic study of sleep disturbances and psychiatric disorders: An opportunity for prevention. *JAMA: Journal of the American Medical Association, 262,* 1479-1484.

Frankel, B. L., Coursey, R. D., Buchbinder, R., & Snyder, F. (1976). Recorded and reported sleep in chronic primary insomnia. *Archives of General Psychiatry, 33,* 615-623.

Friedman, L., Brooks, J. O., III, Bliwise, D. L., Yesavage, J. A., & Wicks, D. S. (1995). Perceptions of life stress and chronic insomnia in older adults. *Psychology and Aging, 10,* 352-357.

Frisoni, G. B., De Leo, D., Rozzini, R., Bernardini, M., Della Buono, M., & Trabucchi, M. (1993). Night sleep symptoms in an elderly population and their relation with age, gender, and education. *Clinical Gerontologist, 13,* 51-68.

Fuller, K. H., Waters, W. F., Binks, P. G., & Anderson, T. (1995). The impact of trait anxiety and worry on sleep architecture. *Proceedings: 9th Annual Meeting of the APSS* (p. 236). Rochester, MN: Association of the Professional Sleep Societies.

Gislason, T., & Almqvist, M. (1987). Somatic diseases and sleep complaints: An epidemiological study of 3201 Swedish men. *Acta Medica Scandinavica, 221,* 475-481.

Gislason, T., Reynisdottir, H., Kristbjarnarson, H., & Benediktsdottir, B. (1993). Sleep habits and sleep disturbances among the elderly—An epidemiological survey. *Journal of Internal Medicine, 234,* 31-39.

Gourash-Bliwise, N. (1992). Factors related to sleep quality in healthy elderly women. *Psychology and Aging, 7,* 83-88.

Hammond, E. (1964). Some preliminary findings on physical complaints from a prospective study of 1,604,004 men and women. *American Journal of Public Health, 54,* 11-23.

Hart, R. P., Morin, C. M., & Best, A. M. (1995). Neuropsychological performance in elderly insomnia patients. *Aging and Cognition, 2*(4), 268-278.

Hauri, P. J. (1983). A cluster analysis of insomnia. *Sleep, 6,* 326-328.

Hauri, P. J. (1997). Cognitive deficits in insomnia patients. *Acta Neurologica Belgica, 97,* 113-117.

Hauri, P., & Fisher, J. (1986). Persistent psychophysiologic insomnia. *Sleep, 9,* 38-53.

Hauri, P., & Olmstead, E. (1989). Reverse first night effect in insomnia. *Sleep, 12,* 97-105.

Healey, E. S., Kales, A., Monroe, L. J., Bixler, E. O., Chamberlain, K., & Soldatos, C. R. (1981). Onset of insomnia: Role of life-stress events. *Psychosomatic Medicine, 43,* 439-451.

Henderson, S., Jorm, A. F., Scott, L. R., Mackinnon, A. J., Christensen, H., & Korten, A. E. (1995). Insomnia in the elderly: Its prevalence and correlates in the general population. *Medical Journal of Australia, 162,* 22-24.

Hicks, R. A., Marical, C. M., & Conti, P. A. (1991). Coping with a major stressor: Differences between habitual short- and longer-sleepers. *Perceptual and Motor Skills, 72,* 631-636.

Hicks, R. A., & Youmans, K. (1989). The sleep-promoting behaviors of habitual short- and longer-sleeping adults. *Perceptual and Motor Skills, 69,* 145-146.

Hoch, C. C., Dew, M. A., Reynolds, C. F., III, Monk, T. H., Buysse, D. J., Houck, P. R., Machen, M. A., & Kupfer, D. J. (1994). A longitudinal study of laboratory and diary-based sleep measures in healthy "old old" and "young old" volunteers. *Sleep, 17,* 489-496.

Hoch, C. C., Reynolds, C. F., III, Kupfer, D. J., Berman, S. R., Houck, P. R., & Stack, J. A. (1987). Empirical note: Self report versus recorded sleep in healthy seniors. *Psychophysiology, 24,* 293-299.

Hoelscher, T. J., & Edinger, J. D. (1988). Treatment of sleep-maintenance insomnia in older adults: Sleep period reduction, sleep education and modified stimulus control. *Psychology and Aging, 3,* 258-263.

Jacobs, E. A., Reynolds, C. F., Kupfer, D. J., Lovin, B. A., & Ehrenpreis, A. B. (1988). The role of polysomnography in the differential diagnosis of chronic insomnia. *American Journal of Psychiatry, 145,* 346-349.

Janson, C., Gislason, T., DeBacker, W., Plashke, P., Bjornsson, E., Hetta, J., Kristbjarnason, H., Vermaire, P., & Boman, G. (1995). Prevalence of sleep disturbances among young adults in 3 European countries. *Sleep, 18,* 589-597.

Johnson, L. C., Freeman, C. R., Spinweber, C. L., & Gomez, S. A. (1991). Subjective and objective measures of sleepiness: Effects of benzodiazepine and caffeine on their relationship. *Psychophysiology, 28,* 65-71.

Kales, A., Caldwell, A. B., Preston, T. A., Healy, S., & Kales, J. D. (1976). Personality patterns in insomnia. *Archives of General Psychiatry, 33,* 1128-1134.

Kales, J. D. (1975). Aging and sleep. In R. Goldman & M. Rockstein (Eds.), *Symposium on the physiology and pathology of aging.* New York: Academic Press.

Kales, J. D., Kales, A., Bixler, E. O., Soldatos, C. R., Cadieux, R. J., Kashurba, G. J., & Vela-Bueno, A. (1984). Biopsychobehavioral correlates of insomnia V: Clinical characteristics and behavioral correlates. *American Journal of Psychiatry, 141,* 1371-1376.

Knab, B., & Engle, R. R. (1988). Perception of waking and sleeping: Possible implications for the evaluation of insomnia. *Sleep, 11,* 265-272.

Kripke, D. F., Simons, R. N., Garfinkel, L., & Hammond, C. (1979). Short and long sleep and sleeping pills: Is increased mortality associated? *Archives of General Psychiatry, 36,* 103-116.

Kronholm, E., & Hyyppa, M. T. (1985). Age-related sleep habits and retirement. *Annals of Clinical Research, 17,* 257-264.

Kryger, M. H., Siteljes, D., Pouliot, Z., Neufeld, H., & Odgnoki, T. (1991). Subjective versus objective evaluation of hypnotic efficacy: Experience with zolpidem. *Sleep, 14,* 399-407.

Kuisk, L. A., Bertelson, A. D., & Walsh, J. K. (1989). Presleep cognitive hyperarousal and affect as factors in objective and subjective insomnia. *Perceptual and Motor Skills, 68,* 1219-1225.

Lacks, P. (1987). *Behavioral treatment for persistent insomnia.* New York: Pergamon.

Lamarche, C. H., & Ogilvie, R. D. (1997). Electrophysiological changes during the sleep onset period of psychophysiological insomniacs, psychiatric insomniacs, and normal sleepers. *Sleep, 20,* 724-733.

Lavidor, M., Libman, E., Babkoff, H., Creti, L., Weller, A., Amsel, R., Brender, W., & Fichten, C. S. (1996, November). *Psychologically laden sleep parameters in aging.* Paper presented at the meeting of the Association for Advancement of Behavior Therapy, New York.

Libman, E., Fichten, C. S., Creti, L., Amsel, R., Bailes, S., Wright, J., Alapin, I., Brender, W., Baltzan, M., & Spector, I. (1999, November). *How should one measure sleep parameters: Retrospective questionnaire vs. ongoing self-monitoring (daily sleep diary)?* Presentation at the annual convention of the Association for advancement of Behavior Therapy (AABT), Toronto, Ontario.

Libman, E., Creti, L., Amsel, R., Brender, W., & Fichten, C. S. (1997). What do older good and poor sleepers do during periods of nocturnal wakefulness? The Sleep Behaviors Scale: 60+. *Psychology and Aging, 12(1),* 170-182.

Libman, E., Creti, L., Levy, R. D., Brender, W., & Fichten, C. S. (1997). A comparison of reported and recorded sleep in older poor sleepers. *Journal of Clinical Geropsychology, 3(3),* 199-211.

Libman, E., Fichten, C. S., Weinstein, N., Tagalakis, V., Amsel, R., Brender, W., & Creti, L. (1998). Improvement and deterioration in sleep status of "younger" and "older" seniors: A longitudinal study. *Journal of Mental Health and Aging, 4(1),* 183-192.

Lichstein, K. L., & Fanning, J. (1990). Cognitive anxiety in insomnia: An analogue test. *Stress Medicine, 6,* 47-51.

Lichstein, K. L., & Fischer, S. M. (1985). Insomnia. In M. Hersen & A. S. Bellack (Eds.), *Handbook of clinical behavior therapy with adults* (pp. 319-352). New York: Plenum.

Lichstein, K. L., & Johnson, R. S. (1991). Older adults' objective self recording of sleep in the home. *Behavior Therapy, 22,* 531-548.

Lichstein, K. L., & Rosenthal, T. L. (1980). Insomniacs' perceptions of cognitive vs. somatic determinants of sleep disturbance. *Journal of Abnormal Psychology, 89,* 105-107.

Lichstein, K. L., Wilson, N. M., Noe, S. L., Aguillard, R. N., & Bellur, S. N. (1994). Daytime sleepiness in insomnia: Behavioral, biological and subjective indices. *Sleep, 17,* 693-702.

Lundh, L. G., Lunqvist, K., Broman, J. E., & Hetta, J. (1991). Vicious cycles of sleeplessness, sleep phobia, and sleep-compatible behaviors in patients with persistent insomnia. *Scandinavian Journal of Behavior Therapy, 20,* 101-114.

Mahoney, M. J. (1977). Some applied issues in self monitoring. In J. D. Cone & R. P. Hawkins (Eds.), *Behavioral assessment: New directions in clinical psychology* (pp. 241-254). New York: Brunner/Mazel.

Marchini, E. J., Coates, T. J., Magistad, J. G., & Waldum, S. J. (1983). What do insomniacs do, think and feel during the day? A preliminary study. *Sleep, 6,* 147-155.

Mathews, A., & Milroy, R. (1994). Effects of priming and suppression of worry. *Behaviour Research & Therapy, 32,* 843-850.

McCall, W. V., & Edinger, J. D. (1991). Need for polysomnographic studies in research on initiating and maintaining sleep [Letter to the editor]. *American Journal of Psychiatry, 148,* 957-958.

McGhie, A., & Russell, S. M. (1962). The subjective assessment of normal sleep patterns. *The Journal of Mental Science, 108,* 642-654.

Mellinger, G. D., Balter, M. B., & Uhlenhuth, E. H. (1985). Insomnia and its treatment: Prevalence and correlates. *Archives of General Psychiatry, 42,* 225-232.

Mendelson, W. B. (1995). Long-term follow-up of chronic insomnia. *Sleep, 18,* 698-701.

Mendelson, W. B., Garnett, D., Gillin, J. C., & Weingartner, H. (1984). The experience of insomnia and daytime and nighttime functioning. *Psychiatry Research, 12,* 235-250.

Miles, L. E., & Dement, W. C. (1980). Sleep and aging. *Sleep, 3,* 119-230.

Monjan, A. A., & Foley, D. J. (1995). Longitudinal study of chronic insomnia in older people. *Proceedings: 9th Annual Meeting of the APSS.* Rochester, MN: Association of the Professional Sleep Societies.

Monk, T. H., Reynolds, C. F., Machen, M. A., & Kupfer, D. J. (1992). Daily social rhythms in the elderly and their relation to objectively recorded sleep. *Sleep, 15,* 322-329.

Morgan, K., & Clarke, D. (1997). Risk factors for late-life insomnia in a representative general practice sample. *British Journal of General Practice, 47,* 166-169.

Morgan, K., Dallosso, H., Ebrahim, S., Arie, T., & Fentem, P. H. (1988). Characteristics of subjective insomnia in the elderly living at home. *Age and Ageing, 17,* 1-7.

Morgan, K., Healey, D. W., & Healey, P. J. (1989). Factors influencing persistent subjective insomnia in old age: A follow-up study of good and poor sleepers age 65-74. *Age and Ageing, 18,* 117-122.

Morin, C. M. (1993). *Insomnia: Psychological assessment and management.* New York: Guilford.

Morin, C. M., Colecchi, C., Stone, J., Brink, D., & Sood, R. (1994). Cognitive-behavior therapy for insomnia. *Convention Proceedings for the 28th Annual AABT,* 65.

Morin, C. M., & Gramling, S. E. (1989). Sleep patterns and aging: Comparison of older adults with and without insomnia complaints. *Psychology and Aging, 4,* 290-294.

Morin, C. M., Kowatch, R. A., Barry, T., & Walton, E. (1993). Cognitive-behavior therapy for late-life insomnia. *Journal of Consulting and Clinical Psychology, 61,* 137-146.

Nau, S. D. (1997). The measurement of daytime sleepiness. In M. R. Pressman & W. C. Orr (Eds.), *Understanding sleep—The evaluation and treatment of sleep disorders* (pp. 209-225). Washington, DC: American Psychological Association.

Nelson, R. O. (1977). Methodological issues in assessment via self-monitoring. In J. D. Cone & R. P. Hawkins (Eds.), *Behavioral assessment.* New York: Brunner/Mazel.

Nicassio, P. M., Mendlowitz, D. R., Fussell, J. J., & Petras, L. (1985). The phenomenology of the presleep state: The development of the presleep arousal scale. *Behavior Research and Therapy, 23*, 263-271.

Ohayon, M. M., Caulet, M., & Guilleminault, C. (1997). How a general population perceives its sleep and how this relates to the complaint of insomnia. *Sleep, 20*, 715-723.

Perlis, M. L., Giles, D. E., Mendelson, W. B., Bootzin, R. R., & Wyatt, J. K. (1997). Psychophysiological insomnia: The behavioral model and a neurocognitive perspective. *Journal of Sleep Research, 6*, 179-188.

Prinz, P. N., Vitiello, M. V., Raskind, M. R., & Thorpy, M. J. (1990). Geriatrics: Sleep disorders and aging. *New England Journal of Medicine, 323*, 520-526.

Randazzo, A. C., & Schweitzer, P. K. (1995). First night effect in elderly insomniacs. *Proceedings: 9th Annual Meeting of the APSS.* Rochester, MN: Association of the Professional Sleep Societies.

Reite, M., Buysse, D., Reynolds, C., & Mendelson, W. (1995). The use of polysomnography in the evaluation of insomnia. *Sleep, 18*, 58-70.

Reynolds, C. F., III, Coble, P. A., Black, R. S., Holzer, B., Carral, R., & Kupfer, D. J. (1980). Sleep disturbances in a series of elderly patients: Polysomnographic findings. *Journal of the American Geriatrics Society, 28*, 164-170.

Reynolds, C. F., III, Kupfer, D. J., Burpse, D. J., Cable, P. A., & Yeager, A. (1991). Subtyping DSM-III-R primary insomnia: A literature review by the DSM-IV work group on sleep disorders. *American Journal of Psychiatry, 148*, 432-438.

Rutter, S., & Waring-Paynter, K. (1992). Prebedtime activity and sleep satisfaction of short and long sleepers. *Perceptual and Motor Skills, 75*, 122.

Salin-Pascual, R. J., Roehrs, T. A., Merlotti, L. A., Zorick, F., & Roth, T. (1992). Long-term study of insomnia patients with sleep state misperception and other insomnia patients. *American Journal of Psychiatry, 149*, 904-908.

Schmitt, F. A., Phillips, B. A., Cook, Y. R., Berry, D.T.R., & Wekstein, D. R. (1996). Self report of sleep symptoms in older adults: Correlates of daytime sleepiness and health. *Sleep, 19*, 59-64.

Schramm, E., Hohagen, F., Kappler, C., Grasshoff, U., & Berger, M. (1995). Mental comorbidity of chronic insomnia in general attenders using DSM-III-R. *Acta Psychiatrica Scandinavica, 91*, 10-17.

Schwartz, R. M., & Garamoni, G. L. (1986). A structural model of positive and negative states of mind: Asymmetry in the internal dialogue. In P. C. Kendall (Ed.), *Advances in cognitive-behavioral research and therapy* (Vol. 5, pp. 1-62). New York: Academic Press.

Seidel, W. F., Ball, S., Cohen, S., Patterson, N., Yost, D., & Dement, W. C. (1984). Daytime alertness in relation to mood, performance, and nocturnal sleep in chronic insomniacs and noncomplaining sleepers. *Sleep, 7*, 230-238.

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State-Trait Anxiety Inventory (Form Y)*. Palo Alto, CA: Consulting Psychologists Press.

Standards of Practice Committee of the American Sleep Disorders Association. (1995). Practice parameters for the use of polysomnography in the evaluation of insomnia. *Sleep, 18*, 55-57.

Stepanski, E., Koshorek, G., Zorick, F., Glinn, M., Roehrs, T., & Roth, T. (1989). Characteristics of individuals who do or do not seek treatment for chronic insomnia. *Psychosomatics, 30*, 421-424.

Stepanski, E., Zorick, F., Sicklesteel, J., Young, D., & Roth, T. (1986). Daytime alertness-sleepiness in patients with chronic insomnia. *Sleep Research, 15*, 174.

Stone, J., Morin, C. M., Hart, R. P., Remsberg, S., & Mercer, J. (1994). Neuropsychological functioning in older insomniacs with or without obstructive sleep apnea. *Psychology and Aging, 9*, 213-236.

Tait, H. (1992). Sleep problems: Whom do they affect? *Canadian Social Trends, 4*, 8-10.

Trinder, J. (1988). Subjective insomnia without objective findings: A pseudo diagnostic classification. *Psychological Bulletin, 103*, 87-94.

Van Egeren, L., Haynes, S. N., Franzen, M., & Hamilton, J. (1983). Presleep cognitions and attributions in sleep-onset insomnia. *Journal of Behavioral Medicine, 6*, 217-232.

Vgontzas, A. N., Kales, A., Bixler, E. O., Manfredi, R. L., & Vela-Bueno, A. (1995). Usefulness of polysomnographic studies in the differential diagnosis of insomnia. *International Journal of Neuroscience, 82*, 47-60.

Waters, W. F., Adams, S. G., Jr., Binks, P., & Varnado, P. (1993). Attention, stress and negative emotion in persistent sleep onset and sleep maintenance insomnia. *Sleep, 16*, 128-136.

Weyerer, S., & Dilling, H. (1991). Prevalence and treatment of insomnia in the community: Results from the Upper Bavarian Field Study. *Sleep, 14*, 392-398.

Williams, R. L., Karacan, I., & Hursch, C. J. (1974). *Electroencephalography (EEG) of human sleep: Clinical applications*. New York: John Wiley & Sons.

World Health Organization. (1992). *International classification of diseases (ICD-10)*. Geneva: Author.

Wyatt, J. K., Bootzin, R. R., Anthony, J., & Bazant, S. (1994). Sleep onset is associated with retrograde and anterograde amnesia. *Sleep, 17*, 502-511.

Zammit, G. K. (1988). Subjective ratings of the characteristics and sequelae of good and poor sleep in normals. *Journal of Clinical Psychology, 44*, 123-130.