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An Evaluation of a New Cognitive-Behavioral Technique For the Treatment of Insomnia in Older Adults

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A Thesis

in

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ABSTRACT

An Evaluation of A New Cognitive-Behavioral Technique for the Treatment of Insomnia in Older Adults

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Concordia University, 1996

Poor sleep quality and complaints of insomnia are particularly prevalent in aging individuals. However, not all older people who experience what may be developmentally inevitable sleep disruption complain of insomnia.

Psychological therapies for sleep disorder have been explored extensively with younger people but only recently have researchers turned their attention to applying these approaches to the treatment of insomnia in older adults. Recent research has demonstrated that older individuals can benefit from such treatment. However, despite abundant evidence for the importance of cognitive factors in insomnia, there has been a relative lack of attention to the development of cognitive interventions.

The present study evaluated a new cognitive-behavioral technique, Countercontrol-Plus Audiobook, aimed directly at disrupting the intrusive thoughts that may interfere with sleep. Forty-one older adults (mean age = 67) with sleep onset and maintenance problems were assigned to one of three intervention conditions: Countercontrol-Plus Audiobook, Countercontrol-Plus Relaxation, and Self-Monitoring Only. All three groups showed significant improvement on various self-report, quantitative and qualitative measures of sleep, although no change was found on daytime sleepiness, fatigue and functioning. Cognitive and somatic presleep variables also showed improvement over the two week treatment period. Gains were generally maintained at a 2-week and 18-month follow-up.

Evaluation of clinically significant change demonstrated that most participants still had some degree of sleep problem at post-intervention. Although most participants showed some improvement on quantitative sleep-wake parameters, insomnia distress and anxious presleep cognitions, only 4% to 29% of participants reached the defined clinically significant level of improvement from baseline to post-intervention, with more individuals improving on sleep onset latency and distress frequency than on duration of nocturnal awakenings. Consistent with previous studies, durations of nocturnal awakenings seem to be more resistant to change than latency to sleep onset.

The findings are discussed in terms of the multidimensional nature of the insomnia experience and the multiple possible effects of the self-monitoring process.

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An Evaluation of A New Cognitive-Behavioral Technique for the Treatment of Insomnia in Older Adults

Insomnia refers to a disturbance in the sleep process but the precise definition of the term is elusive. As used by clinicians, researchers and the general population, it comprises a number of different complaints including unsatisfactory, inadequate, insufficient, nonrestorative, or disrupted (transient) sleep. Therefore, the term insomnia has incorporated three aspects of subjective experience: quantity of sleep, quality of sleep, and daytime effects such as fatigue, mood disturbances, or impaired performance.

Diagnosis and Assessment

The fact that three different classification systems for sleep disorders exist reflects the lack of unanimity in defining insomnia. The International Classification of Diseases, 10th edition (ICD-10; World Health Organization, 1992) includes broad categories of sleep disorders of both nonorganic and organic origins; the International Classification of Sleep Disorders (ICSD, American Sleep Disorders Association, 1990) identifies about 88 distinct sleep disorders, including 12 types of insomnia under the heading of Disorders of Initiating and Maintaining Sleep (DIMS); and the Diagnostic And Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994) provides 23 broad categories of sleep disturbance. These classification systems not only differ in the categories they use but they also utilize different diagnostic criteria to define insomnia. For example, while ICD-10 provides both a frequency criterion (at least 3 times per week) and a duration criterion (at least one month), DSM-IV contains only a duration criterion (at least one month), and ICSD contains neither criterion.

The three classifications are similar in several ways. They arrange disorders by presumed etiology rather than presenting symptom. A diagnosis of primary insomnia is made only after excluding insomnia associated with: a) another 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 a substance (e.g., drug of abuse, medication). Also, all three nosologies include criteria for daytime sequelae of insomnia and require the presence of a complaint of insomnia. In fact, DSM-IV and ICD-10 include a clinical significance criterion of distress related to the sleep problem as a central feature of primary insomnia.

In order to make studies comparable, researchers have developed more specific criteria in the assessment of insomnia. They have distinguished three types of insomnia according to when during the nocturnal sleep period wakefulness is most troublesome. This classification includes: 1) Sleep onset insomnia - difficulty falling asleep, 2)sleep maintenance insomnia - waking during the night with difficulty returning to sleep, and 3) terminal insomnia, also called early morning awakening - waking early in the morning with difficulty going back to sleep. Four quantitative measures of sleep have been commonly used in assessing insomnia and in evaluating the extent of the different types of sleep problems. They are as follows: (1) Sleep onset latency (SOL) - length of time it takes the individual to initiate sleep, (2) Wake after sleep onset (WASO) - amount of time an individual is awake after sleep onset and prior to the final awakening, (3) Total sleep time (TST)- total amount of time spent asleep throughout the night, and 4) Sleep efficiency (SE) is the ratio of total sleep time to total time in bed. Although specific duration and frequency criteria, are not standardized, most clinicians and researchers diagnose sleep-

onset insomnia when SOL exceeds 30 minutes, sleep maintenance insomnia when WASO exceeds 30 minutes, and terminal insomnia when early morning awakening occurs with less than 6.5 hours of total sleep time. A diagnosis of any of these types of insomnia usually requires a frequency of occurrence exceeding three nights per week.

The other factors that comprise the sleep experience - sleep quality and daytime effects - have not received as much research attention as the quantitative aspects of sleep and have been assessed in a less consistent way. Sleep quality has been assessed with various non-standardized rating scales. The most frequently used measures of how the insomniac feels during the day are measures of daytime sleepiness like the Stanford Sleepiness Scale (Hoddes, Zarcone, Smythe, Phillips, & Dement, 1973) and laboratory measurement of sleep tendency throughout the day by the Multiple Sleep Latency Test (MSLT; Carskadon, Dement, Mitler, Roth, Westbrook, & Keenan, 1986).

Prevalence of Insomnia

The prevalence of sleep disturbance in the general population has been obtained through large scale epidemiological surveys in the United States, Europe and Australia. As Soldatos (1994) noted, studies often vary in sample characteristics, means of data collection (e.g., questionnaire vs interview), definition and criteria of insomnia, and time frame for the presence of insomnia symptoms (e.g., currently, last month, last year), making estimates of the prevalence of insomnia difficult to compare directly.

In spite of these differences, a consistent finding in all these studies is that insomnia is a common complaint. It has been estimated that approximately 30% to 40% of the adult population suffers from at least occasional insomnia (cf., Angst, Vollrath, Dobler-Mikola, 1989; APA, 1994; Gislason & Almqvist, 1987; Hohagen, Rink, Kappler, Schramm, Riemann, Weyerer, & Berger, 1993; Mellinger, Balter, & Uhlenhuth, 1985;

Weyerer & Dilling, 1991) with a serious or persistent problem reported by 10% to 20% of the population (Angst et al., 1989; Balter & Uhlenhuth, 1992; Bixler, Kales, Soldatos, Kales, & Healey, 1979; Karacan, Thornby, Anch, Hozer, Warheitt, Schwab & Williams, 1976; Lugaresi et al., 1983; Mellinger et el., 1985). Similar prevalence rates were reported by Statistics Canada (Tait, 1992): 24% of Canadians reported often having problems going to sleep or staying asleep.

The few studies which have attempted to investigate incidence of the different types of insomnia differed in their criteria for defining sleep onset, sleep maintenance and terminal insomnia. In fact, most define sleep maintenance insomnia as frequent nocturnal arousals, and ignore difficulty returning to sleep once awake. Prevalence rates vary from 2.7% to 22.9% for sleep maintenance insomnia, 2.2% to 15.3% for sleep onset insomnia (Bixler et al., 1979; Gislason & Almqvist, 1987; Karacan Thornby, & Williams, 1983; Liljenberg, Almqvist, Hetta, Roos, & Agren, 1988) and 5% to 8% for terminal insomnia (Janson et al., 1995; Karacan et al., 1983). Therefore, the most prevalent type of insomnia appears to be sleep maintenance insomnia (defined as frequent nocturnal arousals), followed by sleep onset insomnia, with terminal insomnia occurring least frequently. The same individual, however, may experience more than one type of insomnia.

Incidence of insomnia rates vary when criteria are more inclusive. For example, when daytime sequelae are included in the definition, insomnia incidence rates decrease. Liljenberg et al. (1988), found prevalence figures to be three times lower when insomnia criteria included both daytime sleepiness and nighttime symptoms.

Epidemiological studies have also revealed some important demographic trends. Sleep complaints are reported more often by women of all ages than by men (Foley, Monjan, Brown, Simonsick, Wallace, & Blazer, 1995., Janson et al., 1995; Karacan et al., 1983; McGhie &

Russel, 1962; Mellinger et al., 1985; Smirne, Franceschi, Zamproni, Crippa, & Ferini-Strambi, 1983; Weyerer & Dilling, 1991). Reports of insomnia increase with increasing age (Hammond, 1964., Hohagen et al., 1993; Karacan et al., 1983; Smirne et al., 1983) and have been associated with an increase in medical disorders and psychological symptoms, such as anxiety, worry and depression (Angst et al., 1989; Bliwise, King, Harris, & Haskell, 1992; Gislason , Reynisdottir, Kristbjarnarson, & Benediktsdottir, 1993; Karacan et al., 1983; Mellinger et al., 1985; Vollrath, Wicki, & Angst, 1989).

Insomnia and Aging

Aging is associated with both objective and subjective changes in sleep quality and quantity. To provide a context, normal physiology of sleep will be presented first. This will be followed by a description of physiological changes in sleep architecture with aging. Then, sleep patterns of older and younger individuals will be compared. The last two sections deal with subjectively reported insomnia in older individuals and a discussion of how objective recording and subjective report of sleep are related.

Normal Sleep

The sleep measure generally accepted as the most reliable and valid is polysomnography. Polysomnography consists of the all-night recording of the electroencephalogram (EEG), electrooculogram (EOG) and the electromyogram (EMG). Other channels recorded by the polygraph may include the electrocardiogram (ECG), respiratory effort and airflow, blood oxygen and CO_2 levels, periodic leg or body movements. Using criteria developed by Rechtschaffen and Kales (1968), sleep is distinguished from wakefulness and can be separated into two distinct states: Rapid eye movement (REM) sleep and non-REM (NREM) sleep. NREM sleep is subdivided into four stages which differ from each other in EEG

amplitude and frequency, with amplitude increasing and frequency decreasing from Stages 1 through 4. Investigators often refer to the combined Stages 3 and 4 sleep as slow wave sleep, delta sleep or deep sleep. NREM sleep is usually associated with minimal mental activity. REM sleep is characterized by low-amplitude and high frequency EEG, decreased muscle tone and episodic bursts of rapid eye movement. The mental activity of human REM sleep is associated with dreaming.

A typical night of sleep begins with NREM sleep, with stages 1 through 4 occurring sequentially. REM sleep usually occurs after about 70 to 100 minutes of NREM sleep. NREM and REM alternate cyclically about every 90 minutes throughout the night. With each successive sleep cycle, REM periods lengthen and stages 3 and 4 sleep time decrease.

Aging and Physiologically Recorded Sleep

Patterns of sleep derived from all-night polysomnographic recordings in older adults have been widely investigated and reported in several reviews (Bliwise, 1993; Bootzin, Engle-Friedman, & Hazelwood, 1983; Carskadon & Dement, 1989; Dement, Miles, & Carskadon, 1982; Vitiello & Printz, 1990). One of the most consistent findings associated with aging is the significant increase in frequency and duration of nocturnal wakefulness, particularly during the latter half of the night (e.g., Feinberg, Koreska, & Hetter, 1967; Kahn & Fisher, 1969; Webb & Campbell, 1980; Williams, Karacan, & Hursch, 1974). This includes both extended awakenings which the individual can report as well as very brief (e.g., 1-15 sec.) arousal of which the individual is probably unaware (Buysse, Reynolds, Monk, Hoch, Yeager & Kupfer, 1991). Older individuals, compared to young or middle aged individuals, take longer to fall asleep (Feinberg et al., 1967) and return to sleep after waking in the middle of the night (Webb & Campbell, 1980). Other changes occurring with increasing age include a decrease in deep sleep (Stages 3 & 4; e.g., Feinberg, Koreska, & Heller, 1967, Kales, 1975;

Miles & Dement, 1980) and a small decrease in REM sleep (Williams et al., 1974). In addition, with increasing age, variability in sleep parameters, such as time in bed, total sleep time, sleep latency, number of awakenings, and time awake after sleep onset, has been found to increase (Williams et al., 1974). It is notable that the typical changes in sleep pattern which occur during normal aging are similar to the pattern seen in nonelderly insomniacs.

Aging and Subjectively Reported Insomnia

As mentioned earlier, prevalence studies of a wide variety of populations have generally indicated that the incidence of insomnia complaints increases with age (cf. Bliwise et al., 1992). The prevalence figures for serious and habitual insomnia in functional, healthy, noninstitutionalized individuals over age 65 range from 7.8% to 45%, with sleep maintenance and terminal insomnia as the most frequently reported types of insomnia complaint (Brabbins et al., 1993; Foley et al., 1995; Frisoni, De Leo, Rozzini, Bernardini, Della Buono, & Trabucchi, 1993; Gislason et al., 1993; Habte-Gaber et al., 1991; Henderson, Jorm, Scott, Mackinnon, Christenson, & Korten, 1995; Mellinger et al., 1985; Monjan & Foley, 1995; Morgan, Dallasso, Ebrahim, Arie, & Fentem, 1988). Estimates of occasional insomnia in this older population have been as high as 73% (Frisoni et al., 1993). The implication of these data is that sleep disruption, accompanied by distress over the sleep problem, increases in a linear fashion with increasing age. Indeed, the rate of deterioration is commonly believed to be accelerated in older people because of the psychophysiological changes in sleep architecture which normally accompany the aging process.

However, a re-examination of both older and more recent investigations suggests that reported sleep disturbance increases with increasing age in non-elderly samples (Janson et al., 1995; McGhie &

Russell, 1962; Weyerer & Dilling, 1991) and peaks prior to age 65 (Hammond, 1964; McGhie & Russell, 1962; Mellinger et al., 1985). For example, Hammond (1964) found the incidence rate for insomnia complaint increasing gradually from 14% in the 30 to 34 age group and peaking at 31% in the 55 to 59 age group. No further increase was found in the over 60 age groups. Also, studies which focused on individuals older than 60 years found that insomnia complaints remained stable with increasing age (Foley et al., 1995; Frisoni et al., 1993; Gislason et al., 1993).

Other findings of studies focusing directly on older individuals, suggest that insomnia in seniors is not simply an aging-related phenomenon. When health and psychological factors are taken into account the incidence of reported insomnia is reduced significantly. For example, in a very healthy older population (between 50 and 65 years old) insomnia prevalence rates for males and females were found to be very low: between 1%-4.4% (Bliwise et al., 1992). In fact, several epidemiological studies have found a strong association between reported insomnia and the presence of medical and psychological disorders (e.g., Foley et al., 1995; Gislason & Almqvist, 1987; Gislason et al., 1993; Mellinger et al., 1985). When mental (e.g., depression) and physical health were adjusted for, either statistically (Foley et al., 1995; Gislason & Almqvist, 1987) or by selecting a carefully screened healthy population (Bliwise et al., 1992), age was no longer associated with insomnia complaints. Whether sleep disruption is the cause or the effect of illness has not yet been established.

Recently it has been suggested that another factor - sleep related distress - is critical to understanding the insomnia complaint (APA, 1994; Fichten, Creti, Amsel, Brender, Weinstein, & Libman, 1995). Most prevalence studies investigate the subjective report of sleep disruption and do not include the individual's distress about the insomnia problem.

Similar to incidence rates reported in epidemiological investigations, Fichten, et al. (1995) found that half of their large community sample (over 600 participants) of older adults did not report experiencing insomnia. Interestingly, they also found that of those participants who did report relatively severe sleep disruption, approximately half expressed minimal distress about their insomnia.

Fichten et al.'s, (1995) data suggest that a reported insomnia problem, at least as it relates to older adults, consists of three aspects: sleep disruption, insomnia distress and daytime sequelae. They found that variables measuring sleep disruption (e.g., duration of nocturnal arousals and nocturnal sleep time) were best predicted by subjective ratings of difficulty falling asleep and getting back to sleep; distress about the sleep problem was best predicted by state and trait anxiety (especially the cognitive aspects of presleep anxiety); and daytime fatigue and sleepiness were best predicted by low levels of depression. As has been previously reported (Lichstein, Wilson, Noe, Aguillard, & Bellur, 1994) the daytime variables failed to distinguish good and poor sleepers. Therefore, sleep-related distress and daytime symptoms attributed to poor sleep appear to be more closely related to psychological adjustment variables than to sleep disruption.

Relationship of Physiologically Recorded and Subjectively Reported Sleep

How the changes in the psychophysiology of sleep associated with aging are related to sleep complaints is unclear. Three patterns have been found: 1) Changes in objective sleep parameters do not necessarily lead to the subjective experience of insomnia (Bootzin et al, 1983), 2) Subjective experience of sleep disruption may not result in related distress (Fichten et al., 1995), and 3) Subjective experience of sleep disruption may not correspond to polysomnographic recording (e.g., Dement, 1972). The latter pattern is commonly referred to as subjective insomnia and is currently classified in the ICSD as "sleep state

misperception". On the other hand, there is psychophysiologic insomnia, where no organic basis can be identified, but the subjective insomnia complaint parallels the polysomnographic record. It should be noted however, that although sleep logs may correlate well with physiological recordings, insomniacs usually overestimate total sleep latency and underestimate total sleep time (Lacks, Bertelson, Gans, & Kunkel, 1983).

In conclusion, the literature suggests that in spite of the physiological changes in sleep architecture that occur with aging, being older does not imply that the individual necessarily has a sleep problem, complains of one or is distressed by one. Since insomnia is common but not a necessary accompaniment of the aging process, it should not be seen as a normal part of aging but as a treatable complaint.

Etiology of Insomnia

As the diagnostic classification systems indicate, insomnia can be secondary to psychiatric, medical, or environmental conditions. It may be associated with pain, a medical condition such as hyperthyroidism, and renal insufficiency, and psychiatric disorders such as depression, and schizophrenia, (APA, 1994; Kales, Kales, Bixler, Soldatos, Cadieux, Kashurba, & Vela-Bueno, 1984; Kales & Kales, 1984). These conditions may affect sleep directly or indirectly through the side effects of the drugs prescribed to relieve pain, or treat medical and psychiatric conditions. Insomnia may also be caused by medications taken to relieve insomnia. Drug-dependent insomnia can result from taking hypnotics over a long period of time (i.e., generally between 2 and 3 weeks continuously; Kay, Blackburn, Buckingham, & Kales, 1976). A further complication of long-term sedative/hypnotic use is rebound insomnia in the withdrawal phase (e.g., Kales, Scharf & Kales, 1978). Alcohol is often used as a soporific and although it can result in shortened sleep onset, intermittent nocturnal awakenings increase as the alcohol is

metabolized. Stimulants such as caffeine and nicotine may also interfere with sleep (Soldatos, Kales, Scharf, Bixler, & Kales, 1980)

Several physiologically based sleep disorders may be the primary cause of reported insomnia. These include sleep apnea (in which the individual stops breathing for as long as 30 seconds and then awakens transiently to resume breathing), restless legs syndrome, periodic limb movement disorder (primarily, abrupt kicking movements throughout the night), circadian rhythm disorders (advanced or delayed sleep phase), and various parasomnias (e.g., sleep terrors).

When these conditions have been ruled out, insomnia can still be experienced without a specified cause. It is this type of insomnia [i.e., primary insomnia (DSM-IV; APA, 1994) or psychophysiological disorder of initiating and maintaining sleep (ICSD; ASDA, 1990)] which has stimulated research into psychological and behavioral factors in the etiology of insomnia.

Arousal and Insomnia

Of the postulated psychological mechanisms in the etiology of insomnia the concept of hyperarousal has been prominent. The two aspects of pre-sleep arousal - cognitive and somatic - have been studied separately. Each has a different impact on insomnia, with cognitive arousal having a more central role.

Relative roles of Somatic and Cognitive Arousal

Nicassio, Mendlowitz, Fussell and Petras (1985) developed and validated the Pre-sleep Arousal Scale, in which subjects rate the intensity of cognitive and somatic symptoms of arousal prior to falling asleep. Both the cognitive and somatic subscales of this measure successfully discriminate insomniacs from normal sleepers. Both correlate significantly with reports of sleep-onset latency, with the Cognitive subscale being more strongly associated with sleep-onset latency than the Somatic scale. This stronger relationship between the

Cognitive subscale and sleep onset insomnia was corroborated in a later study by White and Nicassio (1990) in which Cognitive presleep arousal was consistently and highly correlated to sleep onset latency and poorer sleep quality while Somatic arousal had no significant relationship with either of the sleep measures. Fichten et al.'s (1995) results, in their study of older good and poor sleepers, similarly supported the importance of cognitive arousal in insomnia.

Various other methods have been used to explore the relative roles of cognitive and somatic arousal. For example, Lichstein and Rosenthal (1980) asked a large sample of insomniacs to judge the primacy of cognitive factors, somatic factors, both or neither in their sleep problem. More than half (54.7%) of their participants reported cognitive arousal to be their primary problem, while only 5.4% indicated that somatic arousal was more salient. Even by those endorsing both factors (34.8%), rating scales revealed that the cognitive influence was more strongly experienced. Fichten et al. (1995), using their newly designed measure: the Sleep Self-Statement Test: 60+, found that cognitive aspects of pre-sleep anxiety were more closely related to problematic sleep than were somatic aspects. Espie, Brooks, and Lindsay (1989) found that, of the two main factors that emerged from their Sleep Disturbance Questionnaire, Mental Anxiety was more commonly ascribed as the reason for sleep disturbance than was physical tension.

Somatic Arousal

Monroe (1967) was the first to view arousal as relevant to the problem of insomnia. He compared good and poor sleepers in an all-night study and found that most autonomic indicators were significantly elevated among the sleep-disturbed group both prior to and during sleep, and concluded that insomniacs manifested greater somatic arousal. Since this study, several investigations have examined the relationship between various measures of somatic arousal and various indices of sleep

disturbance. Measures of somatic arousal have included higher body temperature, elevated skin resistance, increased peripheral vasoconstriction, higher electromyographic (EMG) amplitudes, higher heart and respiratory rate and lowered skin temperature. Some studies have indicated elevated physiological arousal in insomniacs as compared to good sleepers but the magnitude of such differences was small (Freedman & Sattler, 1982; Haynes, Fitzgerald, Shute, & O'Meary, 1985; Mendelson, Garnett, Gillin, & Weingartner, 1984; Monroe, 1967). Other studies reported mixed or negative results in this regard (c.f., Buysse & Reynolds, 1990; Van Oot, Lane, & Borkovec, 1983, for reviews).

Cognitive Arousal

The important role of cognitive arousal in insomnia has emerged somewhat more recently (e.g. Borkovec, et al., 1981; Coyle & Watts, 1991; Fichten & Libman, 1991; Kuisk, Bertelson, & Walsh, 1989; Lichstein & Fanning, 1990; Lichstein & Rosenthal, 1980; Morin, Stone, Trinkle, Mercer, & Remsberg, 1993b; Sanavio, et al., 1990) and the data on the impact of cognitive arousal on sleep disturbance is more consistent than that reported for somatic arousal. Also, hypotheses relating cognitions and insomnia have been more fruitful in sleep research.

Two types of data demonstrate the role of cognitive arousal: (1) studies identifying psychological factors which differentiate good from poor sleepers, and (2) more recent research focusing on presleep cognitive arousal and its role in insomnia.

I) Personality and Insomnia: There is a vast literature on personality and psychological adjustment factors in young and middle aged individuals experiencing sleep problems. Personality traits of insomniacs have been assessed in both clinical populations of chronic insomniacs (e.g., at sleep disorders centers; Kales, Caldwell, Preston, Healey, Kales, 1976; Kales, Caldwell, Soldatos, Bixler, & Kales, 1983; Schneider-Helmert, 1987; Zorick, Kribbs, Roehrs, & Roth, 1989) and in

volunteer participants whose sleep onset insomnia has been identified by self-report (Fichten et al., 1995; Levin, Bertelson & Lacks, 1984). Results have been remarkably consistent.

The most frequently used personality measure in insomnia research is the Minnesota Multiphasic Personality Inventory (MMPI). A number of studies employing the MMPI consistently report a greater number and frequency of elevated scales in insomniacs as compared to control participants (e.g., Beutler, Thornsby, & Karacan, 1978; Coursey, Buchsbaum, & Frankel, 1975, Freedman & Sattler, 1982; Kales et al., 1976; Kales et al. , 1983; Levin et al., 1984; Mendelson et al., 1984; Monroe, 1967; Roth, Kramer & Lutz, 1976). The most consistent elevations have been found on the depression (D), hysteria (Hy), hypochondriasis (Hs), and psychasthenia (Pt) scales.

Other psychological and adjustment measures have been used to differentiate good and poor sleepers. These include, among others, the Taylor Manifest Anxiety Scale (e.g., Nicassio & Bootzin, 1974), the State-Trait Anxiety Inventory (e.g., Hirshkowitz, Hamilton, Rando, Bellamy, Williams & Karacan, 1990), Penn State Worry Questionnaire (e.g., Fuller, Waters, Binks, & Anderson, 1995), the Eysenck Personality Inventory (e.g., Dorsey & Bootzin, 1987), and the SCL-90 (e.g., Paulsen & Shaver, 1991). All of these studies describe insomniacs as mildly and chronically depressed, anxious, worrying, and hypochondriacal.

In a study using the methodology of randomly sampling daytime thoughts, behaviors and affect throughout the day, depressive features were reflected in all the sampled daytime variables in insomniacs as compared with good sleepers (Marchini, Coates, Magistad, & Waldum; 1983).

Insomniacs have been shown to differ from good sleepers on other personality characteristics as well. They have reported a lower self-concept, greater difficulty with interpersonal relationships (Healy,

Kales, Monroe, Bixler, Chamberlin, & Soldatos, 1981), and a greater predisposition for cognitive hyperarousal (Coren, 1988).

The little information available about the relationship between sleep parameters and psychological factors in older adults supports the well documented relationship between poor sleep and psychopathology observed in studies of younger insomniacs (Fichten et al., 1995; Frisoni et al., 1993; Morin & Gramling, 1989; Gourash-Bliwise, 1992; Monk, Reynolds, Machen, & Kupfer, 1992; Morgan, et al., 1988, 1989).

In summary, studies comparing good and poor sleepers indicate that insomniacs are more likely to have problematic psychological profiles, characterized by a clinical picture of a depressed, neurotic, and obsessively worrying individual. In view of the high incidence of psychiatric disorder in insomnia and of insomnia in psychiatric disorders, it has been suggested that a more appropriate comparison group would be emotionally disturbed non-insomniacs. A study which made this comparison by using outpatient counselling clients (Piccione, Tallarigo, Zorick, Witig, & Roth, 1981), indicated that although the insomnia group showed the usual pattern of MMPI abnormalities (elevated D, Hy, Pt, and Sc) only the Pt scale differentiated the two groups. The authors hypothesize that characteristics such as obsessive worrying, reflected in elevated Pt scores, play the most important and unique role in insomnia.

In most studies of personality and insomnia, good sleepers are compared to an undifferentiated group of poor sleepers. However, there are some suggestions in the literature that poor sleepers are not homogeneous and that different subgroups of insomniacs have different psychological profiles. Fichten et al. (1995) differentiated older poor sleepers along an insomnia distress dimension (i.e., minimal vs high insomnia related distress). Minimally distressed poor sleepers differed from highly distressed poor sleepers not in that they

experienced substantially less problematic sleep, but in that they manifested less psychological maladjustment and negative affect. In fact, the low distress poor sleepers were more similar to good sleepers on these variables. High distress poor sleepers were found to be significantly different from both good sleepers and low distress poor sleepers on psychological maladjustment variables. Another important distinction may be objectively recorded and subjectively reported insomnia. Paulsen and Shaver, (1991) found that psychological maladjustment (e.g., anxiety, depression) was negatively related to reported sleep quality but not related to polysomnographically recorded sleep variables.

II) Presleep Cognitions and Insomnia: Elevated psychopathology scores in insomniacs led researchers to hypothesize that insomnia is a symptom of anxious and depressive thought patterns which operate at bedtime. Cognitive activity prior to sleep, particularly when this involves anxious and negative thoughts, has been hypothesized to contribute directly to the etiology and maintenance of sleep-onset insomnia (Borkovec, 1979, Coursey et al., 1975,; Lichstein & Rosenthal, 1980; Youkilis & Bootzin, 1981).

Other researchers have viewed presleep cognitive activity as a mediator between sleep disturbance and other factors. For example, cognitive activity has been hypothesized to have an important mediational role when arousal, stimulus control and personality factors are the postulated etiological mechanisms in insomnia (Youkilis & Bootzin, 1981). Kales and Vgontzas (1992) hypothesized that internalization (a cognitive characteristic often found in MMPI studies) produces a state of persistent emotional arousal and results in physiological activation before and during sleep. Thus, physiological arousal and sleep disturbance is mediated by cognition. White and Nicassio (1990) hypothesized that cognitive arousal serves as a mediator

between stress and insomnia. In Fichten et al.,'s (1991) cognitive model of insomnia, cognitive activity, particularly negative and worrying thoughts, is hypothesized to lead to other maladaptive nocturnal aspects including maladaptive behaviors (e.g., tossing and turning), maladaptive affect (e.g. anxiety), and biased information processing (e.g. overestimation of awake times). These three aspects are believed to magnify the sleep complaint by contributing to the negative cognitive experiences which interfere with falling asleep or returning to sleep.

These theories have generated much research addressing the etiological role of presleep cognitive activity in insomnia. Most research has focused on sleep onset insomnia and has employed a variety of experimental techniques: 1) Studies measuring pre-sleep cognitive arousal on pencil-and-paper, global questionnaires, 2) Studies examining frequency and valence of pre-sleep cognitions, 3) Studies investigating cognition in vivo when participants are attempting to go to sleep, and 4) Analogue studies with experimental manipulations aimed at increasing cognitive intrusions during the presleep period. Results of studies using each of these four techniques will be reviewed.

1) **Global Presleep Cognitive Arousal Measures**: Of the studies using global questionnaires (e.g., the Presleep Arousal Scale) to measure pre-sleep cognitive arousal, results consistently characterize insomniacs, compared to good sleepers, as having more difficulty relaxing and frequently describing themselves as tense, anxious, overly preoccupied, worried and depressed (Chambers & Kim, 1993; Fichten et al., 1995; Kales et al., 1984).

2) **Frequency and Valence of Presleep Cognitions**: Studies which investigated frequency of pre-sleep cognitions found young sleep onset insomniacs, compared to good sleepers, reported an overall greater frequency of cognitive activity at night (Coates, Killen, Silverman,

George, Marchini, Hamilton, & Thoresen, 1983; Lundh, Lundqvist, Broman, & Hetta, 1991). When subjective insomniacs were distinguished from objective (psychophysiologic) insomniacs, the latter were found to generate more cognitions than subjective insomniacs during the presleep period (Borkovec, Grayson, O'Brien, & Weerts, 1979; Kuisk, et al., 1989). Although these data may simply reflect the greater time poor sleepers spend awake (and therefore have more time to think), of greater interest is the quality of these cognitions.

Studies which investigated affect and valence of pre-sleep cognitions have reported more negative, worrying thoughts in insomniacs compared to good sleepers (Borkovec, et al., 1981; Coursey et al., 1975; Kuisk, et al., 1989; Lundh, et al., 1991). No differences in negative affect have been found between objective and subjective insomniacs although both groups differ from good sleepers (Van Egeren, Haynes, Franzen, & Hamilton, 1983).

3) **In Vivo Cognitive Studies**: The above studies sampled reports of nighttime cognitive activity with questionnaires completed during the day. Although one might question how accurately such assessment reflects actual nocturnal cognitive processes, studies employing in vivo cognitive sampling measurement techniques (Kuisk et al., 1989; Van Egeren et al., 1983) support the results of these daytime retrospective questionnaire measures. The in vivo investigations, as well, found greater cognitive activity and higher frequency of negative cognitions in insomniacs as compared with good sleepers.

4) **Analogue studies**: Support for the role of pre-sleep cognitive arousal in the etiology of insomnia has been found in studies experimentally manipulating cognitive intrusions in the pre-sleep period of good sleepers (Gross, 1990; Gross & Borkovec, 1982; Haynes et al, 1981). Direct manipulation of cognitive arousal, by inducing a mild

threat immediately before sleep onset (e.g., Haynes, Adams, & Franen, 1981), have led to significantly longer latency to sleep onset.

Summary of Cognitive Arousal Literature

The literature suggests that the complaint of insomnia, regardless of how sleep is measured (objectively or subjectively), is consistently characterized by more frequent and negative presleep cognitions. Whether presleep cognitive arousal is a cause or effect of insomnia, however, has not been determined by research to date. Negative thinking and psychological maladjustment in poor sleepers has been found to precede the onset of insomnia (e.g. Healey et al., 1981) as well as to be the result of sleeplessness (e.g., Morgan, Healy, & Healy, 1989). Whatever the source, it is clear that negative thinking and insomnia are strongly related.

COGNITIVE-BEHAVIORAL INSOMNIA TREATMENTS

The important role of cognitions in insomnia suggests that cognitive interventions would be appropriate in its treatment. The predominance of negative intrusive thinking in insomniacs, suggests that successful therapies would either involve decreasing the frequency of arousing, sleep preventing cognitive events or involve directing attention away from them. Given the abundant evidence for the importance of cognitive factors in insomnia and the agreement among most researchers (cf. Borkovec, 1982; Lacks, 1987; Lichstein & Fischer, 1985) that interference with intrusive cognitive activity is an important factor in insomnia treatment, it is astounding that there has so far been a relative lack of attention to the development of cognitive interventions that are directly aimed at interfering with cognitive activity during nocturnal wakefulness.

The literature on psychological interventions for insomnia is large and diverse. Detailed descriptions of the interventions and evaluations of their effectiveness are available in a number of

excellent reviews (Borkovec, 1982; Buysse & Reynolds, 1990; Hauri, 1989; Lichstein & Fisher, 1985; Van Oot et al, 1983). The numerous interventions can be organized according to procedural or targeted elements into three classes of approaches: 1) Relaxation Treatment - targeting somatic and cognitive hyperarousal, 2) Cognitive Treatment - aimed at cognitive distortions and 3) Behavioral Treatment - addressing learned maladaptive sleep habits (or maladaptive conditioned responses to bedtime cues). This grouping is used for clarity of description and should not be viewed as rigid since most interventions share procedural and targeted elements.

The most extensively evaluated treatments have been the somatically focused relaxation procedure of Progressive Relaxation Training, and the behavioral intervention of Stimulus Control Instruction. Cognitively focused interventions have received the least research attention. Treatment outcome studies have also generally targeted sleep onset insomnia, thus neglecting sleep maintenance problems and older poor sleepers. Although, as prevalence studies indicate, insomnia is common in the aging population, effective psychological treatments for insomnia in this segment of the population have been slow to develop. The few outcome studies which do exist have focused their attention on behavioral treatments or on multicomponent treatments which preclude evaluation of unique treatment effectiveness.

A brief review of treatments will be presented, with a focus on procedural descriptions, targets of treatment, effectiveness evaluations, and postulated effective components.

Relaxation Training

Relaxation training, in its various forms, has been extensively researched and is the most frequently recommended behavioral treatment for insomnia. It includes a variety of training procedures which are somatically (e.g., biofeedback, progressive relaxation, passive

relaxation, autogenic training) and cognitively focused (e.g., meditation, imagery, thought stopping).

Somatically - Focused Relaxation Interventions

Biofeedback

The postulated mechanism for biofeedback treatment is (a) the induction of a global relaxation effect which prepares the individual for sleep, and (b) alteration of the brain sensorimotor rhythm to more closely mimic brain processes during sleep. Biofeedback assisted relaxation in the management of insomnia has relied heavily on feedback of frontalis EMG activity. It has been shown to be effective relative to waitlist or placebo controls in shortening sleep onset latency and in decreasing muscular tension (Coursey, Frankel, Gaarder, & Mott, 1980; Freedman & Papsdorf, 1976; Haynes, Sides, & Lockwood, 1977; Nicassio, Boylan, & McCabe, 1982). However, in general, EMG biofeedback does not appear to be more effective than progressive relaxation (cf. Borkovec, 1982; Lichstein & Fischer, 1985). There is a scarcity of data available regarding biofeedback assisted methods with older adults.

Empirical evidence indicating that sleep improvement with biofeedback is similar to that achieved with relaxation training (Freedman & Papsdorf, 1976; Nicassio et al., 1982) suggests that the much less costly relaxation intervention might be the more reasonable alternative.

Progressive Relaxation

This technique, developed by Edmund Jacobson (1938), has been the most frequently recommended nonpharmacological treatment for insomnia (Bootzin & Nicassio, 1978). It involves the tensing and relaxing of approximately 15 muscle groups in the body. The rationale for relaxation training is that physical relaxation at bedtime facilitates falling asleep. This premise is based primarily on earlier data indicating higher physiological arousal levels in poor sleepers than in

good sleepers (Monroe, 1967). The therapeutic benefits of relaxation training have been extensively documented (see Borkovec, 1982 and Lacks & Morin, 1992 for excellent reviews). The data have consistently showed that progressive relaxation is superior to placebo and/or no treatment control conditions in reducing sleep onset latency (Borkovec & Hennings, 1978; Borkovec, Kaloupek, & Slama, 1975; Borkovec & Weerts, 1976; Espie, Lindsay, Brooks, Hood, & Turvey, 1989; Friedman, Bliwise, Yesavage, & Salom, 1991; Haynes et al., 1974; Lacks et al., 1983; Lichstein & Fischer, 1985; Lick & Heffler, 1977; Nicassio et al., 1982; Nicassio & Bootzin, 1974; Steinmark & Borkovec, 1974; Turner & Ascher, 1979b). Improvement in other sleep parameters such as nighttime awakenings (Woolfolk & McNulty, 1983), total sleep time (Carr-Kaffashan & Woolfolk, 1979; Friedman et al., 1991; Lick & Heffler, 1977) and morning restedness (e.g., Steinmark & Borkovec, 1974) have also been reported.

Meta-analyses of insomnia treatment efficacy studies have also concluded that Progressive Relaxation is superior to no-treatment control and placebo on self-report measures of sleep onset latency (SOL), duration of awakening after sleep onset (WASO), total sleep time (TST), and Sleep Quality (Morin, Culbert & Schwartz, 1994; Murtagh & Greenwood, 1995). Average improvement rates for Progressive Relaxation Training at post-treatment have been reported to be between 28% and 39% for SOL, 28% for WASO, and 11% for TST (Lacks & Morin, 1992; Morin et al., 1994). Although polysomnographic evaluations have generally indicated smaller improvement rates, these objective measures confirmed the efficacy of the technique as measured by subjective reports (e.g., Borkovec & Weerts, 1976; Freedman & Papsdorf, 1976).

Evaluations in Older Adults: Most evaluations for progressive relaxation have focused on sleep onset insomnia despite evidence showing that sleep maintenance problems are more prevalent in the older

population (Bootzin et al., 1983; Morin & Gramling, 1989). Indeed, many studies systematically exclude participants over the age of 55 because of the known developmental changes in sleep patterns. The four studies which have evaluated effectiveness of Progressive Relaxation Training alone in older adults have found it to be less effective than in younger or middle-aged samples. In two studies which included older adults as well as younger and middle aged poor sleepers, treatment outcome was found to be negatively related to age (Lick & Heffler, 1977; Nicassio & Bootzin, 1974). In samples only including older insomniacs, Edinger et al., (1992) failed to find significant improvement in sleep parameters, while Friedman et al. (1991) found WASO and TST to have moderate improvement rates (17.5% and 8.8%, respectively) compared to those generally found with younger samples (about 30% and 11%, respectively).

Several investigations which have studied older individuals have evaluated Progressive Relaxation in combination with various other treatments thus making evaluation of the unique effectiveness of Progressive Relaxation difficult. These multicomponent therapies have included support, cognitively focused treatments and/or behavioral treatments, and have generally resulted in improved sleep (Davies, 1989; Engle-Friedman, , Hazelwood & Tsao, 1992; Carr-Kaffashan & Woolfolk, 1979; Lichstein, Johnson, Fawcett & McCabe, 1991; Nicassio & Bootzin, 1974).

Component Analysis of Progressive Relaxation: Attempts have been made to isolate the effective components of progressive relaxation training by asking the following question: Is insomnia reduced by 1) focusing attention on pleasant, relatively monotonous internal feelings, thus precluding intrusive cognitions or 2) systematic tension release of gross muscle systems to reduce physiological tension (Borkovec et al., 1975)? A series of studies by Borkovec (Borkovec & Hennings, 1978; Borkovec et al., 1975; Borkovec et al., 1979) suggest that the tensing-

releasing component is the critical therapeutic ingredient but other researchers have found that muscle tension-release was not related to treatment outcome (e.g., Haynes, Mosely, & McGowan, 1975; Woolfolk & McNulty, 1983). Woolfolk and McNulty (1983), for example, compared the relative contributions of tension-release and focus of attention (imagery) to improvement in SOL. Their design included the following five groups: progressive relaxation, progressive relaxation without tension-release, imagery with tension release, imagery without tension release and a measurement only control group. Data showed that all treatments were superior than no treatment in improving SOL and daytime fatigue. However, unlike Borkovec's results, the presence of muscle-release was unrelated to outcome. In fact, especially over the long-term, visual focusing (a cognitive strategy) seemed to be superior to somatic focusing. Moreover, as was found in other studies (e.g., Borkovec & Hennings, 1978; Borkovec et al., 1979; Mitchell & White, 1977), decreased frequency of cognitive intrusions parallelled improvement in sleep. In other studies, changes in physiological arousal during the Progressive Relaxation Training session were found to be unrelated to therapy outcome (Borkovec & Fowles, 1973; Lick & Heffler, 1977).

Thus, although both somatic tension and intrusive thoughts have been hypothesized as precipitating and maintaining factors in insomnia, the data suggest that it is change in cognitive activity rather than reduction of physical tension prior to sleep which is more likely to improve sleep, especially sleep onset latencies.

Passive Relaxation

This is a variant of progressive relaxation involving sequentially focusing attention on pleasant feelings in body musculature without the muscle-tense release component. This passive form of relaxation has produced significant long-term subjective improvement in SOL (Borkovec

& Hennings, 1978; Borkovec et al., 1979; Haynes et al., 1974; Shealy, 1979; Woolfolk & McNulty, 1983). However, it was found to be less effective than tension-release relaxation (Borkovec & Hennings, 1978; Borkovec et al., 1979) and in another study it required more time to be effective than when it was paired with the behavior treatment of Stimulus Control Instructions.

Evaluations in Older Adults: Studies evaluating the efficacy of Passive Relaxation Training alone, in older adults, do not exist in the literature. However, two recent studies of older adults (Johnson & Lichstein, 1994; Lichstein & Johnson, 1993) have evaluated a relaxation treatment that combined Passive Relaxation and Autogenic Training (another relaxation technique, described in the next section). They found improvement in sleep and waking durations, sleep efficiency, subjective evaluation of sleep quality and daytime sleepiness in nonmedicated insomniacs at post-treatment, which were maintained at two month follow-up. Hypnotically medicated insomniacs had a smaller degree of improvement but significantly reduced their use of sleep medication (Lichstein & Johnson, 1993). However, when this Passive Relaxation plus Autogenic Training was compared to supportive placebo and behavior treatment (Sleep Restriction plus Sleep Hygiene), all treatments were found to be equally effective in improving insomnia (Johnson & Lichstein, 1994).

Autogenic Training

This technique trains patients to use self-suggestions to generate feelings of heaviness and warmth in their extremities (Schultz & Luthe, 1959). Participants imagine themselves in peaceful nature scenes while also imagining relaxation facilitative sensations of the body. The proposed mechanisms of action include reduction in skeletal muscle tone and decrease of sympathetic tone. Available data evaluating the unique effects of Autogenic Training have been mixed: Nicassio and Bootzin

(1974) found that Autogenic Training was more effective in reducing SOL as compared to a placebo self-relaxation group and a no-treatment control group. Although Coursey et al. (1980) also found improvement in self-reported SOL from pre- to post-therapy when group means were analysed, they found the treatment successful in only two of six participants presenting sleep onset insomnia.

Comparative studies found that the treatment effectiveness of Autogenic Training was similar to that of Progressive Relaxation Training (Nicassio & Bootzin, 1974) and EMG Biofeedback (Coursey et al., 1980).

Evaluations in Older Adults: In outcome studies including older adults Autogenic Training has been combined with other treatments: either Passive Relaxation (Johnson & Lichstein, 1994; Lichstein & Johnson, 1993) or Sleep Hygiene Instructions (Godbout & Montplaisir, 1992). Results indicated improved sleep and reduced hypnotic medication use. Godbout and Montplaisir's (1992) participants also exhibited reduced depression and state and trait anxiety. Four of the five participants reported continued use of Autogenic procedures three months after treatment termination, suggesting that this is a procedure with which it is relatively easy to comply.

Cognitively - Focused Relaxation Procedures

With the development of cognitive behavior therapy, the application of cognitively mediated relaxation instructions of insomnia has grown. Cognitively - focused relaxation treatments aimed at promoting relaxation by refocusing attention away from intrusive thoughts to pleasant, neutral or monotonous stimuli (e.g., meditation, imagery). Although the role of cognitions in insomnia has become increasingly well recognized, relatively little research has been done in the evaluation of cognitively focused treatments. Few studies evaluate the treatments on their own. Instead, cognitive relaxation

treatments are usually part of multimodal interventions which again precludes evaluation of their unique contribution to treatment outcome.

Meditation

Among the different meditative relaxation procedures, a common variation involves simply focusing on the sensations of respiration while repeating a mantra of "in" and "out" in concert with inhalation and exhalation. Woolfolk, Carr-Kaffashan, McNulty, and Lehrer (1976) found that this technique produced significant improvement in the sleep of a sample of adult insomniacs compared with a measurement control group. SOL was decreased by 54% at post and 67% at 6-month follow-up. Schoicket, Bertelson, and Lacks (1988) also found decreases in frequency of nocturnal awakenings. There is some data to suggest that both Transcendental Meditation and mantra meditation (which involve refocussing attention on undifferentiated or repetitive stimulation) are helpful for insomnia (Alperson & Biglan, 1979). The latter study is one of the few that has separately analysed the treatment response of middle-aged and elderly participants and found that only the younger participants benefitted from treatment.

In younger adults, the combination of Meditation with Progressive Relaxation (Carr-Kaffashan & Woolfolk, 1979) or Stimulus Control (described later) (Morawetz, 1989) has indicated equivalent improvements in SOL with additional improvements in WASO (Morawetz, 1989), morning restedness and daytime fatigue (Carr-Kaffashan & Woolfolk, 1979).

Imagery Training

Imagery training may involve guidance by a therapist and/or listening to an audiotape which provides relaxing scenarios. Although Imagery content may vary, it often includes a peaceful nature scene familiar to the client's experience. Audiotapes offering several relaxation scenarios are commercially available. A variation in Imagery content which has been investigated in outcome studies (e.g., Morin &

Azrin, 1988, Woolfolk & McNulty, 1983) consists of imaging a sequence of neutral objects (e.g., a candle, a palm tree on a beach) and focusing attention on their descriptive properties.

Two studies have evaluated the unique effects of Imagery Training in mixed-age samples (Morin & Azrin, 1987, Woolfolk & McNulty, 1983), however, the effect of age on treatment effectiveness was not evaluated. For sleep onset insomnia, Imagery was found to significantly improve SOL, frequency of nocturnal arousals, tiredness and difficulty controlling intrusive cognitions (Woolfolk & McNulty, 1983). Gains were generally maintained at 6-month follow-up with additional variables showing significant change: total sleep time, difficulty falling asleep, sleep quality. Bodily tension failed to show any change over time. For sleep maintenance insomnia, Morin and Azrin (1987) found that imagery training produced significant reductions (35%) in duration of nighttime awakenings at 3- and 12-month follow-ups. They however, failed to find changes in depression and state-trait anxiety.

Imagery has also been combined with the following treatments: 1) other cognitively-focused procedures (e.g., thought stopping, cognitive restructuring; Mitchell, 1979; Mitchell & White, 1977), which resulted in reducing arousing cognitions and physical tension as well as in reducing SOL; 2) Cognitive Restructuring and Progressive Relaxation (Coates & Thoresen, 1979; Thoresen, Coates, Kirmil-Gray, & Rosekind, 1981) which produced improvement on both self-report and polysomnographic sleep parameters (i.e., frequency and duration of awakenings, and sleep efficiency); and 3) Cognitive treatments (e.g., Cognitive Restructuring, positive self-statements), Progressive Relaxation and Sleep Hygiene, administered on audiotape (Jackson & Alsten, 1994), which resulted in the successful reduction of hypnotic medication use (Alsten, Davey, & Jackson, 1995; Jackson & Alsten, 1995).

Evaluations in Older Adults: One study (Morin & Azrin, 1988) has evaluated the effectiveness of Imagery Training in a sample of older individuals. Results indicated significant reductions in hypnotic use and WASO (22% improvement rate) post-treatment which were maintained at 3 and 12 month follow-up. Significant decreases in SOL and greater decreases in WASO were also found 12 months following treatment. The authors found that, compared to Stimulus Control, Imagery was not only slower in producing improvement in SOL and WASO, it was rated as less credible and less satisfactory. Participants also reported having difficulty concentrating and sustaining images.

Overall Effectiveness of Relaxation Techniques

Current outcome research indicates that Relaxation Therapies do lead to improvement compared to no treatment, especially on SOL. However, interrupting cognitive intrusion, rather than lowering physiological arousal seems to be the mechanism for this improvement. Few studies investigated treatment outcome in samples of older adults or compared effectiveness in younger and older samples. Those which have sampled the older population have found that Progressive Relaxation and Meditation is less effective for older adults. However, the combination of Passive Relaxation and Autogenic Training seems promising as it was found to substantially improve subjective waking durations, sleep quality, daytime sleepiness, and hypnotic medication use in older adults.

Cognitive Treatments

Three different cognitive treatments have been used to treat insomnia. One addresses performance anxiety and maladaptive attempts to control sleep onset (Paradoxical Intention); another focuses on dysfunctional thoughts such as unrealistic expectations and attributions (Cognitive Restructuring) and the third targets intrusive thoughts (Cognitive Control).

Paradoxical Intention

Paradoxical instructions target performance anxiety (Ascher & Efran, 1978) - fears about not being able to fall asleep - and the individual's attempt to control the sleep process. Turner and DiTomasso (1983) describe a vicious cycle in which attempts to control sleep result in increased arousal of the sympathetic nervous system, making sleep very difficult to initiate. Sleep deprivation increases the demand for sleep, resulting in trying hard to sleep and creating more tension and more difficulty sleeping. Thus, Paradoxical Intention includes instructions to attempt to stay awake for as long as possible at bedtime, ostensibly to become more aware of the thoughts and feelings blocking sleep.

This technique has been studied less than Progressive Relaxation or the behavior treatment of Stimulus Control. Outcome investigations employing this technique have included samples with wide age ranges which have included older adults (e.g., Turner & Ascher, 1979b; 1982); however, none correlated age with treatment outcome. Results of its efficacy are inconsistent across studies (see reviews by Borkovec, 1982; Lichstein & Fisher, 1985). For example, Turner and Ascher (1982) found no improvement in sleep while other studies have found significant improvement in SOL and WASO (e.g., Espie et al, 1989; Turner & Ascher, 1979a). No efforts have yet been made to identify effective mechanisms.

Cognitive Restructuring

Cognitive restructuring involves altering dysfunctional beliefs and attitudes about sleep (Morin et al., 1994). The rationale is that dysfunctional cognitions exacerbate the vicious cycle of emotional arousal, fear of sleeplessness, and more insomnia. Cognitive Restructuring procedures do not deny sleep difficulty or its daytime sequelae, but insomnia sufferers are guided in examining the validity of their beliefs about sleep and reframing them with alternative, more

rational beliefs. For instance, poor sleepers are provided information about normal age related changes in sleep patterns and the individual variability in sleep needs, challenging the often held notion that 8 hours of sleep is a necessity.

Outcome studies have not evaluated the unique effectiveness of Cognitive Restructuring on insomnia, however, this treatment has been included in several multicomponent treatment packages using mixed age (e.g., Chambers & Alexander, 1992) as well as older samples (Edinger et al., 1992; Morin, Kowątch, Berry, & Walton, 1993). Cognitive restructuring has been combined with the following: 1) Behavioral techniques of Stimulus Control, Sleep Restriction and Sleep Hygiene, (Chambers & Alexander, 1992; Edinger et al., 1992; Morin et al., 1994; Morin, et al., 1995), 2) Stimulus Control, Sleep Hygiene and Progressive Relaxation (Davies, 1989); and 3) Paradoxical Intention, Biofeedback, and the Cognitive Control techniques of thought stopping and positive images (Sanavio, 1988; Sanavio et al., 1990). These studies have similar results; significant improvements in SOL, WASO, sleep quality and daytime functioning. These subjective findings have been confirmed with polysomnography (Chambers & Alexander, 1992).

Cognitive Control Techniques

A variety of techniques focus on reducing the impact of unwanted bedtime cognitions by diminishing their occurrence (e.g., thought stopping, forward planning, and articulatory suppression). These approaches directly address the cognitive intrusions experienced with insomnia and therefore look promising for treatment (Levey, Aldaz, Watts, & Coyle, 1991), however, little research has been conducted in this domain.

The **Forward Planning** procedure (also referred to as Worry Control or Time Out for Worry) targets ruminative worry while trying to fall asleep by scheduling problem solving before bedtime and using coping

statements during nocturnal awakenings (Espie & Lindsay, 1987). Instructions include scheduling 30 minutes per day to problem solve any worries that may occur while trying to fall asleep. This scheduled problem solving is temporally and situationally removed from bed-time and bedroom environment and involves writing down current problems and the next step of action which is intended to resolve them. During the night, the insomniac is instructed to remind himself that "matters are in hand". Espie and Lindsay (1987) report efficiency in reducing WASO (by 68%) using this procedure in a single case study of a middle aged man.

Other studies incorporating this procedure into a treatment package including thought stopping, training in rational thinking, and management of fears through self-desensitization have found reductions in both pre-sleep tension and intrusive cognitions, shortened sleep latency, increased sleep duration and enhanced sleep quality.

Articulatory Suppression (Levey et al., 1991) is another procedure that teaches the skill of controlling intrusive cognitions. It involves the repetition of a set of neutral syllables or phonemes at an appropriate rate in competition with ongoing thoughts. The insomnia sufferer may vary the rate, pitch, and syllable in order to interfere with concurrent thought while not producing arousal levels that are incompatible with sleep. Levey et al. (1991) derived this technique from models of attention and working memory. They maintain that thoughts, which are embodied in inner speech, compel attention at the expense of sleep. A single case study of a middle-aged insomnia sufferer showed reductions in the frequency of nocturnal arousal (Levey et al., 1991).

General Effectiveness of Cognitive Procedures

The cognitive therapy most extensively evaluated is Paradoxical Intention and results regarding its effectiveness have been mixed.

Although older adults have been included in outcome study samples, the effect of age on treatment effectiveness has not been examined. Cognitive procedures have been included in several successful multicomponent treatment programs, however, these do not allow attribution of therapeutic benefits to the cognitive component alone. Few procedures that directly intervene in the cognitive arousal process by interrupting and reducing cognitive intrusions have been developed and investigated. Further research is needed to clarify the relative role of cognitive and attentional factors.

Behavioral Treatments

The third type of treatment for insomnia is behavioral treatment addressing learned maladaptive sleep habits (or maladaptive conditioned responses to bedtime cues). These treatments include Sleep Restriction Therapy, Sleep Hygiene, Stimulus Control Instructions and Countercontrol Instructions.

Sleep Restriction Therapy

This technique is based on the belief that excessive time spent in bed is an important factor in the development, and particularly, in the perpetuation of insomnia. By limiting time spent in bed, more efficient sleep ensues. Sleep is consolidated and sleep patterns become more regular and predictable. Total time in bed is allowed to increase as the patient demonstrates a continuing ability to sleep in an efficient and consolidated fashion.

Since many patients with chronic insomnia underestimate their actual time asleep and have poor sleep efficiency, Spielman, Saskin, and Thorpy (1987) limited time in bed to the patient's own estimate of total sleep time. This simple manoeuvre usually produces mild sleep deprivation, hastens the onset of sleep, and increases the efficiency of sleep. As the continuity of sleep improves, the patient is gradually allowed to increase the time in bed.

A variant of the Sleep Restriction procedure is Sleep Compression (Riedel, Lichstein, & Dwyer, 1995) which allows patients to gradually reduce time in bed to more closely match total sleep time.

Given the greater incidence of sleep maintenance insomnia in older adults, it is not surprising that Sleep Restriction and Sleep Compression has been more frequently applied and evaluated in this population.

Two studies using older adult samples (Anderson, Zendell, Rosa, Rubinstein, Herrera, Simons, Caruso, & Spielman, 1988; Friedman et al., 1991), and one using middle-aged insomniacs (Spielman et al., 1987), have applied sleep restriction methods alone and have found significant improvements on WASO and Sleep Efficiency. The improvement rates were substantial, with reductions in WASO of 200%, 54% and 69% at post-treatment and in Sleep Efficiency of 19%, 24% and 30% (from each study, respectively). SOL and especially TST were found to improve less. In a study which administered sleep restriction therapy to participants who had already had sleep hygiene instruction (Schmidt-Nowara, Beck, & Jessop, 1991), sleep restriction was found to further improve SOL and WASO but not TST.

Similar findings were reported in studies combining Sleep Restriction with other behavioral, cognitive and/or relaxation treatments in mixed age samples (Chambers & Alexander, 1992; Jacobs, Benson, & Friedman, 1993; Morin, Stone, McDonald, & Jones, 1994) as well as older samples (Edinger et al., 1992; Edinger, Lipper & Wheller, 1989; Hoelsher & Edinger, 1988; Johnson & Lichstein, 1994; Morin et al., 1993a; Riedel et al., 1995).

The evidence suggests that Sleep Restriction effectively addresses sleep maintenance in younger individuals as well as in older insomniacs. However, the data suggest that clinical efficiency of this approach may

be more related to reduction of waking durations than to increase in total sleep time.

In spite of its effectiveness, this treatment involves behavioral prescriptions which may affect compliance. Participants experience the instructions of getting out of bed and beginning the day's activities as soon as awake in the morning as aversive (Friedman et al., 1991). In addition, daytime sleepiness is also a major aversive side effect due to initial sleep deprivation which is likely to result in noncompliance.

Sleep Hygiene

Sleep habits and behaviors believed to be conducive to good sleep have been collectively referred to as sleep hygiene practices (Hauri, 1977). Treatment involves informing individuals about sleep scheduling, choice of activities prior to sleep, and preparation of the sleep setting (e.g., eliminating caffeine and alcohol prior to sleep, avoiding rigorous exercise within two hours of bedtime). Although such information is usually given in conjunction with other treatments, it has been shown to improve sleep maintenance insomnia (e.g., frequency and durations of nocturnal arousals) on its own as well (e.g., Schmidt-Nowara et al., 1991; Schoichet et al., 1988).

Although there are no studies which evaluate the specific effects of teaching sleep hygiene practices to older adults, it would appear intuitively reasonable for such practices to be included in any sleep improvement program. In fact, Sleep Hygiene Education is often part of multicomponent treatments developed for older insomniacs (e.g., Edinger et al., 1992; Morin et al., 1993a, Riedel et al., 1995). The role of sleep hygiene in the etiology of insomnia in older adults is called into question by the results of a study which compared older adults with and without insomnia (Morin & Gramling, 1989). Here it was found that sleep hygiene, exercise, napping and sleep medication usage were surprisingly similar in good and poor sleepers aged 60 and over. However, the

absence of good sleep habits may still contribute to maintenance of an existing sleep problem.

Stimulus Control Instructions

Stimulus control treatment for insomnia is the most extensively evaluated behavior therapy for insomnia. It was developed to strengthen cues for falling asleep and separate them from the cues for other activities (Bootzin, 1977). It is based on the assumption that the bed and/or bedroom has been conditioned to the sleep incompatible behaviors which insomniacs engage in (e.g. watching T.V., worrying, reading). Thus, the goal of the treatment is to weaken this conditioning by strengthening the bed/bedroom as a place for sleep and weaken the bed/bedroom as a cue for activities which may interfere with sleep. Stimulus control instructions involve asking insomniacs to get out of bed and go to another room when unable to fall asleep or return to sleep within 10-20 minutes. They are instructed to return to bed only when they feel sleepy. Stimulus control treatment is also aimed at regulating the sleep-wake schedule. This is done by instructing insomniacs to go to sleep and arise at the same time every morning, avoiding daytime napping.

The stimulus control technique has been shown to be highly effective in controlled evaluations. The focus of most evaluations has been on sleep onset insomnia with results indicating substantial decrease in SOL (Ascher & Turner, 1979; Espie et al, 1989; Lacks et al., 1983; Ladoucer & Gros-Louis, 1986; Turner & Ascher, 1979a, 1982; Puder, Lacks, Bertelson, & Storandt, 1983; Shealy, 1979, Zwart & Lisman, 1979). However, improvement in TST (Espie, et al, 1989), FNA & WASO (Lacks, Bertelson, Sugerman, & Kunkel, 1983; Schoicket, et al., 1988) have also been reported using this technique. Furthermore, when stimulus control was added to a sleep medication withdrawal program, sleep onset insomniacs avoided the significant increase in SOL that was experienced

by participants withdrawing from medication without the addition of stimulus control (Riedel, Lichstein, Peterson, Means, & Aguillard, 1994). Sleep maintenance problems have been treated effectively with stimulus control as well (e.g., Anderson et al., 1988; Morin & Azrin, 1988) with significant decrease in frequency and duration of nocturnal arousals.

The improvement rates produced by Stimulus Control Instructions are substantial: generally 60% for SOL, and 50% for WASO (e.g., Morin & Azrin, 1987; Puder et al., 1983). A number of studies have included Stimulus Control Instructions in multicomponent treatment packages for insomnia (including cognitive restructuring and relaxation procedures) (Chambers & Alexander, 1992; Davies, 1989; Jacobs et al., 1993; McClusky, Milby, Switzer, Williams, & Wooten, 1991; Morawetz, 1989; Morin, Colecchi, Stone, Sood, & Brink, 1994; Morin et al., 1994; Sanavio et al., 1990). The results from these studies have been similar to studies evaluating Stimulus Control alone.

In studies where stimulus control has been directly compared with progressive relaxation and paradoxical intention, it was found to be equally effective (Ascher & Turner, 1979; Espie et al., 1989; Ladouceur & Gros-Louis, 1986) or more effective (Lacks et al., 1983; Turner & Ascher, 1979a). When compared to sleep restriction, both techniques were found to be equally effective in improving subjective and polysomnographic measures of SOL, WASO, TST and SE. Several reviews of insomnia treatment efficacy studies (e.g., Borkovec, 1982; Lacks & Morin, 1992), including a study using meta-analysis (Morin et al., 1994), have found Stimulus Control Instructions to be superior to other cognitive-behavioral approaches. However, when moderating influences were controlled for, results of a meta-analysis (Murtagh & Greenwood, 1995) indicated that all treatments were superior to placebo and no

treatment control, but they did not differ significantly among each other in efficacy.

Evaluations in Older Adults: Although most studies have examined younger samples, Stimulus Control Instructions have been found to be effective in improving the sleep of older insomniacs on SOL (Puder et al. 1983;), WASO and TST (Anderson et al., 1988; Hoelscher & Edinger, 1988; Morin & Azrin, 1987), and hypnotic drug use. Improvement rates were found to be comparable to those found in younger samples (e.g., Lacks et al., 1983; Morin & Azrin, 1987). Most studies that have included older adults have evaluated Stimulus Control Instructions in combination with various other behavioral, cognitive and/or relaxation treatments (Edinger et al., 1989; Edinger et al., 1992; Engle-Friedman et al., 1992; Hoelsher & Edinger, 1988; Morin et al., 1993a). Results generally indicate significant and substantial improvement in WASO, averaging about 50%. Other variables that have shown improvement include SOL, sleep-efficiency, total wake time, frequency of nocturnal arousal as well as subjective evaluations of insomnia distress, sleep satisfaction and daytime functioning. Little increase in the amount of time slept per night has been reported.

Although most evaluations are based on self-report, a few studies have verified results with reports by significant others, mechanical devices or polysomnography (Anderson et al., 1988; Edinger et al, 1992; Espie et al, 1989; Morin & Azrin, 1988).

The instructions for stimulus control are fairly complex and the behavioral prescriptions are aversive, particularly for elderly people who complain about the requirement of getting out of bed after every 10-20 minute sleepless period during the night (Davies, Storandt, & Bertelson, 1986), express experiencing boredom before bedtime and reluctance to get out of bed in the morning (Hoelscher & Edinger, 1988). Such factors lead to noncompliance with the behavioral protocol and

undermine the potential clinical benefits. Moreover, it is not clear that all the components must be included for the technique to be effective.

Component Analysis of Stimulus Control Instructions: Attempts have been made to verify the conditioned response premise of the stimulus control procedure by investigating whether good and poor sleepers can be distinguished by sleep-incomparable behaviors in the bedroom. In general, it has been found that good and poor sleepers do not differ on these behaviors (Haynes et al., 1974, Fichten et al., 1995; Lundh et al., 1991; Morin & Gramling, 1989). Therefore the conditioned response premise of stimulus control procedures appears not to be supported. For example, Lundh et al., (1991) found that poor sleepers did not differ from good sleepers in overt behaviors, such as Bootzin hypothesized, but did differ in covert behaviors such as thinking and solving problems in bed. They found that reading in bed, which Bootzin characterizes as a sleep incomparable behavior, was negatively correlated with muscular tension and psychological maladjustment variables. These authors hypothesized that reading in bed, in fact, may be one way of focusing away from vicious cycles of worrying frustration and depression about sleeplessness. This hypothesis is consistent with others in the literature (e.g. Borkovec, 1982) which suggest that the disruption of intrusive thoughts is the effective component of the stimulus control technique. If this hypothesis is correct, the onerous requirement of having to leave the bedroom would be unnecessary. Removing the out-of-bed requirement might increase compliance and treatment effectiveness for the more difficult sleep maintenance problem as well as be more feasible for the less ambulatory older adult.

Countercontrol Treatment

The countercontrol intervention was designed to disrupt sleep-incompatible activities without requiring leaving the bed (Zwart &

Lisman, 1979). Individuals are instructed to engage in a nonarousing activity (e.g. dull reading) in bed whenever they are unable to sleep. The countercontrol procedure is similar to stimulus control with the following exceptions: it is not necessary to leave the bedroom when awake and it is not necessary to regulate the sleep-wake schedule (e.g., there are no napping restrictions and no requirement of a consistent time of getting up in the morning).

Zwart and Lisman (1979) found that countercontrol and stimulus control were equally effective in treating sleep onset insomniacs. Another study found that this technique reduced awake times in sleep maintenance insomnia by about 30% and that older participants profited as much from the treatment as younger participants (Davies et al., 1986). Some procedural requirements of Countercontrol Instructions, although easier to adhere to than the Stimulus Control requirements, may still be aversive, and therefore, affect treatment efficacy. Davies et al., (1986) report that although this technique eliminated the necessity of leaving the bed, an arduous requirement for most older adults, they encountered resistance on the part of participants to turning on the lights in the middle of the night and engaging in some activity.

The success of the countercontrol treatment lends further support to current beliefs that the active ingredient in the stimulus control treatment is the provision of activities that can disrupt cognitive arousal. An insomnia treatment which addresses the disruption of cognitive arousal more directly might have fewer compliance problems and greater therapeutic success (Davies et al., 1986).

Overview of Cognitive-Behavioral Treatments

The behavioral treatments for insomnia, specifically, Stimulus Control and Sleep Restriction procedures, are the most extensively evaluated of all the psychological treatments. They have consistently been found to be effective in promoting sleep among older and younger

adults alike. Significant and substantial improvement rates have been found for sleep onset latency and duration of nocturnal arousal with smaller improvements in nocturnal sleep time.

The various relaxation and cognitive treatments for insomnia have also been found effective. Studies directly comparing various treatments, treatment outcome reviews and a meta-analysis of treatment outcome studies have suggested that Stimulus Control is slightly more effective than other treatments (e.g. Borkovec, 1982; Lacks & Morin, 1992; Lichstein & Fischer, 1985; Morin et al., 1994). However, when moderator factors were controlled for in another study employing meta-analysis, psychological treatments were found to be superior to placebo and no treatment but not different from each other on efficacy (Murtagh & Greenwood; 1995).

Since insomnia is viewed as being a complex problem with various possible causes and maintaining factors, the combination of several treatment strategies seems appropriate. As discussed throughout the previous review of the different insomnia treatments, insomnia has, in fact, often been treated with a combination of treatments. Sleep Hygiene Instructions are often paired with any one of the cognitive-behavioral treatments and in more extensive treatment packages which include various behavioral (e.g., stimulus control and sleep restriction), relaxation (somatic and cognitively focused treatments), and cognitive treatments (e.g., cognitive restructuring and paradoxical intention). These have not produced effect sizes superior to either stimulus control or relaxation alone (Lacks & Morin, 1992; Lichstein & Fischer, 1985; Murtagh & Greenwood, 1995).

Few studies evaluate the efficacy of psychological treatments for insomnia experienced by older adults. Behavioral treatments (especially, Sleep Restriction and Stimulus Control) have consistently been found to produce sleep improvement in older adults as well.

However, these procedures involve instructions that may be difficult to comply with, especially for aging persons. Progressive Relaxation has yielded poor to moderate results among older adults while a combination of Autogenic training and Passive Relaxation has been more promising. An important element of more passive forms of relaxation might be ease of learning and performance for the older person.

Research suggests that, even with behavioral techniques, effectiveness may be due to the interruption and refocusing of thoughts that these techniques require. However, treatments which more directly target disruption of negative cognitive ruminations have not been studied extensively.

THE PRESENT STUDY

The present investigation was designed as an analogue study which examines the effectiveness of a cognitive-behavioral treatment for insomnia in an aging sample. Older individuals appear particularly vulnerable: They may interpret normal age-related physiological changes (e.g., nocturnal awakenings or early morning arousal) as abnormal. This may lead to greater anxiety/worry about sleep which may cause or exacerbate insomnia. The older adult is also more susceptible to illness, lifestyle changes (e.g. retirement), and losses (e.g. family, friends), which have also been found to be related to insomnia.

Thus, older persons are faced with many events that may potentially disrupt their sleep or increase their sleep complaint. This study developed and evaluated a cognitive behavioral treatment for insomnia which is easily accessible to older adults and which directly addresses the hypothesized effective component of most cognitive-behavioral treatments for insomnia: elimination of obsessive and intrusive thoughts by refocusing attention.

A NEW TECHNIQUE: Countercontrol-Plus Audiobook

This technique involves instructing poor sleepers to engage in a cognitively distracting activity (listening to an audiotaped book) whenever they are unable to sleep. They are instructed to perform their usual presleep sequence of activities and when they experience difficulty falling or returning to sleep, they are to listen to an audiotaped story while lying in bed with eyes closed, in a relaxed posture.

The proposed intervention - Countercontrol Plus Audiobook - is expected to disrupt cognitive activity which interferes with sleep. It is similar to the Countercontrol procedure with one important exception: it minimizes sleep-incompatible environmental factors. Specifically, it does not require the individual to get up, open his eyes and/or turn on the lights. Light may be arousing in itself and may disturb a sleeping partner. It has been reported that people with sleep maintenance problems themselves tend to resent turning on a light in the middle of the night (Davies et al., 1986).

The use of audiobooks is similar to cognitive procedures such as meditation, imagery, and articulatory suppression in that they all target interruption of ruminative thoughts through refocusing of attention. Though not burdensome, listening to an audiotaped story in this context is likely to demand sufficient attention to block obsessive and intrusive thoughts while being sufficiently neutral in affect to lower ambient arousal to a level where sleep can take place. An alternative audiotape content could be music. However, even if listening to music is pleasurable, the intruding and obsessive thoughts which characterizes insomniacs' cognitions when they are trying to fall asleep may easily override this stimulus. Compared to existing cognitive procedures, listening to audiobooks may be less demanding than generating articulations or images and therefore may facilitate

compliance in older adults. Morin and Azrin (1988) for instance, reported that older participants in their treatment study had difficulty concentrating and sustaining images. An additional advantage of using audiobooks is that they are familiar and easily available in bookstores and libraries and are similar to reading and watching TV, common activities prior to sleep onset. Also, the technique involves no lengthy or costly training program and no burdensome bedtime routine to learn and practice. In addition to disrupting intrusive cognitions, listening to a story is likely to result in a more pleasant experience, less distress and thus, better sleep.

The present investigator proposes that audiobooks used within the framework of a Countercontrol intervention strategy, will interfere with maladaptive cognitive arousal, thereby facilitating falling asleep. Therefore, the primary objective of this study is to conduct a preliminary comparative evaluation of the use of audiobooks within the context of a countercontrol intervention in the management of insomnia.

In assessing treatment outcome, the present investigator considered variables beyond the traditional sleep parameters of sleep latency and sleep duration in order to better represent the heterogeneity of insomnia. For purposes of the present study, the subjective sleep experience was evaluated. Consistent with current diagnostic classification systems and outcome research, the subjective sleep experience was defined as comprising three dimensions: 1) Quantity, 2) Quality and 3) Daytime Sequelae.

1) The quantitative dimension involves the subjective estimation of durations of nocturnal sleep and wake times and was assessed with measurements of commonly used Sleep - Wake Parameters: Sleep onset latency (SOL), Waking after sleep onset (WASO), Total sleep time (TST), and Sleep Efficiency.

2) The qualitative dimension involves the evaluation of more qualitative/subjective aspects of the sleep experience. These aspects are not as often investigated in sleep research as are the quantitative variables. Of interest in the present study are four qualitative variables. The first, and most commonly measured, involves daily ratings of sleep quality. The second is an insomnia frequency rating (from 'not at all' to 'very often') which is the qualitative counterpart to the quantitative measure of the estimate of sleep and wake times. The third variable is distress about the insomnia problem, rarely investigated in insomnia research despite its importance as a diagnostic criterion in two current classification systems (DSM-IV, 1990; ICD-10, 1992) and in recent insomnia research (Fichten et al., 1995). The fourth variable is sleep self-efficacy expectations, which targets poor sleepers' perceptions of control over their sleep.

3) Although daytime variables have not been found to distinguish good and poor sleepers, they have at times been found to improve as a consequence of cognitive - behavioral treatment. Since a number of scales and questionnaires exist and none are used consistently in the literature, four measures were included in the present study: two involve global ratings of daytime sleepiness and daytime fatigue due to lack of sleep, and two involve daily ratings of daytime functioning and morning restedness.

Although cognitive intrusion is frequently thought to mediate the effects of cognitive-behavior treatments, changes in cognitions are rarely investigated in outcome studies. In the present study, changes in cognitive and somatic presleep factors were measured in order to evaluate the present treatment's presumed mode of action. These measures included both daily ratings and global assessments of cognitive and somatic arousal. A general measure of presleep cognitive anxiety

was also included in order to address the negative quality of cognitions which has been consistently found to be characteristic of poor sleepers.

Insomnia outcome studies only infrequently investigate sleep-maintenance insomnia of older poor sleepers. In addition, about half the studies addressing the insomnia of older individuals fail to use comparison groups. In the present study, Countercontrol-Plus Audiobook Intervention was compared with a Measurement Only group (i.e., self-monitoring) and a Passive Relaxation treatment group. This latter group was included since relaxation training is a credible intervention which has shown some efficacy in treating older adults (Lichstein & Johnson, 1993; Nicassio & Bootzin, 1974). Since the Relaxation Intervention is more somatically focused, it also provided a contrast to the Audiobook Intervention, which is more cognitively focused. In addition, the Relaxation technique can be administered via audiotape.

In recent years, the importance of investigating clinically significant change in outcome studies has received much attention (Jacobson & Truax, 1991; Michelson, Mavissakalian & Marchione, 1985; Morin et al., 1995). Nevertheless, few studies have evaluated insomnia treatment outcome in this way. To address this concern, in this study, statistical comparisons of group means as well as evaluations of clinical significance were made.

In addition, the comparative evaluation of the intervention groups included examining factors related to treatment implementation and acceptability: credibility, satisfaction and compliance. Finally, stability of results is essential for clinical appreciation of the validity of psychological treatments; therefore, included in the experimental design is an 18 month follow-up.

In summary, the central goals include: (a) determining the comparative effectiveness of the treatment on several dimensions of the sleep experience, (b) evaluating the present treatment's presumed mode

of action (i.e., refocusing attention away from maladaptive and interfering thoughts) by examining the intervention's effect on cognitive and somatic factors related to sleep, (c) evaluating treatment credibility, satisfaction and compliance rates, and (d) evaluating continued change with an 18 month follow-up.

METHOD

PARTICIPANTS

Forty-one older, community dwelling individuals with an insomnia complaint participated in this investigation. They were volunteers who had initially taken part in an investigation of sleep patterns and characteristics in older adults (Fichten, et al., 1995). Both good and poor sleepers were recruited from the greater Montreal area through presentations to seniors' groups, media publicity consisting of press releases, and notices in community clinics and residences for seniors.

403 people responded to the press releases, notices and presentations. They were invited to participate in a study examining sleep characteristics in good and poor sleepers and the efficacy of a non-medical treatment for insomnia. Those interested in participating were screened first by telephone using the Telephone Screening Interview and subsequently in person using the Structured Sleep History Interview (see Procedure and Appendix E).

The subject selection criteria were as follows:

(a) age 55 and over,

(b) ability to read and write English well enough to complete the questionnaire measures,

(c) prescription sleep medication, if used, was currently taken no more than 3 nights per week (this criterion is consistent with sample selection in published studies on psychological interventions for insomnia and allows for the selection of a reasonably "typical" sample of elderly insomniacs (cf. Lichstein & Fischer, 1985),

(d) psychological status: currently not receiving psychiatric or psychological care, no evidence of psychopathology or depression,

(e) physical status: absence of major illness or drug use directly associated with sleep disturbance (cf. Lacks, 1987; Nicassio & Buchanan, 1981),

(f) no evidence of physiologically based sleep disturbance such as sleep apnea, restless leg syndrome, nocturnal myoclonus (cf. APS, 1994; ASDA, 1990), and

(g) no evidence of parasomnias or sleep phase disorder (e.g., phase delay, phase advance, or deregulation of circadian cycles).

On the basis of this initial screening 95 people were excluded because they failed to meet at least one of the selection criteria. Table 1 presents the number of people excluded with respect to each criterion. An additional 91 declined to participate in the investigation after they were provided with more details concerning the purpose and requirements of the project. The majority of these individuals did not specify their reason for declining; of those who did, most invoked time constraints. An additional 22 individuals could not be reached at the beginning of the study, and six people were excluded during testing because they were unable to complete the questionnaires.

Of the 403 individuals who responded to the subject recruitment procedure, 189 good and poor sleepers participated in the initial investigation of sleep and aging. They were administered a series of questionnaires (which included the Baseline Evaluation battery of the present study, as well as other questionnaires of the sleep and aging study), given a brief description of the present treatment study and invited to participate. Fifty-two individuals agreed to participate and receive an experimental, short-term, non-pharmacological intervention for insomnia.

Participants were randomly assigned to one of three intervention conditions: Self-Monitoring Only (SM), Countercontrol-Plus Relaxation

Table 1

Number of Potential Participants Excluded

With Respect to Each Selection Criterion (N=95)

Criterion	Number of Participants
Age	6
Language	1
Sleep medication > 3 times per week	30
Psychological difficulty (depression and personal problems)	17
Health problems	23
Physically based sleep disturbance (apnea, myoclonus)	11
Parasomnia or sleep phase disorder	6
Narcolepsy	1

and Self-Monitoring (Relaxation), Countercontrol-Plus Audiobook and Self-Monitoring (Audiobook). Of the 52 participants who entered the treatment study, 41 completed the program (i.e., completed all required Baseline evaluations and Post-Intervention assessments). The attrition rates in each group of the 11 drop-outs were as follows: SM = 2(13%), Relaxation = 3(19%), Audiobook = 6(30%). Chi-square tests failed to reveal a significant difference in the proportion of drop-outs in the three experimental conditions, $\chi^2_{(2)} = 1.61$, $p=.45$. The main reasons participants failed to complete the treatment program were: (a) disliked the treatment ($n=1$), (b) out of town ($n=3$), (c) illness or surgery ($n=3$), (d) reporting currently taking sleep medication more than 3 times a week ($n=1$), and (e) unspecified reasons ($n=3$). The final numbers in the three intervention conditions were: SM = 13, Relaxation = 14, Audiobook = 14. T-tests failed to indicate any significant differences between completers and drop-outs (see Appendix H1) on any of the Baseline measures with one exception: insomnia frequency, $t(1,50) = 2.93$, $p<.01$, with completers reporting greater insomnia frequency (Mean = 8.29 on a ten point rating scale with: 1 = not at all and 10 = very often) than drop-outs (Mean = 6.45).

The demographic characteristics for the final sample of 41 participants are detailed in Table 2. The sample consisted of 28 women and 13 men whose age averaged 67.49 years (range = 55-85). They were predominantly married (68%) and living with a spouse or other companion (72.5%). Although socioeconomic background varied extensively, most participants were Jewish (61%; probably due to the Jewish General Hospital being the location where the research was conducted and the proximity of Jewish community services), well educated (98% had at least a high school education), not currently employed (76%), had an income greater than $30,000 (61%), and were reasonably satisfied with their

Table 2

Demographic Characteristics

Variables	
Age (years)	
Mean	67.49
SD	6.71
Range	55-85
Gender	
Male	13
Female	28
Marital Status	
Married/Common Law	28
Currently Single[a]	13
Living Arrangements	
Alone	11
With Spouse/Partner	25
Other	4
Education	
Elementary	1
HS/CEGEP/Trade	25
University	15
Employment	
Full time/Part time	10
Unemployed/Retired	31
Income	
$10,000 - $30,000	13
> $30,000	20
Declined to indicate	8
Income Adequacy[b]	
Mean	5.30
SD	1.73
Religion	
Jewish	25
Catholic	7
Protestant	6
Other	1
None	2

[a]Includes: never married, divorced, widowed, separated

[b]This variable has a 9-point scale with the following labels: 1=inadequate, 5=adequate, 9=more than adequate.

income (75% indicated that their income was "adequate" or "more than adequate" in meeting their needs).

Participants' responses to the Baseline Sleep Questionnaire (administered prior to participants' assignment to the three experimental conditions) provided data on the sample's sleep characteristics (see Table 3). Reported duration of the insomnia problem averaged of 15.24 years (range = 1-50). Two participants met conventional research criteria for sleep onset insomnia only (i.e., sleep latency greater than 30 minutes, at least 3 times per week, problem duration at greater than 6 months), 16 met the criteria for sleep maintenance insomnia only (i.e., duration of awakenings after sleep onset greater than 30 minutes, at least 3 times per week, problem duration greater than 6 months), 17 met the criteria for both sleep onset and sleep maintenance insomnia, and 6 participants met none of the above criteria. Twelve participants (29.27%) used prescribed or over-the-counter sleep medication an average of 1.71 times a week (range = 1-3) and had been using this medication for an average of 5.17 years (range = 2.5 months to 15 years).

MEASURES

Participants completed 12 paper and pencil self-report instruments. Copies of these instruments appear in Appendix A. Areas of investigation and their associated measures include the following:

I. Demographic and Socioeconomic Factors

Background Information Form. This is a modified version of a short questionnaire used in previous studies on aging (Libman, Creti, & Fichten, 1987; Libman, Fichten, Creti, Weinstein, Amsel, & Brender, 1989a, 1989b). It has 9 items and provides socioeconomic, personal and demographic descriptors such as age, sex, highest education level, marital status, income, and adequacy of income.

Table 3

Sleep Characteristics

Variables		Total
Duration of Insomnia (years)		
Mean		15.24
SD		13.09
Range		1-50
Type of Insomnia Problem		
Onset Only		2
Maintenance Only		16[1]
Onset & Maintenance		17[2]
No Diagnosable Problem		6
Sleep Medication Use		
Number of Participants		12
Nights/week[3]:	Mean	1.71
	SD	.75
Years of Use[3]:	Mean	5.17
	SD	5.10

[1]Includes a participant who was diagnosed with sleep maintenance insomnia but could not be evaluated for sleep onset insomnia due to missing data.

[2]Includes a participant who could not be diagnosed for either sleep onset or sleep maintenance insomnia but who experienced insomnia episodes for at least 30 minutes, at least three times a week.

[3]Data only includes participants who used medication.

II. Sleep Measures

Daily Sleep Diary. This is a modified version of Lacks' measure (Lacks, 1987; 1988) which allows participants to monitor their sleep experience on a daily basis. It includes 15 items which assess sleep onset latency, frequency and duration of nocturnal awakenings, total sleep time, quality of the sleep/wake experience, napping, and the use of sleep medication. The Daily Sleep Diary, when completed during the treatment phase, also assesses compliance with the treatment program.

Dependent variables derived from this measure include: (1) Sleep Onset Latency (SOL), (2) Waking After Sleep Onset (WASO): duration of nocturnal arousals, (3) Total Sleep Time (TST): respondents' perception of how long they slept during the night, (4) Sleep Efficiency (SE): hours slept divided by hours in bed multiplied by 100, (5) Sleep Quality: subjective evaluation of the quality of sleep rated on a five point scale (1 = very poor to 5 = very good), (6) Daytime Functioning: subjective rating on a five point scale (1 = very poorly to 5 = very well) of how well one functions during the day, (7) Morning Restedness: subjective rating on a five point scale (1 = very poorly rested to 5 = very well rested) of how rested one feels in the morning.

Although sleep diaries may not provide the precision of scores based on polysomnography, subjective estimates of sleep parameters do provide a reliable and valid index of insomnia (Coates, Killen, George, Marchini, Silverman, & Thoresen, 1982). It has been found that although the two measures yield different values, they are highly correlated. Furthermore, daily sleep monitoring is the most practical and economical method of prospectively tracking sleep over longer periods of time in the individual's natural environment (Lacks & Morin, 1992).

Test-retest reliability for Lacks' instrument is high for estimates of sleep onset latencies (SOL) and number of minutes spent awake after sleep onset (WASO)(Bootzin & Engle-Friedman, 1981).

Significant differences found on SOL between insomniacs (means range from 37 to 82 minutes) and good sleepers (means range from 9 to 14 minutes) reflects the measure's validity (Lacks, 1988).

Sleep Questionnaire. This brief questionnaire inquires about typical sleep experiences and is scored on an item by item basis. It was designed for the larger sleep and aging study and the present investigation. The data show that scores based on this measure have acceptable psychometric properties for research use; test-retest correlations indicate reasonable temporal stability (r values range from .58 to .92 for test-retest intervals ranging between 2 weeks and 15 months) and the pattern of correlations among variables shows logical, highly significant relationships (Fichten, et al., 1995). For instance, the greater the duration of time slept, the lower the frequency of insomnia related distress (r=-.50).

Of interest in the present investigation are the following descriptive variables derived from the Sleep Questionnaire: (1) Duration of the insomnia problem, (2) Diagnosis of the presence or absence of a disorder of initiating or maintaining sleep[1], (3) Type and Frequency of sleep medication use, (4) Sleep Onset Latency (SOL), (5) Waking After Sleep Onset (WASO): duration of nocturnal arousals, (6) Total Sleep Time (TST), (7) Sleep Efficiency: total sleep time divided by the usual hours in bed, multiplied by 100, (8) Frequency of Insomnia: based on a 10-point scale ranging from 1 = very rarely to 10 = very often, (9) Distress Frequency: distress associated with an insomnia problem rated on a 10-point scale ranging from 1 = not at all to 10 = very often, and

[1]Diagnosis was made according to conventional research criteria: a diagnosis was made if the duration of the sleep problem was at least six months and if sleep latency (at sleep onset or after waking during the night) was at least 30 minutes with a frequency of at least 3 times per week. An attempt was made to evaluate terminal insomnia (i.e., waking up too early) by asking participants to record the frequency and duration of early morning awakenings. However, participants had difficulty differentiating awakenings in the middle of the night from early morning awakenings. Therefore, responses to questions relating to sleep maintenance and terminal insomnia were combined and only a diagnosis for sleep maintenance insomnia was made (based on the reports of duration of awakenings after sleep onset).

10) Daytime Fatigue: frequency (days per week) of feeling tired during the day attributed to lack of sleep.

Self-Efficacy Scale (Sleep) (Cook & Lacks, 1984; Lacks, 1988). This 9-item scale evaluates individuals' beliefs about their ability to influence their own sleep-related motivation and behavior. Higher scores indicate stronger sleep self-efficacy expectations. Stronger sleep self-efficacy expectations after behavioral treatment for insomnia (Cook & Lacks, 1984; Lacks, 1988) constitute evidence for the scale's validity.

Stanford Sleepiness Scale (Hoddes, Zarcone, Smythe, Phillips, & Dement, 1973). This frequently used measure of daytime sleepiness/ alertness consists of a seven-point Guttman-scaled item where responses range from 1 (feeling active and vital; alert; wide awake) to 7 (lost struggle to remain awake). Respondents select the one option which best describes how sleepy they feel at the time of testing. In the present investigation, participants were asked how sleepy they feel on most days. The scale's authors report that alternate forms reliability yielded an agreement of 88%. Concurrent validity data show that the measure is reasonably highly correlated with vigilance (r = .68) and memory (r =.47) scores. Also, scores were shown to be sensitive to sleep loss effects.

III. Psychological Adjustment: State Measures

Pre-Sleep Arousal Scale. Sixteen items using a 5-point rating scale assess pre-sleep states. Two scores are derived: Somatic and Cognitive arousal (e.g., "a tight tense feeling in your muscles", "thoughts keep running through your head", respectively). Nicassio et al., (1985) showed good psychometric properties for this scale. Subscales were shown to be internally consistent and stable over time. Reported Cronbach's alphas for subscales ranged from .67 to .88 and

test-retest correlations (with a 3 week interval) ranged from .72 (Cognitive subscale) to .76 (Somatic subscale). Insomniacs' mean scores were significantly higher than normal sleepers' scores for both subscales. Higher scores indicate greater arousal.

Anxious Self-Statement Questionnaire (ASSQ; Kendall & Hollon, 1989). This 32 item self-report measure evaluates cognitions in the form of anxious self-talk. Reliability for the measure is acceptable (split half reliability was .92, item-total correlations ranged from .45 to .79) and the scale's authors demonstrated that it is sensitive to a stressful event. In the present investigation, respondents were asked to base their responses on periods of unwanted nocturnal wakefulness. Using this modification, poor sleepers were found to have significantly higher scores on this measure than good sleepers (Fichten et al., 1995). Higher scores indicate more anxious self-talk.

IV. Psychological Adjustment: Trait Measures

Brief Symptom Inventory (BSI) (Derogatis, Rickels, & Rock, 1976). This brief self-report psychological symptom inventory has 53 items which form subscales for 9 symptom dimensions (e.g., depression, anxiety) and 3 global indices. It is a brief version of the SCL-90 (Derogatis, 1977) - a frequently used instrument with acceptable reliability and validity. Validation data indicate correlations from .92 to .98 between the symptom dimensions and global indices of the BSI and the SCL-90 (Derogatis, 1977). Normative data for an elderly sample are provided by Hale, Cochran, and Hedgepeth (1984). Of interest to the present investigation is the symptom dimension score for depression. Lower scores indicate better adjustment.

Eysenck Personality Inventory (EPI) (Eysenck & Eysenck, 1968). This reliable and valid questionnaire is among the most frequently used measures of personality (Digman, 1990). It evaluates the dimensions of

Neuroticism, Extraversion-Introversion, and the tendency to respond in a socially desirable direction. Only the Neuroticism subscale is of interest in the present investigation. Higher scores indicate greater neuroticism.

Penn State Worry Questionnaire (Meyer, Miller, Metzger & Borkovec, 1990). This 16 item self-report measure was designed to measure frequency and intensity of worrying in general. Respondents indicate, using a 5-point scale, how typical of themselves each statement is. Internal consistency evaluations obtained in the eight validation studies conducted by the authors ranged from coefficient alpha scores of .91 to .95. Test-retest reliability coefficients (after 8-10 weeks) ranged from .74 to .92. Data showing concurrent and criterion group validity were acceptable. Higher scores indicate a more worrying personality style.

V. Intervention Related Measures

Client Satisfaction Questionnaire (Larsen, Attkinson, Hargreaves, & Nguyen, 1979). This 8-item measure assesses participants' evaluation of their satisfaction with various aspects of a treatment. Internal consistency is high (coefficient alpha = .93) and it correlates well with therapists' estimates of client satisfaction (r=.56). Higher scores indicate greater satisfaction.

Intervention Evaluation Form. This is a modified version of Borkovec & Nau's (1972) 5-item credibility/expectancy-for-improvement scale which was developed to assess different therapy rationales. The scale was adapted for use with insomnia treatment: this resulted in four 10-point items which are summed and prorated out of five to render them comparable with Borkovec and Nau's (1972) measure. Higher scores indicate greater credibility.

VI. Interviews

Telephone Screening Interview. The first individual contact with potential participants consisted of a standardized interview which included introducing the investigator and the research project (see Appendix E). Selection/exclusion criteria were evaluated by asking potential participants their age and language, the presence of serious medical or personal problems, whether these affected their sleep, current medical or psychological consultations, and medication use.

Structured Sleep History Interview. A modified version of the clinical instrument developed by Lacks (1987) was used. Most questions require a Yes/No answer, with prompts in case of difficulty. The measure provides information on exclusion criteria such as sleep apnea, parasomnias, physical disorders, sleep phase disorder, medication use, hypnotics and sedatives use, and physical and psychological disorders (see Appendix E). Operational definitions for specific variables are noted in the measure.

Long-Term Follow-Up Interview. One to two years after terminating treatment, participants were telephoned and interviewed using a modified version of the Sleep Questionnaire (Appendix E). At this time the researcher also answered any questions participants had and made appropriate referrals when necessary.

PROCEDURE

This study consisted of four phases: Baseline, Intervention, Follow-Up, and Long-Term Follow-Up. Table 4 outlines a schedule of the study's activities.

I. Baseline Phase

a) **Recruitment and Screening of Participants:** Participants were recruited in two phases. For the larger study of sleep and aging, both

Table 4

Procedure and Measures

Phase		Duration	Activity
I.	Baseline		
	a) Telephone screening	15 min.	-Telephone screening interview
	b) Evaluation	2 hours	-Orientation -Consent Form 1 -Sleep History Interview -Baseline Questionnaires[1] -Intervention Questionnaires[2] -Recruitment for intervention study -Consent Form 2
	c) Self-Monitoring	14 days	-Daily Sleep Diary
II.	Intervention		
	a) Administration	1.5 hrs	-Intervention rationales -Demonstration of equipment -Intervention Evaluation Form -Treatment Contract -Take-home treatment instructions
	b) Self-Monitoring	14 days	-Daily Sleep Diary -Additional 3 days of practice for countercontrol treatment groups
	c) Evaluation	1.5 hrs	-Intervention Questionnaires[2] -Client Satisfaction Questionnaire

Table 4 (cont'd)

Procedure and Measures

Phase		Duration	Activity
	b) Self-Monitoring	14 days	-Daily Sleep Diary -Use of tapes optional
	c) Evaluation and Termination	1.5 hrs	-Intervention Questionnaires[2] -Client Satisfaction Questionnaire -Intervention Evaluation Form -Equipment returned
IV.	Long-term Follow-up		
	a) Evaluation	1/2 hr	-Telephone Interview (Sleep Questionnaire)
	b) Self-Monitoring	7 days	-Daily Sleep Diary

[1]Background Information Form, Brief Symptom Inventory, Penn State Worry Questionnaire, Eysenck Personality Inventory

[2]In order of administration: Sleep Questionnaire, Stanford Sleepiness Scale, Pre-Sleep Arousal Scale, Self-Efficacy Scale, Anxious Self-Statement Questionnaire

good and poor sleepers were recruited through media publicity consisting of press releases and notices in community clinics and residences for seniors. Participants were also recruited through presentations to seniors' groups. During these group presentations, participants were given a 1/2 hour talk on stress management by the researcher or a research assistant, followed by a brief introduction to the sleep and aging study. Group members were then asked to complete a series of questionnaires, including: Background Information Form, Sleep Questionnaire, Stanford Sleepiness Scale. Potential participants were told that they were free not to respond to any questions and that completing the questionnaires was completely voluntary. Participants who completed the questionnaires (which took approximately twenty minutes) were then told about the additional phases of the sleep and aging investigation, including the treatment intervention study, and invited to participate. Individuals who wanted more information and who were interested in further participation were asked to leave their names and telephone numbers.

All individuals who inquired about the studies, whether they learned about the project from the group presentations or media publicity, were briefly informed about the goals of the sleep and aging study, what would be required of them, and the treatment offered. After verifying that they met the selection criteria, those interested in participating were given an appointment to complete the measures as well the time estimation tasks required by the larger investigation. Those who failed to meet the selection criteria were offered appropriate referrals.

b) **Evaluation:** Evaluations were conducted at the Sir Mortimer B. Davis - Jewish General Hospital. All potential participants first received a standardized introduction and subsequently were asked to provide written consent to participate (Consent Forms can be found in

Appendix C). They were then administered the Structured Sleep History Interview to ensure that all selection criteria were met. Individuals whose responses suggested that their insomnia may have been due to a sleep disorder, such as sleep phase disorder or sleep apnea, or to physical or psychiatric illness, were excluded from the study and referred to their physicians or to the Sleep Disorders Clinic at the Royal Victoria Hospital.

Potential participants who met the selection criteria were administered the Baseline Questionnaires, which was administered only once throughout the course of the study, and the Intervention Questionnaires, which were administered again at Post-Intervention and Follow-Up. Questionnaires were coded to ensure participant confidentiality. The Baseline Questionnaires included: Background Information Form, Brief Symptom Inventory, Penn State Worry Questionnaire, and Eysenck Personality Inventory. The Intervention Questionnaires included, in order of administration: Sleep Questionnaire, Stanford Sleepiness Scale, Pre-Sleep Arousal Scale, Sleep Self-Efficacy Scale, Anxious Self-Statement Questionnaire. The complete battery of questionnaires took approximately 1 and 1/2 hours to complete. Participants who had already completed some of these measures in the context of the seniors' group meetings were not required to complete these again. The experimenter supervised administration of all measures and was available to address questions or concerns which arose during testing. Once individuals completed these measures they were told about the purpose of the treatment study, the testing and time requirements, and that the therapy offered was a short-term non-pharmacological self-administered treatment. Individuals who declined participation were given a booklet on improving sleep (Walsh, undated) and were offered a free consultation for their sleep problem with a

psychologist on the research team. Those who agreed to participate read and signed a consent form (Appendix B).

After verifying that the next six weeks were expected to be typical (no unusual events in the individual's life, such as travel, guests, or surgery), participants were asked to complete Daily Sleep Diaries every morning for the following 14 consecutive days. To assure that participants understood how to use this self-monitoring form, they completed one Daily Sleep Diary with the investigator, basing their responses on the previous night's sleep. To ensure monitoring on a daily basis, participants were instructed to call the investigator every morning to report their responses. If the investigator was not personally available, they were instructed to read their responses onto an answering machine. If participants did not call, the investigator called them.

II. Intervention Phase

Participants were blocked according to sex and randomly assigned to the Relaxation, Audiobook, or SM experimental conditions.

a) **Intervention Rationales:** After two weeks of Baseline self-monitoring the participants were seen again. Daily Sleep Diaries were collected and a battery of questionnaires needed for the larger investigation was administered. This included: Sleep Questionnaire, Pre-Sleep Arousal Scale, Sleep Self-Efficacy Scale, and the Anxious Self-Statement Questionnaire.

Subsequent to the administration of the questionnaires, participants were given one of three intervention rationales:

1) Countercontrol - Plus Audiobook: Participants in this condition were told that thoughts, whether distressing or just mentally involving, could keep them awake and thus interfere with going to sleep. Therefore, a "cognitive refocusing" technique which involved listening to audiotaped novels could help them get into a more favorable sleeping

state. It was explained that the audiotapes would interrupt the sequence of negative or involving thoughts and allow them to relax mentally and physically so that they could more easily fall asleep.

2) Countercontrol - Plus Relaxation: Participants in this condition were also told that thoughts, whether distressing or just involving, could keep their minds and bodies awake and, therefore, interfere with going to sleep. Therefore, a "passive relaxation" technique, which involved listening to audiotaped passive relaxation instructions, could help get their bodies into a more favorable state for sleeping. It was explained that the audiotape would allow them to focus on and to relax different parts of their bodies. Their bodies would relax, making it more likely to fall asleep.

3) Self-Monitoring Only: Participants in this condition were asked to monitor their sleep for an additional two weeks before beginning their treatment with the rationale that this would provide more information about their sleep pattern and thus, help with their treatment.

b) **Treatment Instructions**: Individuals in the two Countercontrol-Plus treatment groups were asked to continue self-monitoring on the Daily Sleep Diary. They were also given a demonstration of the equipment they were to use at home. This consisted of a tape recorder which shuts off when the tape is finished (Panasonic model RQ-2104), a flat pillow speaker designed to fit unobtrusively under the pillow (Realistic model P-10), and the audiotape intervention (i.e., Relaxation or Audiobook).

During a pilot phase it was found that easy manipulation of the tapes and taperecorder required some practice. In addition, without the visual images which characterize television, it is sometimes difficult to focus attention on the audiotape. Therefore, participants were instructed to practice using the equipment and to get familiar with

focusing attention on the audiotapes for 3 days before using the tape(s) at night. Specifically, they were told to listen to the tape(s) twice a day for ten minutes on the first day, twice a day for 20 minutes on the second day and twice a day for 30 minutes on the third day. The experimenter discussed the times that the participant could set aside for this practice during the following three days. Participants were told that they would be called after a day or two of practice and once during the two weeks of treatment to see how they were doing and to answer any question they may have.

Participants were instructed to set up the tape recorder on their night table before bedtime and to set the volume of the tape so that it was just comfortably audible through the pillow speaker. Participants were permitted to adhere to their usual pre-sleep practices during all phases of the study with one exception: they were to discontinue practices that interfered with the intervention (e.g., watching television after lights out). After lights out, they were to use the tapes every time they had difficulty falling asleep. That is, if they were not asleep 10 minutes following lights out (or after 10 minutes spent awake during the night), they were to turn on the tape recorder. They were to make sure that they listened to the audiotape and brought their attention back to it if their mind wandered. Of course, if they were drifting off to sleep they were to let it happen. They could let the tape stop by itself or they could turn it off. In the morning, they were instructed to complete the Intervention Daily Sleep Diary and call the experimenter with their responses.

The importance of using a tape every time they had difficulty falling asleep was emphasized and participants were told that if they did not use a tape for more than two consecutive nights of sleep difficulty they would be required to terminate participation in the treatment study. Once participants understood the rationale and

instructions of their treatment, they were asked to read and sign a treatment contract (Appendix C) which requested that participants: (1) carry out the treatment as specified earlier, and (2) return the equipment at termination. Participants were provided with written treatment instructions (Appendix D) to take home along with the equipment. At the end of this session participants were asked to complete the Intervention Evaluation Form.

1)Countercontrol - Plus Audiobook Intervention: Audiobooks were selected from commercially available materials consisting of plays, dramatized novels, and radio dramas. This type of audiobook content was selected based on a pilot study which showed greater difficulty habituating to verbal content with frequent changes in tone, accent, level and pitch. A wide variety of audiobooks was made available so that participants could themselves select audiobooks that were interesting enough to refocus their attention and yet not arousing enough to keep them from falling asleep. The Audiobook intervention participants were given 42 hours of audiotapes (3 hours per night for 14 nights) for the treatment period and an equivalent number of tapes for the Follow-Up period. Audiotapes were mostly 90 and 120 minute tapes.

2)Countercontrol - Plus Relaxation Intervention: The Relaxation intervention consisted of an audiotape of a modified version of Bernstein and Borkovec's (1973) progressive muscle relaxation instructions. The taped instructions contained only the relaxation component of the tension and relaxation components of the progressive relaxation technique. This passive relaxation technique was selected because the tensing component of muscle relaxation could pose problems for individuals with certain painful joint conditions such as arthritis. Data show that passive relaxation (i.e., muscle relaxation instructions without the tensing instructions) is an effective treatment for insomnia (Woolfolk & McNulty, 1983). Fichten's (1990) audiotaped version of the

passive relaxation instructions was used since it contains all relaxation instructions for each of the 16 muscle groups specified in Bernstein and Borkovec's (1973) manual and because it is an audiotaped version of the treatment shown to be effective by Woolfolk and McNulty (1983). To allow participants a continuous relaxation experience, the full text was recorded three times onto each side of a 90 minute audiotape. This was done in order to permit audiotapes in the two intervention conditions to be similar in length and to involve the same amount of cassette manipulation.

c) **Post-Intervention Evaluation Phase**: Participants in all three groups returned for Post-Intervention Evaluation approximately 17 days after they began treatment (or continued self-monitoring for the Self-Monitoring group). Sleep Diaries were collected and the following Intervention Questionnaires were re-administered: Sleep Questionnaire, Stanford Sleepiness Scale, Pre-Sleep Arousal Scale, Sleep Self-Efficacy Scale, Anxious Self-Statement Questionnaire.

Participants who wanted to discontinue their participation after completing the Post-Intervention Evaluation were asked to complete the Client Satisfaction Questionnaire. They were also given a booklet on improving sleep (Walsh, undated). If they expressed distress about their remaining insomnia problem, they were offered a free consultation with a psychologist on the research team. This same termination procedure was followed in the Follow-Up Evaluation phase.

III. Follow-Up Phase

a) **Reassignment of Self-Monitoring Only Participants**: Participants in the Self-Monitoring Only group were randomly assigned to the two treatment groups. They were administered the relevant rationales, instructions, and contracts and asked to continue to complete the Daily

Sleep Diaries for 14 additional days. From this point, they followed the same procedures as the two Countercontrol-Plus treatment groups.

b) **Self-Monitoring:** Participants in the two treatment groups were told that for the next two weeks the use of the tapes was optional but that they were to continue self-monitoring with the Daily Sleep Diaries and to phone in their responses every morning.

c) **Evaluation and Termination:** All participants were re-administered the Intervention Questionnaires which they had completed two weeks earlier at Post-Intervention Evaluation. In addition, the Follow-Up Sleep Diaries and the equipment were collected and the Client Satisfaction Questionnaire was administered. Participants who requested audiotapes were given the passive relaxation tape and they were given the names of libraries and book stores where they could acquire audiobooks.

IV. Long-Term Follow-up Phase

Participants were contacted by the investigator by telephone between 13 and 27 months (mean = 18.64, SD = 3.25) after completing the Follow-Up Evaluation. The time duration is variable due to constraints of the larger investigation as well as to difficulties in reestablishing contact with the participants. At this time, they were administered a modified interview version of the Sleep Questionnaire (Appendix E) by telephone. Participants were also asked to complete Daily Sleep Diaries for 7 consecutive days and return them by mail.

DATA MANAGEMENT

Mean scores on the Daily Sleep Diaries were used in data analyses. Means were calculated as follows: (1) Baseline scores include the first week of the two-week Baseline self-monitoring. This interval was chosen in order to reduce testing effects. A minimum of four days of completed Sleep Diaries was required to calculate a mean. (2) Intervention means included the second week of the two-week Intervention self-monitoring.

(3) Follow-Up means include the second week of the two-week Follow-Up monitoring. (4) Long-Term Follow-Up means include data from one week of self-monitoring.

DESIGN AND STATISTICAL ANALYSES

The present study examined the effects of short-term non-pharmacological insomnia treatment using a series of repeated measures multivariate analysis of variance (MANOVA) comparisons. MANOVA tests were chosen as the primary analyses because of the large number of dependent variables relative to the small number of participants. Computing ANOVA tests on each dependent variable would have led to alpha inflation. A minimum requirement when computing MANOVA is an approximate ratio of three subjects per variable (Tatsuoka, 1970). As a total of 41 participants completed Post-Intervention testing, a maximum of 13 variables could be selected for each MANOVA. In order to maximize power, missing data were replaced by group means.

Four aspects of the sleep experience were investigated: 1) Sleep - Wake Parameters: time-related variables measured by the Daily Sleep Diary (SOL, WASO, TST, SE), 2) Subjective Sleep Variables (Sleep Quality, Insomnia Frequency, Distress Frequency, Sleep Self-Efficacy), 3) Daytime Variables (Sleepiness, Fatigue, Functioning, Morning Restedness) and 4) Cognitive-Affective Variables (Anxious Self-Statements, Cognitive and Somatic Arousal, Mental Activity and Physical Tension). The variables measuring each of these four aspects constituted the dependent variables in four separate MANOVAs.

To evaluate changes due to the three intervention manipulations, 3 X 2 MANOVAs were carried out [3 Experimental Groups (Audiobook, Relaxation, SM) X 2 Testing Times (Baseline and Post-Intervention)]. Subsequent to the reassignment of SM participants to the two Countercontrol-Plus interventions, 2 X 2 MANOVAs [2 Countercontrol - Plus Experimental Groups X 2 Testing Times (Baseline and Post-

Intervention)] and 2 X 3 MANOVAs [2 Countercontrol - Plus Experimental Groups X 3 Testing Times (Baseline, Post-Intervention and Follow-Up)] were carried out. Due to the small sample size at Long-Term Follow-up, data could not be analyzed using Group by Time MANOVAs. Thus, long-term effects of the interventions were examined using repeated measures ANOVAs which included the two Countercontrol - Plus treatment groups and four testing times (Baseline, Post-Intervention Follow-Up and Long-Term Follow-Up).

Only when the MANOVA revealed significant findings, were univariate ANOVAs computed. As a rule, to correct for inflated Type 1 error rates associated with repeated measures ANOVA, F values were tested with Greenhouse Geisser's adjusted degrees of freedom. These fractional degrees of freedom were used to obtain the reported significance levels. The ANOVAs were followed by Newman Keuls post hoc tests whenever significant differences were found.

These MANOVAs and ANOVAs were repeated with a subsample of participants selected for high Insomnia Distress levels.

Descriptive statistics were employed to define the subject sample and univariate statistics (i.e., chi-square tests, ANOVAS) were used to investigate sex differences and homogeneity of intervention groups at Baseline. T-tests were used to compare the treatment groups on treatment credibility, satisfaction and compliance.

RESULTS

Demographic Characteristics

Equivalence of Intervention Groups

The 41 participants in the three treatment conditions were compared on demographic variables (see Table 5) to assess between-group homogeneity. One-way ANOVAs failed to reveal significant differences either in age, $F(2,38) = .29$, $p>.05$, or income adequacy, $F(2,37) = .63$, $p>.05$. Chi-square comparisons on the remaining seven nominal and ordinal variables revealed significant differences between groups on three variables: education level, employment status and income category (see Appendix F1). However, after Bonferroni corrections were applied to guard against chance findings due to multiple comparisons, these differences were no longer found to be significant.

Sex Differences

Due to the small number of participants per treatment condition, group by sex ANOVAs were not computed. However, chi-square comparisons were used to investigate sex differences on the nominal and ordinal demographic variables and t-tests were used on continuous variables at Baseline. Chi-square tests failed to reveal any significant differences between males and females (see Appendix F2). T-tests also failed to indicate significant sex differences on age, $t_{(39)} = -1.72$, $p>.05$, or income adequacy, $t_{(38)} = .56$, $p>.05$.

Baseline Functioning

Group Differences

1) Problem Specific Variables

The intervention groups were compared on three problem specific variables: duration of the insomnia problem, insomnia diagnosis, and number of participants taking sleep medication. Scores for the three intervention groups are presented in Table 6. A one-way ANOVA failed to reveal significant group differences in the Duration of Insomnia,

Table 5

Demographic Characteristics

Variables	Intervention Groups		
	Relaxation (n=14)	Audiobook (n=14)	Self-Monitoring (n=13)
Age (years)			
Mean	68.14	67.93	66.31
SD	6.99	7.47	5.88
Gender			
Male	4	5	4
Female	10	9	9
Marital Status			
Married/Common Law	10	8	10
Single	4	6	3
Living Arrangement[a]			
Alone	3	5	3
With Spouse/Partner	8	8	9
Other	2	1	1
Education			
Elementary	1	0	0
HS/CEGEP/Trade	10	9	6
University	3	5	7
Employment			
Full time/Part time	1	2	7
Not employed	13	12	6
Income Category[b]			
$10,000 - $30,000	7	5	1
> $30,000	6	5	9
Income Adequacy[ac]			
Mean	4.92	5.29	5.69
SD	1.98	1.20	1.98
Religion			
Jewish	8	10	7
Catholic	4	3	0
Protestant	0	1	5
Other	1	0	0
None	1	0	1

[a] N=40
[b] N=33
[c] This variable has a 9-point scale with the following labels: 1=inadequate, 5=adequate, 9=more than adequate.

Table 6

Problem Specific Variables

Variables	Intervention Groups		
	Relaxation (n=14)	Audiobook (n=14)	Self-Monitorin (n=13)
Duration of Insomnia (years)			
Mean	14.00	15.43	16.38
SD	10.25	16.35	12.84
Type of Insomnia Problem			
Onset Only	0	1	1
Maintenance Only	3	7	6[1]
Onset & Maintenance	9	5[2]	3
No Diagnosable Problem	2	1	3
Sleep Medication Use			
Number of Subjects	3	4	5

Note. There are no significant differences between groups on any of the variables.

[1]Includes a participant who was diagnosed with sleep maintenance insomnia but could not be diagnosed for sleep onset insomnia due to missing data.

[2]Includes a participant who could not be diagnosed for either sleep onset or sleep maintenance insomnia but who experienced insomnia episodes for least 30 minutes, at least three times a week.

$F(2,40) = .11$, $p>.05$, and Chi-square comparisons failed to show group differences either in the distribution of diagnoses or in Sleep Medication Use (see Appendix F3).

2) Sleep-Wake Parameters:

Four quantitative Sleep-Wake Parameters, including Sleep Onset Latency (SOL), Wake After Sleep Onset (WASO), Total Sleep Time (TST) and Sleep Efficiency (SE), were assessed by the Daily Sleep Diary. Baseline means and standard deviations for the Sleep-Wake Parameters of the three intervention groups are presented in Table 7. Test results indicate that the three groups did not differ significantly on any of these variables ($p>.05$, see Appendix F4).

Means in Table 7, where sleep-wake durations are reported as hours, show that on the Daily Sleep Diary, the whole sample of participants had an average SOL of 43 minutes an average WASO of 1 hour and 43 minutes, a mean TST of 5 hours and 19 minutes and a mean Sleep Efficiency of 67%.

3) Subjective Sleep Variables

Four measures assess participants' subjective perception of their sleep. These include: 1) Sleep Quality, as measured by the Sleep Diary, 2) Frequency of Insomnia, evaluated on a 10-point scale, and 3) Frequency of Insomnia Distress, evaluated on a 10-point scale (both Frequency of Insomnia and Insomnia Distress were measured by the Sleep Questionnaire) and 4) Sleep Self-Efficacy Expectations. Mean scores and standard deviations for the four variables are presented in Table 8. One-way ANOVAs failed to reveal any significant differences among groups on any of the variables ($p >.05$; see Appendix F5).

Means for the whole sample indicate that participants rated Sleep Quality as moderate, with the mean score lying midway between very poor and very good (mean = 3.07 on a 5-point scale); they reported experiencing insomnia quite often (mean = 8.29, on a 10-point scale);

Table 7

Means and Standard Deviations

of Sleep-Wake Parameters at Baseline

Intervention Groups	M	SD
	SOL (hrs)	
Relaxation	.73	.40
Audiobook	.68	.56
Self-Monitoring	.74	.77
Whole Sample	.72	.57
	WASO (hrs)	
Relaxation	1.98	1.01
Audiobook	1.87	1.39
Self-Monitoring	1.29	1.11
Whole Sample	1.72	1.19
	TST (hrs)	
Relaxation	5.01	1.31
Audiobook	5.30	1.42
Self-Monitoring	5.67	1.09
Whole Sample	5.32	1.28
	Sleep Efficiency (%)	
Relaxation	62	17
Audiobook	66	18
Self-Monitoring	73	14
Whole Sample	67	17

Note. There are no significant differences between groups on any of the variables.

Table 8

Means and Standard Deviations on Subjective Sleep Variables at Baseline

Intervention Groups	M	SD
	Sleep Quality[a]	
Relaxation	2.91	.56
Audiobook	3.13	.86
Self-Monitoring	3.17	.55
Whole Sample	3.07	.67
	Insomnia Frequency[b]	
Relaxation	8.21	2.15
Audiobook	8.29	1.54
Self-Monitoring	8.38	1.45
Whole Sample	8.29	1.71
	Distress Frequency[bc]	
Relaxation	6.17	2.52
Audiobook	5.79	2.81
Self-Monitoring	5.62	1.39
Whole Sample	5.85	2.28
	Sleep Self-Efficacy[a]	
Relaxation	24.14	5.83
Audiobook	24.43	7.18
Self-Monitoring	26.38	3.75
Whole Sample	24.95	5.74

Note. N=41.There are no significant differences between groups on any of the variables.

[a]Higher scores indicate better sleep quality, greater self-efficacy expectations.

[b]Higher scores indicate greater insomnia and distress frequencies.

[c]N=39: Relaxation group N=12.

Frequency of Insomnia Distress was just above the midpoint (mean = 5.85), and Sleep Self-Efficacy Expectations were fairly low (mean = 24.95%, with the highest score equal to 37%).

4) Sleep Lifestyle Variables

Four Sleep Questionnaire Variables assessed the usual sleep habits of participants. These include usual Bedtime, Arising Time (time when out of bed), Total Time in Bed (Arising Time minus Bedtime), and Nap Frequency (days/week). Although these variables are also evaluated by the Daily Sleep Diary, these data will not be reported since Diary data provide only a one week window on the sleep experience, compared to the global picture of the individual's sleep which the Sleep Questionnaire provides.

Means and standard deviations of the lifestyle variables are reported in Table 9. One-way ANOVAs failed to reveal any differences among groups ($p > .05$; see Appendix F6). Means indicate that participants spent an average of 7 hours and 50 minutes in bed (range = 5-1/2 to 10 hours), their usual bedtime was 11:16 P.M. (Range = 10 P.M. - 3 A.M.), and their usual arising time was 7:08 A.M. (Range = 5 A.M. - 10 A.M.). The average frequency of naps for the whole sample was 1.4 days per week (range = 0-7). Less than half of the participants (n=19, 46.34%) reported napping during the day. These participants napped an average of 3 days in a week (range = 1-7); a Chi-square comparison failed to reveal significant differences between groups, $\chi^2_{(2)} = 1.99$, $p>.05$, as did a one-way ANOVA, $F(2,16) = .34$, $p>.05$.

5) Daytime Variables

Means and standard deviations for the Daytime Variables are presented in Table 10. The three groups did not differ significantly on any of these measures ($p > .05$; ANOVA summary tables are presented in Appendix F7).

Table 9

Baseline Scores for

Lifestyle Sleep Variables

Intervention Groups	M	SD
	Bedtime	
Relaxation	23.20	.87
Audiobook	23.32	1.22
Self-Monitoring	23.33	.62
Whole Sample	23.28	.92
	Arising Time (A.M.)	
Relaxation	7.18	.81
Audiobook	7.23	1.25
Self-Monitoring	6.98	1.04
Whole Sample	7.13	1.03
	Time in Bed (hours)	
Relaxation	7.91	1.19
Audiobook	7.91	1.12
Self-Monitoring	7.65	.90
Whole Sample	7.83	1.06
	Nap Frequency (days/week)[a]	
Relaxation	2.88	2.42
Audiobook	3.50	2.40
Self-Monitoring	2.38	1.49
Whole Sample	3.00	2.18

Note. N=41. There are no significant differences between groups on any of the variables.

[a]Data includes only subjects who napped: Relaxation N=8, Audiobook N=7, Self-Monitoring Only N=4, Whole Sample N=19.

Table 10

Means and Standard Deviations for Daytime Variables at Baseline

Intervention Groups	M	SD
	Sleepiness (SSS)[a]	
Relaxation	2.33	1.30
Audiobook	2.50	1.09
Self-Monitoring	2.15	.99
Whole Sample	2.33	1.11
	Fatigue (days/week)[a]	
Relaxation	1.64	1.78
Audiobook	2.64	1.78
Self-Monitoring	2.31	2.25
Whole Sample	2.20	1.94
	Functioning[b]	
Relaxation	3.64	.68
Audiobook	3.57	.69
Self-Monitoring	3.85	.73
Whole Sample	3.68	.69
	Restedness[b]	
Relaxation	3.33	.75
Audiobook	3.25	.73
Self-Monitoring	3.40	.75
Whole Sample	3.33	.73

Note. N=41. There are no significant differences between groups on any of the variables.

[a]Scores have a possible range of 1 to 7. Higher scores indicate greater sleepiness or fatigue due to lack of sleep.

[b]Higher scores indicate better functioning or feeling of restedness (5-point scale).

Means indicate that participants had an average Daytime Sleepiness (SSS) score of 2.33 (on a 7-point scale), indicating a reasonably high level of alertness, although not at peak. Participants reported experiencing a relatively low frequency of Daytime Fatigue due to lack of sleep (mean = 2.2 days per week). Similarly, the Daily Sleep Diary revealed that participants felt they were functioning fairly well during the day (mean = 3.68 on a 5-point scale) and that they felt fairly well rested in the morning (mean = 3.33 on a 5-point scale).

6) Cognitive-Affective Variables

Table 11 presents Baseline means and standard deviations for scores on the Cognitive-Affective Variables of the three intervention groups. For comparison purposes, population norms are also indicated where available; norms for older samples do not exist. The three groups did not differ significantly on any of these variables ($p>.05$; see Appendix F8 for ANOVA summary tables). Kendall and Hollon, (1989) provided test scores for several samples in their validation study of the Anxious Self-Statement Questionnaire (ASSQ). Participants in the present study had ASSQ scores that fell within the population means for non-anxious college students and were lower than those of an anxious group (Kendall & Hollon, 1989), indicating a normal level of anxious self-talk for this sample. The mean score on the Cognitive Subscale of the Pre-Sleep Arousal Scale fell within the population norms of insomniacs and above the population norms of non-insomniacs (White, 1983). The mean Somatic Subscale score fell slightly above the population mean for insomniacs, although the score is within the population norms of both non-insomniacs and insomniacs. The means indicate that the sample's average Physical Tension and Mental Activity scores (3.60 and 3.47, respectively) fell above the midpoint of the 5-point scale, indicating relatively low physical tension and mental activity. Thus, cognitive-affective scores for insomniacs in this study

Table 11

Means and Standard Deviations for Cognitive-Affective Variables at Baseline

	Intervention Groups										
	Relaxation		Audiobook		Self-Monitoring		Total Sample		Population Norms		
Variables	M	SD	M	SD	M	SD	M	SD	M	SD	Sample Description
Anxious Self-Talk	54.14	18.96	57.00	22.81	53.92	20.45	55.05	20.33	56.43	10.07	Normals
Cognitive Arousal	17.57	4.38	16.43	6.64	17.00	4.18	17.00	5.10	15.12 11.34	5.3 3.4	Insomniacs Normals
Somatic Arousal	10.14	2.07	11.86	3.23	10.08	2.43	10.71	2.69	10.13 9.31	2.6 2.0	Insomniacs Normals
Mental Activity	3.09	.64	3.65	.85	3.70	.65	3.47	.76	---	---	
Physical Tension	3.19	.45	3.70	.84	3.93	.54	3.60	.69	---	---	

Note. N=41. All Group comparisons are nonsignificant. Higher means indicate greater arousal and anxiety on all measures except Physical Tension and Mental Activity where lower scores indicate greater tension and mental activity (5-point scales).

generally fell within normal parameters, suggesting that state anxiety was relatively low in this sample. Only pre-sleep Cognitive Arousal fell within the norms of insomniacs.

7) Psychological Variables

Table 12 presents the mean scores and standard deviations for the three intervention groups as well as population norms on the various psychological measures. For Depression (as measured by the BSI), only gender specific population norms were available; therefore, male and female scores for these variables are reported separately. One-way ANOVAs failed to reveal any significant differences among intervention groups ($p>.05$; see Appendix F9). All scores fell within available population norms, indicating generally good psychological functioning.

Sex Differences

Due to the small number of participants per treatment condition, group by sex ANOVAs were not computed. However, t-tests were used to investigate sex differences on all of the previously described Baseline variables. As Appendices F10 to F12 show, no significant differences on any of these variables were found at Baseline.

Intercorrelations Among Variables

Table 13 presents intercorrelations among Sleep-Wake Parameters, Subjective Sleep Variables, Daytime Variables, Cognitive-Affective Variables and Psychological Variables. Several significant correlations were found, all were in the expected direction.

Of particular interest, given this study's focus on the relationship between cognitive activity and sleep, are the findings on the Cognitive-Affective variables. These were not significantly correlated either with each other or with Sleep-Wake Parameters. The variables that were highly and significantly correlated with Cognitive-Affective Variables included Sleep Self-Efficacy ($r=-.55$) and Depression ($r=.55$); the correlations indicate that greater Cognitive Arousal is

Table 12

Means and Standard Deviations for Psychological Variables at Baseline

	Intervention Groups									
	Relaxation		Audiobook		Self-Monitoring		Whole Sample		Population Norms for "Normals"	
Variables	M	SD	M	SD	M	SD	M	SD	M	SD
Depression (BSI)										
Males[a]	.58	.83	1.10	1.01	.25	.50	.68	.85	.43	.50
Females[b]	.45	.26	.62	.46	.44	.52	.50	.42	.53	.59
Neuroticism[c] (EPI)	11.08	3.25	10.93	5.64	10.15	5.60	10.73	4.86	10.50	4.70
Worry[d] (Penn State)	54.00	16.38	48.42	13.88	50.23	14.89	50.78	14.78	48.80	13.80

Note. Higher means indicate worse psychological adjustment on all varaibles. There are no significant differences between groups on any of the variables.

[a]N=28
[b]N=13
[c]N=40
[d]N=36

Table 13
Relationships Among Sleep-Wake, Subjective, Daytime, Cognitive-Affective and Psychological Variables

	Sleep-Wake Parameters				Subjective Sleep Variables			
	SOL	WASO	TST	SE	Sleep Quality	Insomnia Frequency	Distress Frequency	Sleep Self-Efficacy
Sleep-Wake Parameters								
SOL	-							
WASO	.35*	-						
TST	-.43**	-.81***	-					
SE	-.48**	-.87***	.90***	-				
Subjective Sleep Variables								
Sleep Quality	-.37*	-.73***	.80***	.74***	-			
Insomnia Frequency	.37*	.40*	-.37*	.46**	-.24	-		
Distress Frequency	.43**	.33*	-.38*	-.46**	-.31	.59***	-	
Sleep Self-Efficacy	-.25	-.23	.13	.25	.23	-.21	-.64***	-
Daytime Variables								
Morning Restedness	-.12	- .45**	.50**	.41**	.63***	.03	-.07	.14
Daytime Functioning	-.13	- .37*	.33*	.30	.54***	.04	-.13	.22
Daytime Sleepiness	.06	.17	-.12	-.17	-.09	.10	.27	-.30
Daytime Fatigue	.14	.24	-.12	-.17	-.16	.21	.37*	-.38*

* $p < .05$
** $p < .01$
*** $p < .001$, and significant with Bonferroni correction.

Table 13 (cont'd)

Relationships Among Sleep-Wake, Subjective, Daytime, Cognitive-Affective and Psychological Variables

	Sleep-Wake Parameters				Subjective Sleep Variables			
	SOL	WASO	TST	SE	Sleep Quality	Insomnia Frequency	Distress Frequency	Sleep Self-Efficacy
Cognitive-Affective Variables								
Anxious Self-Talk	-.19	.16	-.10	-.14	-.30	-.01	.27	-.40**
Cognitive Arousal	.03	-.18	.14	.18	-.04	-.12	.37*	-.55***
Somatic Arousal	.04	-.15	.18	.07	.08	-.10	.11	-.18
Mental Activity	-.17	-.18	.24	.18	.46**	.12	-.05	.31*
Physical Tension	-.03	-.20	.29	.25	.45**	.04	-.60	.27
Psychological Variables								
Depression	-.10	.20	-.09	-.15	-.27	.04	.33*	-.47**
Neuroticism	.01	-.04	-.04	-.16	-.18	.06	.31	-.45**
Worry	-.05	-.01	.13	-.05	-.06	.15	.38*	-.55**

* $p < .05$
** $p < .01$
*** $p < .001$, and significant with Bonferroni correction.

Table 13 (cont'd)

Relationships Among Sleep-Wake, Subjective,
Daytime, Cognitive-Affective and Psychological Variables

	Daytime Variables			
	Morning Restedness	Daytime Functioning	Daytime Sleepiness	Daytime Fatigue
Daytime Variables				
Morning Restedness				
Daytime Functioning	.74***			
Daytime Sleepiness	-.30	-.29		
Daytime Fatigue	-.31*	-.28	.64***	
Cognitive-Affective Variables				
Anxious Self-Talk	-.39*	-.31	.30	.41**
Cognitive Arousal	-.16	-.17	.40*	.33*
Somatic Arousal	.24	-.17	.04	.11
Mental Activity	.45**	.49**	-.08	.05
Physical Tension	.34*	.50**	-.15	.10
Psychological Variables				
Depression	-.29	-.32*	.64***	.64***
Neuroticism	-.18	-.23	.40*	.44**
Worry	-.13	-.08	.36*	.27

* $p < .05$
** $p < .01$
***$p < .001$, and significant with Bonferroni correction.

Table 13 (cont'd)

Relationships Among Sleep-Wake, Subjective, Daytime, Cognitive-Affective and Psychological Variables

	Cognitive-Affective Variables				Psychological Variables		
	Anxious Self-Talk	Cognitive Arousal	Somatic Arousal	Mental Activity	Depression	Neuroticism	Worry
Cognitive-Affective Variables							
Anxious Self-Talk							
Cognitive Arousal	.32*						
Somatic Arousal	-.11	.14					
Mental Activity	-.33*	-.29	.09				
Physical Tension	-.31	-.27	-.04	.85***			
Psychological Variables							
Depression	.64***	.39*	.16	-.14	-		
Neuroticism	.45**	.46**	.21	-.20	.55***	-	
Worry	.44**	.47**	-.19	-.34*	.42*	.42*	-

* $p < .05$
** $p < .01$
***$p < .001$, and significant with Bonferroni correction.

associated with lower Sleep Self-Efficacy Expectations, and greater Anxious Self-Talk is associated with greater Depression.

ANALYSES OF TREATMENT EFFICACY

Baseline vs Post-Intervention Comparisons: Audiobook, Relaxation, and Self-Monitoring Groups

Upon completion of Post-Intervention testing, data were available for three groups of participants: the Self-Monitoring Only group (N=13), Countercontrol-Plus Audiobook group (N=14) and the Countercontrol-Plus Relaxation group (N=14).

The effects of the intervention on different parameters of functioning were examined using a 3X2 (Group X Time) mixed design multivariate analysis of variance (MANOVA), with time as a repeated measure. The grouping factor consisted of three experimental conditions: Self-Monitoring Only, Countercontrol-Plus Audiobook, and Countercontrol-Plus Relaxation. Time included two levels, Baseline and Post-Intervention. ANOVA summary tables are presented in Appendices I1 - I4.

MANOVAs were used to examine four aspects of the sleep experience: 1) Sleep-Wake Parameters, 2) Subjective Sleep Variables, 3) Daytime Variables and 4) Cognitive-Affective Variables. Variables measuring each of these aspects were grouped together and included in one of four MANOVAs. Variables included in each MANOVA are listed in Table 14.

A. Sleep - Wake Parameters

These time related variables included SOL, WASO, TST and Sleep Efficiency as measured by the Daily Sleep Diary.

The Pillais Bartlett criterion did not reveal a significant main effect for Group, F (8, 72), = .14, p>.71, or for the Time by Group interaction F (8, 72) =.35, p>.07. A significant main effect for Time

however, was found, $F(4, 35) = .23$, $p < .05$. Inspection of the means in Table 14 and the univariate F-tests for the Time effect indicate significant improvements on WASO from Baseline (Mean = 1.72 hours) to Post-Intervention (Mean = 1.44 hours), $F(1, 38) = 6.08$, $p < .05$, representing an improvement rate of 16%. Other variables that were significantly improved at Post-Intervention were TST, $F(1, 38) = 7.98$, $p < .01$; and Sleep Efficiency, $F(1, 38) = 8.80$, $p < .01$, with improvement rates of 6% on both. It is noteworthy that although SOL was not found to be significantly improved at Post-Intervention, the means nevertheless decrease by approximately 24%, with a Post-Intervention mean score close to 30 minutes.

B. Subjective Sleep Variables

As was the case for the Sleep-Wake Parameters, MANOVA results failed to reveal a significant main effect either for Group, $F(8, 72) = .10$, $p > .87$, or for the Time by Group interaction, $F(8, 72) = .16$, $p > .63$, but did indicate a significant main effect for Time, $F(4, 35) = .58$, $p < .001$. Univariate *F*-tests indicate significant improvement Baseline to Post-Intervention on three of the four variables in this MANOVA: Sleep Quality, $F(1,38) = 6.22$, $p < .05$, Insomnia Frequency, $F(1, 38) = 31$, $p < .001$, and Sleep Self-Efficacy Expectations, $F(1, 38) = 12.4$, $p < .01$. The magnitude of improvement for each of these variables was 9% for Sleep Quality, 18% for Insomnia Frequency and 12% for Sleep Self-Efficacy Expectations.

C. Daytime Variables

MANOVA results failed to indicate a significant main effect for Time, $F(4, 35) = .06$, $p > .72$, for Group, $F(8, 72) = .06$, $p > .97$, or for the Time by Group interaction, $F(8, 72) = .26$, $p > .23$.

D. Cognitive-Affective Variables

Similarly, results failed to indicate a significant main effect for Group, $F(10, 70) = .34$, $p > .19$, Time, $F(5, 34) = .17$, $p = .25$, or the Time by Group interaction, $F(10, 70) = .20$, $p > .63$.

Summary of Findings on Baseline to Post-Intervention Changes in the Audiobook, Relaxation and Self-Monitoring Groups

The MANOVAs and subsequent ANOVAs failed to reveal any significant main effects for Group or any significant Time by Group interactions. However, significant main effects for Time were found for Sleep-Wake Parameters as well as for Subjective Sleep Variables, indicating improvements Baseline to Post-Intervention on 6 of the 8 variables examined: WASO, TST, Sleep Efficiency, Sleep Quality, Insomnia Frequency and Sleep Self-Efficacy Expectations. No significant Baseline to Post-Intervention changes were found on the MANOVAs for Daytime Variables or for Cognitive-Affective Variables. Baseline and Post-Intervention means and standard deviations of all dependent variables are presented for the whole sample in Table 14 and for each intervention group seperately in Appendix I17.

Baseline vs Post-Intervention Comparisons:
Enlarged Relaxation and Audiobook Groups

Following the Post-Intervention Evaluation, the Self-Monitoring Only participants were randomly assigned to the two Countercontrol-Plus treatment conditions: 7 participants were assigned to the Audiobook condition and 5 to the Relaxation condition (one participant from the Self-Monitoring Only group chose not to continue after completing the Post-Intervention testing). This resulted in 21 participants in the Audiobook condition and 19 in the Relaxation condition. Because it was possible that the absence of significant differences between experimental groups was due to inadequate power due to low sample size, Baseline to Post-Intervention changes were reanalyzed with the Self-

Table 14

Baseline and Post-Intervention Means and Standard Deviations for the Whole Sample

Variables	Baseline		Post-Intervention		ANOVA
	M	SD	M	SD	Significance Level
Sleep-Wake Parameters					
SOL (hr)	.72	.57	.55	.39	ns
WASO (hr)	1.72	1.19	1.44	1.04	p<.05
TST (hr)	5.32	1.28	5.62	1.07	p<.01
SE (%)	67	17	71	14	p<.01
Subjective Sleep Variables					
Sleep Quality[a]	3.07	.67	3.34	.71	p<.05
Insomnia Frequency[b]	8.29	1.71	6.81	2.23	p<.001
Distress Frequency[b]	5.85	2.22	5.48	2.38	ns
Sleep Self-Efficacy[a]	24.95	5.74	27.83	6.34	p<.01
Daytime Variables					
Sleepiness(SSS)[b]	2.32	1.08	2.30	1.12	ns
Fatigue[b]	2.20	1.94	2.43	1.61	ns
Functioning[a]	3.68	.69	3.69	.76	ns
Morning Restedness[a]	3.32	.73	3.41	.76	ns
Cognitive-Affective Variables					
Anxious Self-Talk[b]	55.05	20.33	50.24	18.89	ns
Cognitive Arousal[b]	17.00	5.10	16.73	5.77	ns
Mental Activity[a]	3.47	.76	3.57	.86	ns
Somatic Arousal[b]	10.71	2.70	10.34	2.48	ns
Physical Tension[a]	3.60	.69	3.61	.84	ns

Note. N = 41. All one-way ANOVA Group and Group x Time effects are nonsignificant. Reported significance levels are for Time Main Effects. ns=nonsignificant.

[a]Higher scores indicate better adaptation.

[b]Higher scores indicate worse adaptation.

Monitoring Only participants now included in the Relaxation and Audiobook groups.

As in the previous analyses, the effects of the Audiobook and Relaxation Interventions on different aspects of sleep were examined in four 2X2 (Group X Time) mixed design MANOVAs, with Time as a repeated measure. The grouping factor consisted of two conditions: Countercontrol-Plus Audiobook and Countercontrol-Plus Relaxation. Time included two levels: Baseline and Post-Intervention.

Again, only significant Time main effects were revealed. As can be seen in Appendices I5 to I8 the four MANOVAs and subsequent ANOVAs failed to reveal any significant main effects for Group or any significant Time by Group interactions. Results were similar to those of the three group comparisons described earlier and, in addition, SOL and Anxious Self-Talk improved significantly over Time: 32% and 11% respectively. Thus, all four Sleep-Wake Parameters, three of four Subjective Sleep Variables and one Cognitive-Affective variable were found to improve significantly from Baseline to Post-Intervention. It is notable that the absolute value of SOL at Post-Intervention fell below the 30 minute cutoff typically used to define insomnia. Appendix I9 presents Baseline and Post-Intervention means and standard deviations for the total sample.

Comparisons of Audiobook and Relaxation Groups

Across Three Testing Times:

Baseline, Post-Intervention, and Follow-up

To determine the short-term stability of the treatment effect, sleep diaries were obtained from 33 participants at two weeks post-treatment. The enlarged Relaxation and Audiobook group participants (Relaxation = 15, Audiobook = 18) were used for this analysis, since all groups received treatment prior to this follow-up (this reassignment procedure has been used by Davies et al., 1986). The distribution of

drop-outs from the two experimental conditions was not statistically significant, $\chi^2_{(1)} = .32$, $p>.05$, with attrition rates as follows: Relaxation = 4 (21% of the Relaxation group participants who completed Post-Intervention), Audiobook = 3 (15%). Again, t-tests failed to indicate any significant differences between completers and drop-outs (see Appendices H2 & H3) on all but one of the Baseline measures: drop-outs reported spending more time in bed (Mean = 8.64) than completers (Mean = 7.69), $t(1,38) = -2.28$, $p<.05$. When completers and drop-outs were compared on Post-Intervention measures, no significant differences were found (Appendix H3). Of the 33 participants who completed Daily Sleep Diaries, one subject from each experimental condition failed to complete the Follow-up Questionnaire measures.

The scores of participants who completed the Follow-up evaluations were examined to (1) evaluate whether treatment gains were maintained at Follow-up, (2) assess the possibility that participants continued to improve after the intervention period, and (3) explore the possibility of deterioration over a longer time period.

The effects of the intervention on different parameters of functioning were examined using 2X3 (Group X Time) MANOVAs. The grouping factor consisted of two conditions including Countercontrol-Plus Audiobook and Countercontrol-Plus Relaxation. Time included three levels: Baseline, Post-Intervention and Follow-up. 2x3 ANOVAS and Newman-Keuls post-hoc tests were performed where appropriate. Appendices I10 to I13 present ANOVA summary tables for all dependent variables.

A. Sleep-Wake Parameters

The Pillais Bartlett criterion failed to reveal either a significant main effect for Group, $F(4,28) = .04$, $p >.88$ or for the Time by Group interaction, $F(8,120) =.18$, $p >.17$. Results did indicate a significant main effect for Time, $F(8, 120) = .44$, $p < .001$, with

significant improvements in SOL, $F(2,62) = 5.08$, $p < .05$; WASO, $F(2,62) = 20.30$, $p = .001$; TST, $F(2,62) = 11.09$, $p < .001$; and Sleep Efficiency, $F(2,62) = 13.32$, $p < .001$. Newman-Keuls post-hoc tests, with α set at .05, indicated improvement from Baseline to Post-Intervention with no further significant change at Follow-up on WASO and TST, with a magnitude of improvement of 25% and 7%, respectively. Significant improvement from Baseline to Post-Intervention and continuing at Follow-up was found on SOL and Sleep-Efficiency (see Figures 1 and 2), with a magnitude of improvement from Baseline to Follow-up of 34% and 10%, respectively. Once again, the absolute value of SOL at Follow-up was less than 30 minutes (Mean = .47).

B. Subjective Sleep Variables

Results failed to reveal either a significant main effect for Group, $F(4,26), = .14$, $p > 0.41$, or a significant Time by Group interaction, $F(8,112) = .07$, $p > .83$, but indicated a significant main effect for Time, $F(8,112) = .52$, $p < .001$, with significant improvements Baseline to Post-Intervention on three of the four variables in the MANOVA: Sleep Quality, $F(2,62) = 6.77$, $p < .01$, Insomnia Frequency, $F(2,58) = 16.04$, $p < .001$, and Sleep Self-Efficacy, $F(2,58) = 15.09$, $p < .001$. Newman-Keuls post-hoc tests, with α set at .05, failed to show any further significant changes at Follow-up. The magnitude of improvement for these three variables from Baseline to Post-Intervention was 9%, 23% and 7%, respectively.

C. Daytime Variables

Results failed to indicate either significant Time, $F(8,112) = .13$, $p > .45$, or Group, $F(4,26) = .05$, $p > .83$, main effects; similarly, the Time by Group interaction was nonsignificant, $F(8,112) = .09$, $p > .73$.

D. Cognitive-Affective Variables

The Time main effect was, once more, significant, F (10,110) = .41, $p < .01$, with improvement over time on Anxious Self-Talk, F(2,60) = 13.79, $p < .001$, although results failed to reveal a significant main effect for Group, F (5,25) = .12, $p > .62$, or a significant Time by Group interaction, F (10,110) = .18, $p > .37$. The Newman-Keuls test indicated that significant change in Anxious Self-Talk occurred only from Baseline to Post-Intervention, although the means suggest a trend toward continued improvement. The magnitude of improvement from Baseline to Post-Intervention was 12%.

Summary of Baseline vs Post-Intervention vs Follow-up Changes

Once again, the MANOVAs and subsequent ANOVAs failed to reveal any significant Group main effects or any significant Time by Group interactions. However, significant main effects for Time were found for the same variables as on the analyses comparing Baseline to Post-Intervention changes in the Enlarged Relaxation and Audiobook groups. Two variables, SOL and Sleep Efficiency, showed significant improvement Baseline to Post-Intervention as well as continued improvement at Follow-up. Six variables showed significant Baseline to Post-Intervention improvement, which was maintained at Follow-up: WASO and TST, Sleep Quality, Insomnia Frequency, Sleep Self-Efficacy and Anxious Self-Talk. Figure 1 presents an example of this typical pattern of improvement. No significant changes with time were found for Daytime Variables. Table 15 presents means and standard deviations for the total sample for the three time periods.

Since these analyses included a subgroup of participants who had self-monitored for an extra two weeks, one-way ANOVAs were repeated with the Relaxation and Audiobook groups without the inclusion of the Self-Monitoring group participants. Results indicated similar significant findings (see Appendix I14). Due to the small sample sizes of the

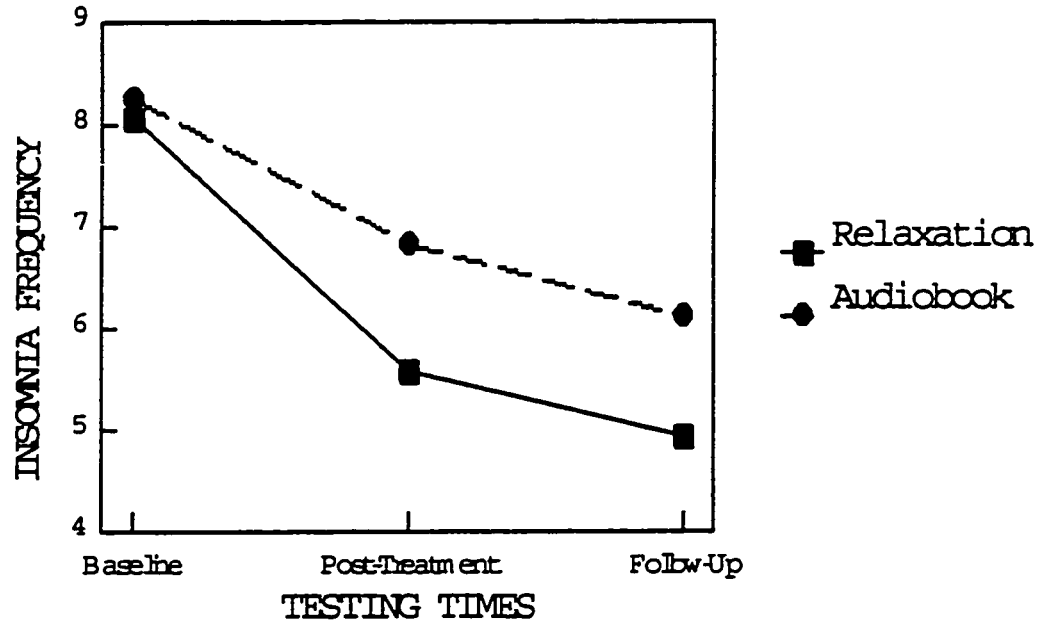


Figure 1: Weekly Means of Insomnia Frequency Ratings (1=not at all, 10=very often)

Table 15

Baseline, Post-Intervention and Follow-Up

Means and Standard Deviations for the Whole Sample

Variables	Baseline		Post-Intervention		Follow-Up		Newman-Keuls Test
	M	SD	M	SD	M	SD	(p<.05
	Sleep-Wake Parameters-Diary						
SOL	.71	.59	.50	.39	.47	.35	B>P>F
WASO	1.71	1.13	1.28	.93	1.08	.87	B>P=F
TST	5.36	1.18	5.74	1.01	5.87	.96	B>P=F
SE(%)	68	15	73	14	75	12	B>P>F
	Subjective Sleep Variables						
Sleep Quality[a]	3.05	.70	3.33	.74	3.44	.78	B>P=F
Insomnia Frequency[b]	8.16	1.83	6.26	2.56	5.58	2.66	B>P=F
Distress Frequency[b]	5.65	2.26	5.42	2.61	5.07	2.85	ns
Sleep Self-Efficacy[a]	24.32	5.15	28.39	6.74	29.37	6.71	B>P=F
	Daytime Variables						
Sleepiness[b]	2.42	1.18	2.43	1.31	2.50	1.06	ns
Fatigue[b]	2.10	1.99	2.37	1.82	2.48	1.63	ns
Functioning[a]	3.71	.73	3.71	.73	3.70	.77	ns
Restedness[a]	3.30	.75	3.41	.73	3.51	.75	ns
	Cognitive-Affective Variables						
Anxious Self-Talk[b]	54.38	17.76	47.59	14.16	44.00	13.82	B>P=F
Cognitive Arousal[b]	17.48	5.09	16.00	4.82	15.84	5.72	ns
Mental Activity[a]	3.40	.77	3.57	.83	3.58	.84	ns
Somatic Arousal[b]	10.81	2.54	10.65	3.35	9.91	2.33	ns
Physical Tension[a]	3.57	.72	3.57	.83	3.66	.71	ns

Note. All one-way ANOVA Group and Group x Time effects are nonsignificant. Reported significance levels are for Time Main Effects.
ns=nonsignificant. B=Baseline, P=Post-Intervention, F=Follow-up. N = 33 for Daily Sleep Diary variables; for other variables, N=31.

[a]Higher scores indicate better adaptation.

[b]Higher scores indicate worse adaptation.

Relaxation and Audiobook treatment groups which had extra self-monitoring, Baseline to Post-Intervention to Follow-up changes could not adequately be evaluated.

Long-term Follow-up

The goal of the Long-term Follow-up Evaluation was to examine the effects of the different treatments over a longer time period. Therefore, the sleep experience of participants in the study was re-evaluated after an average of 18 months (range = 13 to 27 months). In order to maximize the response rate, the Long-term Follow-up Evaluation was, in part, conducted over the telephone. It consisted of a modified telephone version of the Sleep Questionnaire which was followed by one week of Daily Sleep Diaries. The resulting dependent variables, therefore, included only a subsample of the variables previously used: 1) all Sleep-Wake Parameters, measured by both Diary and Questionnaire, 2) three of the four Subjective Sleep Variables (Sleep Quality, Insomnia Frequency, and Distress Frequency), 3) three of the four Daytime Variables (Functioning, Morning Restedness, and Fatigue), and 4) two of the five Cognitive-Affective variables (Physical Tension and Mental Activity).

Twenty-three (Relaxation: N=11, Audiobook: N=12) of the 31 participants who had previously completed the Follow-up questionnaires also completed the Long-term Follow-up Evaluation on the telephone. The reason for the noncompletion of eight participants was the experimenter's lack of success in being able to contact them. The distribution of drop-outs from the two experimental conditions was not statistically significant, $\chi^2_{(1)} = .26$, $p>.61$, with attrition rates as follows: Relaxation = 3, Audiobook = 5. These eight non-completers were compared to the completers on scores at Baseline, Post-Intervention and Follow-up with a series of t-tests. Means and standard deviations are presented in Appendices H4 and H5. Several variables were found to

significantly differentiate the two groups at all three testing times. At Baseline, non-completers generally fared worse on Subjective Sleep Variables (i.e., Insomnia Distress, Sleep Self-Efficacy) and Cognitive-Affective Variables (i.e., ASSQ, Cognitive Arousal, Physical Tension, Mental Activity). At Post-Intervention and Follow-up significant Group differences were found on some Sleep-Wake Parameters and Daytime Variables (see Appendix H5), with drop-outs having worse scores than completers. When Bonferroni corrections were applied, differences were no longer significant.

Of the 23 participants who completed the Sleep Questionnaire on the telephone, only 12 (Relaxation: N=4, Audiobook: N=8) completed one week of Long-term Follow-up Daily Sleep Diaries. Of the non-completers, only one subject refused to have the Diaries mailed to him, stating that self-monitoring required too much time and energy. The remaining participants agreed to complete the diaries but failed to return them. Once again, the distribution of drop-outs from the two experimental conditions was not found to be statistically significant, $\chi^2_{(1)} = 1.12$, $p>.29$.

Due to the small number of participants who completed both the Sleep Questionnaire and Daily Sleep Diaries at all four testing times, the data could not be analyzed using Group by Time MANOVAs. Nevertheless, it was still possible to investigate sleep/wake changes over time for the group as a whole. Since all previous analyses failed to reveal significant group effects, scores were collapsed across intervention conditions. Repeated measures ANOVAs, with Bonferroni corrections, were conducted on the four sets of variables evaluated in the previous analyses (i.e., Sleep-Wake Parameters, Subjective Sleep Variables, Daytime Variables, and Cognitive-Affective Variables), across four testing times (i.e., Baseline, Post-Intervention, Follow-up, and

Long-term Follow-up). Where indicated, Newman-Keuls post-hoc tests were applied.

Since few participants (N=12) filled out the Daily Sleep Diaries, the data on Sleep-Wake Parameters was limited. In order to represent a larger proportion of this study's sample, the Sleep-Wake Parameters measured by the Sleep Questionnaire (with a sample size of 23) were also analyzed. It should be noted that for the 12 participants who completed both measures, 3 of the 4 pairs of sleep-wake scores on the Sleep Questionnaire and Daily Sleep Diary at Long-term Follow-up were highly correlated (r: SOL=.20, WASO=.75, $p<.01$; TST=.93, $p<.001$; SE=.95, $p<.001$).

Means and standard deviations for the dependent variables in the one-way ANOVAs at the four testing times are presented in Table 16. ANOVA summary tables for these variables are reported in Appendices I15 and I16. Results (after the application of Bonferroni corrections) indicate significant changes over time on one Sleep-Wake Parameter: WASO as measured by Sleep Questionnaire, and on two Subjective Sleep Variables: Insomnia Frequency and Insomnia Distress. Newman-Keuls post-hoc tests, with α set at .05, indicated improvement from Baseline (Mean = 2.66) to Post-Intervention (Mean = 1.37) with no further significant change at Follow-up or Long-term Follow-up on WASO, with an overall 49% improvement rate from Baseline to Post-Intervention. Results indicated continuing improvement on Insomnia Frequency from Baseline (Mean = 8.26) to Long-term Follow-up (Mean = 4.30), with an improvement rate of 48% for this time period. Distress Frequency shows significant improvement from Baseline to Follow-up, and continued improvement at Long-term Follow-up, with an overall magnitude of improvement of 44% (Baseline Mean = 5.17 and Long-term Follow-up Mean = 2.91).

In general, findings indicate that scores of the participants in this subsample appeared to improve after treatment and improvement was

Table 16

Means and Standard Deviations of Sleep Variables Across 4 Testing Times for Whole Sample

Variables	Baseline		Post-Intervention		Follow-Up		Long-Term Follow-Up		Neuman-Keuls Test
	M	SD	M	SD	M	SD	M	SD	($p<.05$)
Sleep-Wake Parameters - Daily Sleep Diary									
SOL	.51	.32	.38	.27	.45	.25	.45	.30	ns
WASO	1.44	.92	1.05	.91	1.04	.84	1.22	1.44	ns
TST	5.88	.95	6.27	.85	6.34	.90	6.23	1.07	ns
SE (%)	74	10	79	12	79	11	79	14	ns
Sleep-Wake Parameters - Sleep Questionnaire									
SOL	.68	1.14	.39	.31	.31	.20	.32	.29	ns
WASO	2.66	1.94	1.37	1.45	1.42	1.91	1.00	1.27	B>P=F=LF
TST	5.27	1.45	5.61	1.15	5.80	1.02	5.58	1.21	ns
SE (%)	69	18	72	15	74	16	74	18	ns
Subjective Sleep Variables									
Sleep Quality[a]	3.32	.51	3.67	.78	3.68	.82	3.63	.73	ns
Insomnia Frequency[b]	8.26	1.96	6.47	2.48	5.35	2.69	4.30	2.65	B=P=F>LF
Distress Frequency[b]	5.17	2.10	5.57	2.33	4.91	2.78	2.91	2.39	B=P>F>LF
Daytime Varibles									
Fatigue[b]	1.96	2.08	2.17	1.83	2.35	1.43	1.39	1.23	ns
Functioning[a]	4.06	.70	4.04	.71	4.04	.66	4.11	.52	ns
Restedness[a]	3.71	.79	3.82	.74	3.80	.77	3.96	.76	ns
Cognitive-Affective Variables									
Mental Activity[a]	3.61	.77	3.87	.69	3.79	.92	3.92	.64	ns
Physical Tension[a]	3.72	.74	3.85	.69	3.81	.72	3.79	.84	ns

Note. N=12 for Daily Sleep Diary variables. For all other variables, N = 23. All one-way ANOVA Group and Group x Time effects are nonsignificant. B=Baseline, P=Post-Intervention, F=Follow-Up, LF=Long-Term Follow-up.

[a]Higher scores indicate better adaptation.

[b]Higher scores indicate worse adaptation.

subsequently maintained on Sleep Quality and on most of the Sleep-Wake Parameters. A pattern of continuing improvement from Baseline to Long-term Follow-up was apparent on Insomnia Frequency (see Figure 2) and Distress Frequency. Consistent with the previous analyses, Daytime and Cognitive-Affective Variables (i.e., Mental Activity and Physical Tension) showed no change across testing times.

Overall Summary of Changes with Time for the Whole Sample

Table 17 summarizes the results of the Time main effects for all the ANOVAs for each of the three sets of analyses (for 2 and 3 testing times). As can be seen in this table, significant changes in Sleep-Wake Parameters and Subjective Sleep Variables occurred in all three groups from Baseline to Post-Intervention and short-term Follow-up. Data also indicate that for most variables, these changes were relatively well maintained for as long as 27 months. Notable exceptions to this trend are Daytime Variables and most Cognitive-Affective Variables, which did not show significant change over time. Anxious Self-Talk (ASSQ) was the only Cognitive-Affective variable which did show significant improvement over time.

HIGH DISTRESS PARTICIPANTS

Results showed substantial, significant changes in sleep parameters without concomitant significant changes on Insomnia Distress and on most Cognitive-Affective variables. Since even very poor sleepers can vary greatly in their experience of insomnia related distress (Fichten et al., 1995), the present sample's Baseline Distress Scores were examined. These ranged from 2 to 8 on the 10-point scale (mean = .85, SD = 2.28), with 12 participants experiencing relatively low distress (scores below 5) prior to the intervention. In order to obtain a sample of individuals with a greater insomnia complaint, these low distress participants were eliminated from the sample. Statistical

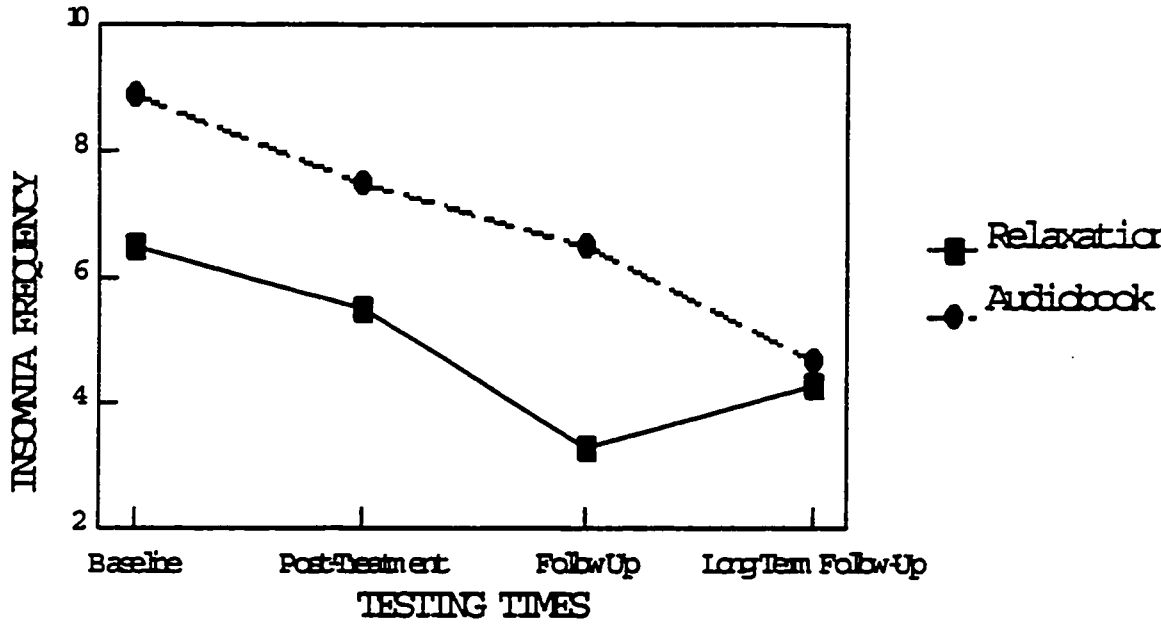


Figure 2: Weekly Means of Insomnia Frequency Ratings (1=not at all, 10=very often)

Table 17

Summary of ANOVA Significant Time Main Effects for the Whole Sample and for the High Distress Sample

	Baseline to Post-Intervention Comparisons				Pre-Post-Follow Comparisons	
	3 Group Design		2 Group Design (Enlarged Samples)			
Variables	Whole Sample	High Distress	Whole Sample	High Distress	Whole Sample	High Distres
Sleep-Wake Parameters						
SOL	ns	ns	**	**	*	ns
WASO	*	ns	**	*	***	***
TST	**	**	**	**	***	**
SE (%)	**	ns	***	**	***	**
Subjective Sleep Variables						
Sleep Quality	*	*	*	*	**	**
Insomnia Frequency	***	***	***	***	***	***
Distress Frequency	ns	*	ns	*	ns	ns
Sleep Self-Efficacy	**	***	***	***	***	***
Cognitive-Affective Variables						
Anxious Self-Talk	ns	*	**	**	***	***
Cognitive Arousal	ns	ns	ns	*	ns	ns
Mental Activity	ns	ns	ns	ns	ns	ns
Somatic Arousal	ns	ns	ns	*	ns	**
Physical Tension	ns	ns	ns	ns	ns	ns

* $p<.05$
** $p<.01$
*** $p<.001$

analyses were performed on the scores of the remaining 29 relatively high distress participants (Self-Monitoring Only group: N=9, Countercontrol-Plus Audiobook group: N=9, and the Countercontrol-Plus Relaxation group: N=11).

Baseline Functioning

Group Differences

At Baseline testing, 1-way ANOVAs revealed significant differences between the groups on 2 of the 17 comparisons (see Appendices J1 to J4). Significant findings were obtained on: 1) Physical Tension, $F(2,26) = 4.81$, $p<.05$, which indicated more tension in the Relaxation (mean = 3.07) than in the Self-Monitoring Only group (mean = 3.93), and 2) Somatic Arousal, $F(2, 26) = 4.87$, $p< .05$, which indicated more arousal in both the Relaxation (mean = 9.07) and Self-Monitoring Only groups (mean = 10.00) than in the Audiobook group (mean = 13.00). However, after a Bonferroni correction to the α levels, these significant findings disappeared.

Baseline vs Post-Intervention Comparisons

The MANOVA and ANOVA tests that were performed on the scores of the whole sample were repeated using the High Distress sample. MANOVAs on Sleep-Wake Parameters, Subjective Sleep Variables, Daytime Variables, and Cognitive-Affective Variables again indicated no significant Group or Group X Time interactions. These did however show significant Time main effects on all variables with the exception of Daytime Variables. ANOVA summary tables are presented in Appendices J5 to J12.

As can be seen in Table 17, the findings on improvement over time for the High Distress sub-sample were similar to the findings for the whole sample; this is especially true for the analyses with more power (i.e., the enlarged sample which consists of two rather than three experimental groups). That is, as was the case for the whole sample, Daytime Variables were not found to change significantly over time while

significant improvement Baseline to Post-Intervention was found on all Sleep-Wake Parameters, on 3 of 4 Subjective Sleep Variables (i.e., Sleep Quality, Insomnia Frequency and Sleep Self-Efficacy), and on one Cognitive-Affective Variable (Anxious Self-Talk). In addition, three comparisons which were previously non-significant for the whole sample, showed significant improvement in this High Distress sample: Distress Frequency, Cognitive Arousal and Somatic Arousal. The magnitude of improvement for these three variables was 14% for Distress Frequency and 11% for both Cognitive and Somatic Arousal. Means and standard deviations for Baseline to Post-Intervention comparisons are presented in Appendix J13 (for the 3 group comparison) and Table 18 (for the 2 group comparison).

Comparisons of the Two Treatment Conditions

Across Three Testing Times:

Baseline, Post-Intervention, and Follow-up

At the Follow-up testing time, data were available for 23 High Distress participants who completed the Daily Sleep Diaries: Countercontrol-Plus Audiobook group (N=13), Countercontrol-Plus Relaxation group (N=10). One subject failed to complete the Sleep Questionnaires; therefore for some analyses n=22.

Due to the small number of participants who completed all measures at all three testing times, the data could not be analyzed using Group by Time MANOVAs. It was however, possible to investigate sleep/wake changes over time for the group as a whole by collapsing scores across intervention conditions. Repeated measures ANOVAs [3 Testing Times (Baseline, Post-Intervention, Follow-up)] with Bonferroni corrections, were conducted on all 17 variables evaluated in previous analyses. Means and standard deviations for these dependent variables at the three testing times are presented in Table 19. ANOVA and Newman Keuls results

Table 18

Means and Standard Deviations at Baseline and Post-Intervention of High Distress Participants

Variables	Baseline		Post-Intervention		ANOVA Time Main Effect Significance Level
	M	SD	M	SD	
	Sleep-Wake Parameters				
SOL	.84	.63	.54	.36	p<.01
WASO	1.95	1.33	1.55	1.09	p<.05
TST	5.10	1.40	5.53	1.19	p<.01
SE (%)	63	18	69	16	p<.01
	Subjective Sleep Variables				
Sleep Quality	2.97	.67	3.35	.81	p<.05
Insomnia Frequency	8.86	1.56	7.18	2.29	p<.001
Distress Frequency	6.89	1.73	5.93	2.52	p<.05
Sleep Self-Efficacy	23.57	5.60	28.00	7.43	p<.001
	Daytime Variables				
Daytime Sleepiness (SSS)	2.39	1.20	2.39	1.45	ns
Daytime Fatigue	2.36	2.00	2.39	1.73	ns
Daytime Functioning	3.72	.74	3.82	.72	ns
Morning Restedness	3.38	.79	3.46	.84	ns
	Cognitive-Affective Variables				
Anxious Self-Talk	54.93	20.89	49.61	19.37	p<.01
Cognitive Arousal	17.68	5.16	15.82	4.46	p<.05
Mental Activity	3.48	.73	3.64	.89	ns
Somatic Arousal	10.86	2.90	9.68	1.91	p<.05
Physical Tension	3.55	.71	3.66	.82	ns

Note. N = 41.
All Group and Group x Time ANOVA effects are nonsignificant.
ns=nonsignificant.

Table 19

Means and Standard Deviations of Dependent Variables Across 3 Testing Times for High Distress Sample

Variables	Baseline		Post-Intervention		Follow-Up		Newma Keul Test (p<.0
	M	SD	M	SD	M	SD	
Sleep-Wake Parameters							
SOL	.84	.64	.53	.39	.54	.38	ns
WASO	1.89	1.26	1.43	.99	1.29	.91	B<P=
TST	5.21	1.26	5.63	1.06	5.78	1.01	B>P=
SE (%)	66	17	71	15	73	13	B>P=
Subjective Sleep Variables							
Sleep Quality[a]	2.96	.69	3.33	.82	3.42	.82	B>P=
Insomnia Frequency[b]	8.73	1.64	6.96	2.42	6.14	2.73	B<P<
Distress Frequency[b]	6.73	1.70	5.95	2.56	5.55	2.87	ns
Sleep Self-Efficacy[a]	22.68	4.47	27.55	7.31	28.64	7.17	B>P>I
Daytime Functioning							
Sleepiness (SSS)[b]	2.46	1.30	2.47	1.53	2.53	1.22	ns
Fatigue[b]	2.41	2.06	2.43	1.87	2.64	1.71	ns
Functioning[b]	3.73	.77	3.70	.70	3.71	.82	ns
Restedness[a]	3.40	.83	3.44	.77	3.55	.81	ns
Cognitive-Affective Variables							
Anxious Self-Talk[b]	54.59	18.49	48.05	16.19	43.46	15.49	B<P<F
Cognitive Arousal[b]	18.32	5.38	16.09	4.78	15.73	5.95	ns
Mental Activity[a]	3.35	.76	3.55	.87	3.63	.88	ns
Somatic Arousal[b]	11.00	2.60	9.86	2.15	9.64	1.92	B<P=F
Physical Tension[a]	3.51	.73	3.54	.85	3.67	.70	ns

Note. N=23 for all Daily Sleep Diary variables. For other variables, N=2
All one-way ANOVA Group and Group x Time effects are nonsignificant.
Reported significance levels are Time effects. ns=nonsignificant

[a]Higher scores indicate better adaptation.

[b]Higher scores indicate worse adaptation.

(Appendices J14 and J15) were similar to findings for the whole sample at Follow-up. Significant Baseline to Post-Intervention changes were found for WASO, TST, Sleep Efficiency, Sleep Quality, and Somatic Arousal, with improvement rates of 24%, 8%, 8% 13% and 10%, respectively. Three variables not only significantly improved from Baseline to Post-Intervention but also continued to significantly improve at Follow-up: Insomnia Frequency, Sleep Self-Efficacy, and ASSQ. The magnitude of improvement from Baseline to Follow-up for these variables was 30%, 26% and 20%, respectively.

Comparisons of The Two Treatment Conditions

Across Four Testing Times:

Baseline, Post-Intervention, Follow-up & Long-term Follow-up

Only 15 of the High Distress participants completed the Sleep Questionnaire at all four testing times: Audiobook group (N=9), Relaxation group (N=6) and only 10 of these completed the Daily Sleep Diary at all four testing times, including the Long-term Follow-up: Audiobook group (N=8), Relaxation group (N=2). Therefore, as in the analyses of the whole sample, only changes over time for the group as a whole were evaluated.

Means and standard deviations for dependent variables assessed at all four testing times are presented in Table 20. The pattern of changes and the significant differences found in this High Distress sample were similar to those of the whole sample at Long-term Follow-up. That is, ANOVAs indicated significant changes over time on WASO as measured by Sleep Questionnaire, and on Insomnia Frequency and Distress Frequency (see ANOVA summary tables in Appendices J16 and J17). Newman-Keuls post hoc tests showed significant improvement on WASO from Baseline (Mean = 3.43) to Post-Intervention (Mean = 1.81), which represents an improvement rate of 47%. Insomnia Frequency decreased significantly from Baseline to Follow-up, with no further significant

Table 20

Means and Standard Deviations of Sleep Variables Across 4 Testing Times for High Distress Sample

Variables	Baseline		Post-Intervention		Follow-Up		Long-Term Follow-up		N
	M	SD	M	SD	M	SD	M	SD	(
	Sleep-Wake Parameters - Daily Sleep Diary								
SOL	.54	.35	.37	.29	.41	.25	.47	.31	
WASO	1.47	.97	1.13	.99	1.15	.89	1.34	1.56	
TST	5.95	1.04	6.34	.92	6.40	.98	6.28	1.17	
SE (%)	75	11	79	13	79	12	79	16	
	Sleep-Wake Parameters - Sleep Questionnaire								
SOL	.92	1.36	.40	.33	.33	.21	.34	.30	
WASO	3.43	1.76	1.81	1.63	1.85	2.23	1.30	1.42	B<
TST	5.02	1.64	5.55	1.31	5.80	1.13	5.42	1.43	
SE(%)	65	20	69	16	72	16	70	19	
	Subjective Sleep Variables								
Sleep Quality[a]	3.38	.53	3.70	.85	3.78	.86	3.57	.79	r
Insomnia Frequency[b]	9.00	1.73	7.47	2.03	5.93	2.84	4.73	2.66	B=
Distress Frequency[b]	6.33	1.59	6.20	2.11	5.33	2.85	3.33	2.77	B=
	Daytime Varibles								
Fatigue [b]	2.33	2.19	2.13	1.85	2.47	1.41	1.13	2.13	
Functioning[b]	4.11	.75	4.03	.70	4.08	.70	4.13	.57	
Restedness[a]	3.90	.71	3.83	.81	3.91	.80	3.97	.84	
	Cognitive-Affective Variables								
Mental Activity[a]	3.70	.81	3.94	.72	4.00	.84	3.98	.68	
Physical Tension[a]	3.81	.79	3.93	.72	3.96	.69	3.89	.87	

Note. N = 10 for all Daily Sleep Diary variables. N = 15 for other variabl
B=Baseline, P=Post-Intervention, F=Follow-up, LF=Long-term Follow-up.

[a]Higher scores indicate better adaptation.

[b]Higher scores indicate worse adaptation.

change at Long-term Follow-up, and Distress Frequency only showed a significant decrease at Long-term Follow-up compared to all three previous testing times. The magnitude of change from Baseline to Long-term Follow-up for both these variables was 47%.

Summary of Significant Changes Over Time for the Whole Sample and for the High Distress Sample

Four aspects of the insomnia experience were investigated: estimates of sleep-wake durations, subjective sleep perceptions, daytime functioning and cognitive arousal. ANOVAs (multivariate and univariate) indicated significant improvement in all three intervention groups (Relaxation, Audiobook and Self-Monitoring Only) on all aspects but one: Daytime Variables. Improvement was noted mainly at Post-Intervention, with improvement rates varying from 6% (for TST and SE) to 36% (for SOL); for most variables, these changes were relatively well maintained for over a year. Subjective ratings of Insomnia Frequency and Distress Frequency continued to decrease over time, with improvement rates from Baseline to Long-term Follow-up ranging from 34% to 47%. The High Distress subsample was especially sensitive to changes in Distress and Cognitive-Affective Variables compared to the whole sample.

CLINICALLY SIGNIFICANT CHANGE

Relying on statistical comparisons of group means to evaluate treatment outcomes can be risky because it can obscure individual responses to treatment and because statistically significant improvement may not be clinically meaningful. Thus, the effectiveness of the interventions was evaluated by examining clinically significant change.

Assessing the clinical significance of statistically significant changes continues to challenge treatment outcome studies. Several techniques have been designed to assess the clinical significance of treatment effects for various disorders (Jacobson & Truax, 1991; Michelson, Mavissakalian & Marchione, 1985; Morin et al., 1994). One

technique involves reporting the number of participants whose scores on a given measure move from a dysfunctional range to a nondysfunctional range based on normative data. For insomnia, there are no available standardized norms for the sleep related variables assessed in the present study. An alternative has been to use criteria commonly used by insomnia researchers in selecting participants (Morin et al., 1994; Riedel et al., 1995).

In view of the differences noted in the mean performance of the High Distress group compared with the whole sample, the clinical significance of the changes in this subsample was evaluated at Post-Intervention. Examination of clinically significant change was limited to variables in the three areas that showed statistically significant change: sleep-wake durations, insomnia distress, and anxious self-talk.

Indices of Significant Change

1) Sleep-Wake Parameters

Three of the Sleep-Wake Parameters were included as indices of clinically significant change: SOL, WASO, and SE.

Participants were considered to be clinically improved at Post-Intervention if they (1) attained a 50% reduction on the main target symptom - either SOL, for those with a diagnosis of sleep onset insomnia, and/or WASO for those with a diagnosis of sleep maintenance insomnia at Baseline - and (2) achieved an absolute value of less than 30 minutes for that symptom at Post-Intervention. The criterion of 30 minutes of undesired wake time is traditionally used in selecting participants for insomnia treatment outcome research and was also used in the present study to diagnose type of sleep problem. The 50% reduction criterion minimizes the chance of classifying a participant as clinically improved when the Baseline score on the target symptom was already near the cutoff score of 30 minutes.

A sleep efficiency of 80% has been commonly used in outcome research to classify participants as good or poor sleepers. In the present study, participants were considered to be clinically improved if (1) their Sleep Efficiency moved from a dysfunctional range (less than 80%) to a functional one (80% and greater), and (2) if they showed an improvement rate of at least 10%. Once again, the dual criterion ensures that a participant with a baseline score already near the cutoff value is not classified as clinically improved.

2) Insomnia Distress

Due to the lack of information in the literature on this aspect of the sleep experience, valid criteria and standardized norms are lacking. Thus, for this study, participants were considered clinically improved if (1) they obtained a Post-Intervention Distress Frequency score lower than 5 and (2) they improved at least 2 scale points (on the 10-point scale). A cut-off score of lower than 5 was used because this is below the midpoint of the scale (indicating relatively low distress) and because scores under 5 fall one standard deviation below the mean of this High Distress sample (Mean = 6.83, SD = 1.73). Once again, the dual criterion was necessary to reduce the chance of classifying a participant with a Baseline score that is already near the cutoff value as clinically improved.

3) Anxious Self-Talk

Mean ASSQ scores were found to improve over time. Although norms exist for this measure, and the present sample's scores fall within these, no norms exist for the measure as it was used in the present investigation - i.e., as a measure of nocturnal cognitive arousal. Therefore, participants were considered clinically improved if (1) their Post-Intervention scores fell below 34.50, which is one standard deviation below the mean of the High Distress subsample (Mean = 56.34, SD = 21.88) and (2) their scores improved by at least 25%; this reduces

the chance of classifying a participant with a Baseline score that is already near the cutoff value as clinically improved.

Change Status

Table 21 presents a summary of the number of participants across the three intervention groups achieving various improvement rates on SOL, WASO, Sleep Efficiency, Distress Frequency and Anxious Self-Talk at Post-Intervention. Three categories of improvement are presented: 1) Clinically Improved - required participants to meet both clinical significance criteria on the variable in question, 2) Somewhat Improved - required participants to show an improvement above 0 without necessarily attaining the absolute Post-Intervention score defined by the clinical significance criteria on the variable in question, and 3) Unchanged/Worse - included participants who met neither of the two improvement criteria.

Since responders seemed to be evenly distributed among the three intervention groups (Table 21), significant change was examined irrespective of group membership. Table 22 presents a summary of the number of participants achieving various improvement rates on the five indices of clinically significant change.

SOL: Four (29%) of the 14 participants with a sleep onset insomnia diagnosis met the dual criteria of 50% improvement and less than 30 minute SOL at Post-Intervention. Seven (50%) additional participants met the criteria for Somewhat Improved, while 3 (21%) remained unchanged or deteriorated.

WASO: Only one (4%) of the 25 participants with a diagnosis of sleep maintenance insomnia met the dual criteria for clinically significant improvement (WASO <30 min and at least 50% improvement). Some improvement was obtained by 14 participants (56%) while 10 (40%) remained unchanged or deteriorated.

Table 21

Distribution of High Distress Participants with Varying Improvement Rates Across Intervention Conditions

	Clinically Improved	Somewhat Improved	Unchanged / Worse
SOL			
Relaxation	3	2	1
Audiobook	1	1	1
SM	0	2	2
WASO			
Relaxation	1	5	3
Audiobook	0	5	3
SM	0	4	4
Self Efficacy			
Relaxation	1	6	1
Audiobook	1	0	5
SM	2	3	3
Distress Frequency			
Relaxation	3	1	5
Audiobook	2	2	5
SM	2	4	3
Anxious Self-Talk			
Relaxation	1	2	0
Audiobook	0	2	1
SM	1	2	0

Table 22

Distribution of Improvement

Rates for the High Distress Sample

	n	Degree of Improvement		
		Clinically Improved[a]	Somewhat Improved[b]	Unchanged / Worse
SOL	14	4 (29%)	7 (50%)	3 (21%)
WASO	25	1 (4%)	14 (56%)	10 (40%)
Sleep Efficiency	22	4 (18%)	9 (41%)	9 (41%)
Distress Frequency	27	7 (26%)	7 (26%)	13 (48%)
Anxious Self-Talk	21	1 (5%)	15 (71%)	5 (19%)

Note. n reflects the number of participants who had the potential to improve.

[a]Clinically Improved:

SOL/WASO: Participants reaching dual criterion of improvement ≥ 50% and SOL or WASO below 30 minutes at Post-Intervention.

Sleep-Efficiency: Participants reaching dual criterion of improvement ≥ 10% and their score moving from 80% or greater to less than 80% at Post-Intervention.

Distress Frequency: Participants reaching dual criterion of improvement of 2 scale points and an absolute Post-Intervention score < 5.

Anxious Self-Talk: Participants reaching dual criterion of improvement ≥ 25% and a Post-Intervention score of < 34.50.

[b]Somewhat Improved:

SOL/WASO: Participants who have an improvement > 0 on SOL or WASO without necessarily reaching a waking duration of less than 30 minutes at Post-Intervention.

Sleep-Efficiency: Participants with an improvement > 0 but not necessarily a Post-Intervention Sleep Efficiency of 80%.

Distress Frequency: Participants with an improvement > 0 without necessarily reaching a Post-Intervention Distress score under 5.

Anxious Self-Talk: Participants with an improvement > 0 not necessarily reaching a Post-Intervention score below 34.50.

Sleep Efficiency: 27 participants had a sleep onset and/or a sleep maintenance insomnia diagnosis. Five of these had Baseline Sleep Efficiencies greater than 80%; 4 of these five participants deteriorated at Post-Intervention, but only by a maximum of 8 percentage points (e.g., 86% to 78%); the fifth subject improved. Of the remaining 22 participants, 4 (18%) moved from a dysfunctional to a functional range, with an improvement of at least 10%, 9 (41%) met the criteria for somewhat improved while another 9 (41%) remained unchanged or deteriorated.

Insomnia Distress Frequency. Seven out of 27 participants (26%) who had been diagnosed with a sleep onset and/or a sleep maintenance problem met the dual criteria of improvement of at least two scale points and an absolute Post-Intervention Distress score less than 5. Seven participants showed only some improvement (i.e., met either one of the two criteria or improved only one scale point), 6 remained unchanged and 7 deteriorated.

Anxious Self-Talk. Six of the 27 participants who had a sleep onset and/or a sleep maintenance insomnia diagnosis had Baseline scores below the improvement cutoff score of 34.50 and these scores remained unchanged at Post-Intervention. Of the remaining 21 participants, only one (5%) met the dual criteria for clinical significance (i.e., <34.5 and at least 25% improvement), 15 (71%) improved somewhat and 5 (19%) remained unchanged or deteriorated.

TREATMENT IMPLEMENTATION

A rigorous comparative evaluation of the interventions also required assessment of the following three potentially confounding components of treatment implementation: treatment credibility, satisfaction with the treatment, and treatment compliance.

Treatment Credibility and Satisfaction

Two t-tests for independent samples were performed on treatment credibility (Intervention Evaluation Form) and treatment satisfaction (Client Satisfaction Questionnaire) means in the two Countercontrol-Plus treatment groups. Results revealed that the two groups did not differ on evaluations of credibility, $t(1, 32) = 1.24$, $p>.05$, and satisfaction, $t(1, 33)=.27$, $p>.05$. Means for the whole sample indicate that treatment credibility was fairly high, with a mean of 37.38 (SD = 8.25), where the maximum possible score is 50. Participants also felt reasonably satisfied with the treatment they received, reporting an average satisfaction of 24.28 (SD = 5.11) out of a maximum possible score of 32.

Treatment Compliance

Participants in the two Countercontrol-Plus intervention groups were instructed to use a tape at night whenever they were awake for longer than 10 minutes. Thus, for sleep onset insomnia, participants were expected to use a treatment tape if they were awake after 'lights out' for more than 10 minutes. For sleep maintenance insomnia, the number of times a tape was expected to be used was more difficult to determine because participants were not required to report the duration of each nocturnal arousal; they were simply asked to record how often they awoke and the total amount of time that they were awake in the middle of the night. Given this limitation, the number of times a tape was expected to be used for sleep maintenance insomnia was estimated by dividing the time participants were awake (WASO) by the number of arousals. This calculation provided an estimate of the average duration of each arousal. Participants were expected to have used a tape for each sleep maintenance insomnia episode greater than 10 minutes. Treatment compliance was computed as a percentage of the number of times that participants used a treatment tape divided by the number of times

that they were expected to use a tape. Data reduction was accomplished by averaging daily compliance rates over one week.

Compliance was considered to be Low if the participant used the treatment tapes less than 50% of the time that she/he was expected to use them (i.e., after 10 minutes of undesired sleeplessness). Compliance was considered to be High if treatment tapes were used at least 50% of the time the participant should have used them.

Treatment compliance was assessed separately for sleep onset and sleep maintenance insomnia episodes. It was evaluated at Post-Intervention for the enlarged Countercontrol-Plus groups (n=40). Treatment Compliance was assessed for the Follow-up period as well, even though participants were not required to use tapes during this period.

Three comparisons of Treatment Compliance were conducted: 1) across treatment groups (i.e., Relaxation vs Audiobook), 2) across testing times (i.e, Intervention vs Follow-up phase), and 3) across type of insomnia episode (i.e., sleep onset vs sleep maintenance).

1) Comparisons of Compliance Across Treatment Groups

Differences in treatment compliance between the two treatment groups were analyzed in two ways: 1) t-tests were performed to determine whether the Relaxation and Audiobook groups differed on the percentage of times that they used a treatment tape, 2) Chi-square tests were used to assess whether the proportions of participants with Low and High levels of compliance differed significantly in the Relaxation and Audiobook groups.

Table 23 presents the number of participants with Low and High levels of compliance as well as the number of participants who did not need to use the treatment tapes. Table 24 presents means and standard deviations for treatment compliance across testing times, intervention conditions and type of insomnia problem for the whole sample.

Table 23

Treatment Compliance: Number of Participants with Low and High Compliance Across Insomnia Episodes at Post-Intervention and Follow-Up

	Type of Insomnia Problem			
	ONSET		MAINTENANCE	
	Intervention Group		Intervention Group	
Compliance	Relaxation	Audiobook	Relaxation	Audiobook
	Post - Intervention			
LOW	2	9	4	9
HIGH	14	10	14	11
Not Necessary	3	2	1	1
	Follow-Up			
LOW	6	7	8	4
HIGH	7	8	6	8
Not Necessary	3	3	1	6

Note. Post-intervention: Relaxation: N=19, Audiobook: N=21
Follow-up: Relaxation: N=15, Audiobook: N=18.

Table 24

Means and Standard Deviations of Treatment Compliance Scores (%) at Post-Intervention and Follow-Up

Type of Insomnia Problem	Intervention Group: Relaxation	Intervention Group: Audiobook	Total Sample
	Post-Intervention		
Onset[a]			
Mean	78.00	48.79	62.14
SD	33.36	38.59	38.69
Maintenance[b]			
Mean	75.39	55.35	64.84
SD	36.91	64.84	38.97
	Follow-Up		
Onset[c]			
Mean	53.08	49.93	51.39
SD	41.61	44.40	42.36
Maintenance[d]			
Mean	44.14	54.08	48.73
SD	41.85	43.45	42.03

[a]Relaxation: N=16, Audiobook: N=19
[b]Relaxation: N=18, Audiobook: N=20
[c]Relaxation: N=13, Audiobook: N=15
[d]Relaxation: N=14, Audiobook: N=12

Compliance at Post-Intervention Phase:

Sleep Onset Insomnia Episodes: The Daily Sleep Diary indicated that 35 participants experienced at least one episode of sleep onset insomnia, and therefore were expected to use treatment tapes. T-tests on this subsample, revealed a significant difference in compliance for sleep onset insomnia between Relaxation and Audiobook groups, $t(1,33) = 2.37$, $p<.05$, with greater compliance in the Relaxation group (mean = 78% vs mean = 49% for Audiobook). Also, the proportion of participants with Low and High levels of Treatment Compliance in the Relaxation and Audiobook groups differed significantly, $X^2(1,N=35) = 4.90$, $p<.05$, with fewer participants in the Relaxation group having Low compliance and a greater number having High compliance scores. As a whole group, most participants - 24 of the 35 (69%) who experienced a sleep onset insomnia episode - complied most of the time. The proportion of participants not experiencing sleep onset insomnia and therefore, not needing to use a treatment tape (5 out of 40) did not differ between the two treatment groups, $X^2 (1,N=40)= .36$, $p > .05$.

Sleep Maintenance Insomnia Episodes: Daily Sleep Diaries indicated that 38 participants experienced at least one episode of sleep maintenance insomnia. Although the mean scores suggest that the Relaxation group had greater compliance scores, an independent t-test failed to indicate a significant difference between the two treatment groups in compliance for sleep maintenance insomnia, $t(1,33) = 2.37$, $p>.05$. The mean compliance score for the whole sample was 65% (SD = 39%). A Chi-square comparison on the proportion of participants who had Low versus High compliance also failed to reveal significant differences between groups, $X^2 (1,N=38)= 2.18$, $p>.05$. Once again, most participants, 25 out of 38 (66%), who needed to use the tapes did so

more than 50% of the time. Only one participant in each treatment group did not need to use a treatment tape.

Compliance During the Follow-up Phase:

Sleep Onset Insomnia Episodes: Follow-up Daily Sleep Diaries indicated that 33 participants experienced at least one sleep onset insomnia episode. Results failed to indicate a significant difference in compliance for sleep onset insomnia between Relaxation and Audiobook groups, $t(1,26)=.19$, $p>.05$. The average compliance score for the whole sample was 51.39% (SD = 42.36%). A Chi-square test of the significance of the difference between proportions (i.e., participants with Low versus High compliance) also failed to reveal significant differences between the two groups, χ^2 (1,N=28) =.001, $p>.05$. In the whole sample, about the same proportion of individuals reported High (N=15) and Low compliance (N=13). The proportion of participants not experiencing sleep onset insomnia (5 out of 33) did not differ between the two Countercontrol-Plus treatment groups, χ^2 (1, N=33) =.07, $p> .05$.

Sleep Maintenance Insomnia Episodes: Daily Sleep Diaries at Follow-up indicated that 33 participants experienced some sleep maintenance insomnia. An independent t-test failed to indicate a significant difference in compliance between the two treatment groups, $t(1,24) = -.59$, $p>.05$. The proportion of individuals with Low and High compliance in the two groups were not significantly different, χ^2 (1, N = 26) = 1.47, $p>.05$. Once again, in the whole sample, the number of High versus Low compliance participants was similar (N = 14 and N = 12, respectively). A Chi-square test on the proportions of participants not needing to use the tapes (N=7) failed to show significant differences between the two Countercontrol-Plus treatment groups, χ^2 (1, N=33)= 3.48, $p>.05$.

2) Comparisons of Treatment Compliance Across Testing Times

For sleep onset insomnia episodes, paired t-tests failed to indicate any significant decrease in compliance from the Intervention to the Follow-up phase for either the Relaxation, $t(1,12)=1.97$, $p>.05$, or the Audiobook group, $t(1,13)=.14$, $p>.05$. However, for sleep maintenance insomnia episodes, paired t-tests did indicate a significant decrease in compliance at Follow-up for the Relaxation, $t(1,13)=3.56$, $p<.01$, but not for the Audiobook group, $t(1,11)=-.04$, $p>.05$.

3) Comparisons of Treatment Compliance across Types of Insomnia Episodes

No significant differences were found in Treatment Compliance when sleep onset insomnia episodes were compared to sleep maintenance episodes for Relaxation or Audiobook groups at either the Intervention or the Follow-up phase (see Appendix G).

Overall Treatment Compliance

Since participants in the present study experienced insomnia both when retiring at night and in the middle of the night, an estimate of how many participants complied with the treatment regardless of type of insomnia episode was evaluated. Overall treatment compliance was considered High if the participants used the treatment tape(s) during more than 50% of undesired awake times for at least one insomnia episode (sleep onset or sleep maintenance). Low overall treatment compliance was defined as using treatment tapes less than 50% of the time during both sleep onset and sleep maintenance episodes.

Chi-square comparisons on the proportion of participants who had Low and High levels of compliance failed to reveal differences between Relaxation and Audiobook groups at either Post-Intervention, $\chi^2(1, N=40) = 2.98$, $p> .05$, or Follow-up, $\chi^2 (1, 32) = .43$, $p>.05$. As a whole group, 78% of participants had High overall compliance at Post-Intervention and 59% had High overall compliance at Follow-up (see Table 25).

Table 25

Overall Treatment Compliance: Number of Participants with Low and High Compliance at Post-Treatment and Follow-Up

Intervention Group	Level of Compliance			
	High		Low	
	n	%	n	%
	Post - Intervention			
Relaxation	17	89.5	2	10.5
Audiobook	14	66.7	7	33.3
Whole Group	31	77.5	9	22.5
	Follow-Up			
Relaxation	8	53.3	7	46.7
Audiobook	11	64.7	6	35.3
Whole Group	19	59.4	13	40.6

Note. Post-Intervention: Relaxation: N=19, Audiobook: N=21.

Follow-up: Relaxation: N=15, Audiobook: N=17.

Summary

Results show that most participants (78%) complied with the treatment during the Intervention phase. Analyses indicated only one significant difference between Relaxation and Audiobook groups: Compliance for sleep onset insomnia during the Intervention phase was significantly higher in the Relaxation group than in the Audiobook group. Chi-square analyses supported the t-test results, indicating that the Relaxation group had a greater proportion of participants with High compliance scores. Also, the Relaxation group had treatment compliance scores that were greater during the Intervention phase than during the Follow-up phase, when participants were not obliged to use tapes; this was especially evident for sleep maintenance insomnia.

As can be seen in Table 24, compliance scores remain relatively stable, at about 50%, for the Audiobook group, regardless of insomnia episode or testing time. The Relaxation group, on the other hand, started with higher compliance (about 75%) during the Intervention phase; these, then decreased to the same level as the Audiobook group - to about 50% - at Follow-up.

DISCUSSION

The primary objective of the present study was to conduct a comparative evaluation of a new, brief, self-administered cognitive-behavioral treatment for the management of insomnia in older adults; specifically, the use of audiobooks within the context of a countercontrol intervention. In order to address the multidimensional nature of insomnia, three aspects of the subjective sleep experience were investigated: quantitative sleep-wake parameters, subjective, more qualitative sleep variables and daytime functioning. Based on the premise that the treatment operates by interfering with negative cognitive intrusions consequently facilitating sleep, cognitive and somatic arousal was also examined.

Limitations of the Study

Before discussing the results of the present investigation some of the limitations of this study will be considered. The sample size was relatively small, therefore, particularly in light of the number of variables examined, results should be viewed as preliminary and generalizability is limited. Replications with larger samples are needed.

Composition of the sample was restricted with respect to demographic variables as well as sleep related variables. Although participants were of both genders, they also tended to be female, white, generally healthy, well adjusted, educated and financially comfortable. Therefore, the findings may not generalize to other, less advantaged older populations. However, there is some empirical evidence that gender is unrelated to cognitive-behavioral treatment outcome (Morin et al., 1994) and that insomniacs with health (Morin, Kowatch & Wade, 1989) and psychiatric problems (Morin, Kowatch & O'Shanick, 1990) may also benefit from such treatments. The present sample was also restricted in

that participants were not regularly taking hypnotic medication and were screened for the presence of other sleep disorders. The results may therefore not be generalizable to other populations that are more at risk for insomnia due to the presence of other sleep disorders and dependency on sleep medication. Future research should study the applicability of cognitive-behavioral techniques to a broader range of participants.

Participants were community dwelling volunteers, thus presenting the possibility that their insomnia problem was less severe than that of patients seeking insomnia treatment in a clinical setting. While this too, could affect the generalizability of the findings it is unlikely. Participants reported substantial durations of nocturnal arousal (average WASO was one hour and 45 minutes) and they had been experiencing insomnia for an average of about 16 years. In addition, the literature suggests that there are no differences on sleep characteristics or in treatment outcome between patients seeking treatment and solicited community volunteers (Morin et al., 1994; Stepanski, Koshorek, Zorick, Glinn, Roehrs, & Roth, 1989).

It should also be noted that participants selected themselves for participation in the present treatment study. Thus insomnia was defined subjectively rather than objectively. The absence of polysomnography has several limitations. First, polysomnographic evaluations prior to the introduction of the interventions might have portrayed more accurately the extent and nature of the sleep disturbance. Second, it would have more accurately screened for insomnia due to sleep pathology, such as sleep apnea and myoclonus. Finally, objective evaluations would have provided another index of change. However, objective evaluation by polysomnographic recording is not necessarily the best criterion of sleep quality. It is rather another dimension of the sleep experience. Indeed, it is the subjective experience of the sleep disturbance that

causes people to feel distressed and seek treatment. Thus, treatments that address the subjective complaint are perhaps sufficient for the insomniac patient and the treating clinician.

The Present Findings and Their Context

The present data indicated statistically significant, though modest, improvement over time in the self-reported sleep experience of older adults in all three intervention groups, including the measurement only group. The effects of three factors may be operating: self-monitoring, indirect transmission of information, and nonspecific therapy effects.

Self-Monitoring Effects: Improvement with self-monitoring is not uncommon in the insomnia treatment outcome literature (Borkovec & Weerts, 1976; Carr-Kaffashan & Woolfolk 1979; Engle-Friedman et al., 1992; Nicassio & Bootzin, 1974). However, most studies that have focused on older adults have not included a measurement control group. Of the five studies which did include a measurement only group, two studies found no change over time in this group (Morin & Azrin, 1988; Puder et al., 1983) while three studies found significant improvement on waking after sleep onset and sleep efficiency (Engle-Friedman et al., 1992; Morin et al, 1993a; Riedel et al., 1995), sleep onset latency and total sleep time (Riedel et al., 1995), and on frequency of nocturnal arousals and morning restedness (Engle-Friedman et al., 1992).

It is as yet unclear what is responsible for these inconsistent findings. Riedel et al., (1995) suggested that insomnia which begins in the later years is particularly reactive to self-monitoring. This hypothesis was based on the finding that their older participants generally developed insomnia at about age 60, unlike Morin's (Morin et al., 1993a) or Puder's (Puder et al., 1983) participants, whose insomnia was of longer duration and had developed before age 60. Support for this hypothesis cannot be confirmed by the Engle-Friedman study (Engle-

Friedman et al., 1992), which found improvement on several sleep measures in control subjects since data on the duration of insomnia is not provided. In the present study, duration of insomnia is approximately 16 years, which would date the onset of insomnia before the age of 60, thus not supporting Riedel's hypothesis of differential aging-self-monitoring effects.

The completion of daily sleep diaries by all participants in all conditions may have had the reactive effect common to the self-monitoring process (Kazdin, 1974). Indeed, Jason (1975) found that just one week of self-monitoring was sufficient to significantly reduce SOL in severe insomniacs. Several factors related to self-monitoring may have contributed to improved sleep in the present study: (a) Self-monitoring may have provided a "reality check" on the sleep experience. Poor sleepers may have changed their perceptions of how well they slept, realizing that they slept better than they initially thought. (b) This realization may have encouraged them to monitor actual sleep parameters more accurately, thereby moderating overly pessimistic assessments of the sleep experience. (c) Participants may have learned that sleep quality and quantity are not uniformly impaired across different nights. (d) Self-monitoring may have indirectly allowed insomniacs to attend to and change some factors that may contribute to the variations in their sleep. For instance, observing that sleep is better when they go to bed later may elicit a change in the time they regularly go to bed. (e) Also, self-monitoring may have helped participants develop not only a coping approach but also a perception of self-control over sleep. (f) Attempting to complete the sleep diaries accurately, may have given the participants a focus other than their usual negative and intrusive thoughts, thus making self-monitoring an attention refocusing strategy, much like the two Countercontrol-Plus treatments. (g) Alternately, attending to the presleep somatic and cognitive experiences, may have

resulted in a decrease in negative affect and distress related to insomnia. For example, in a study of pain management and physical discomfort, Cioffi and Holloway (1993) found that simply focusing on physical discomfort (e.g., of having a hand in ice water for a prolonged amount of time) drained the emotionality of the sensations making the experience less painful.

Information Effects: All participants were exposed to an extensive evaluation process which involved interviews and questionnaires. Participants may have become more aware of sleep related issues through the questions they were asked to answer. They may have indirectly acquired information regarding factors potentially influencing their insomnia and possible strategies to help improve their problem.

Nonspecific Therapy Effects: Nonspecific therapy effects may have mitigated against differential intervention outcome. A good rapport was established with the volunteer poor sleepers who received considerable attention in each condition. This included the assessment interview, questionnaire completion at the laboratory and some telephone contact to aid and record sleep diary completion. In addition, all participants expected their insomnia would be treated. Thus, nonspecific treatment effects include hope and expectancy of improvement which may have reduced their anxiety and improved their sleep.

Experimental Dilemmas and Future Strategies

"Questionnaire cures" and nonspecific therapy effects are well known clinical phenomena. The reactivity of daily self-monitoring in particular, places researchers in a bind since the use of daily sleep diaries is a standard, useful and reliable way of measuring sleep parameters. A strategy that may circumvent this problem, or at least reduce the reactivity of sleep diaries, may be to reduce self-monitoring to one week at baseline and one week post-treatment, not including it as

part of the intervention phase. This may allow a clearer comparative examination of various interventions.

Nevertheless, the benefit derived from using daily sleep diaries points to their value as a component in an insomnia treatment program. Future research may profitably consider self-monitoring as a treatment component worthy of direct investigation. Some specific questions might be: What are the mediating processes of its reactivity? What are the long-term effects of monitoring one's sleep experience? What parameters are the most valuable to monitor? When does self-monitoring stop being reactive?

Intervention Effects

Improvement on Quantitative Sleep-Wake Parameters:

All groups in this study showed improvement in daily sleep diary reports of time related sleep-wake parameters (i.e., SOL, WASO, TST, SE). The average improvement rates were approximately 30% for SOL, 20% for WASO and 10% for sleep duration and sleep efficiency. At post-treatment only SOL fell to normal levels, below 30 minutes while WASO remained high (at about 90 minutes), total time slept was about 5 and a half hours, and sleep efficiency did not reach normal values ($\geq$ 80%). These findings are comparable to those in other studies of older insomniacs in relaxation treatment and self-monitoring groups (Johnson & Lichstein, 1994; Lichstein & Johnson, 1993; Friedman et al, 1991) as well as in a countercontrol treatment group (Davies et al., 1986) but improvement rates are lower than those found for a behavior therapy intervention including sleep restriction and stimulus control (Morin et al., 1993a). Perhaps, as Davies et al., (1986) suggest, the effective component in Stimulus Control which is missing in Countercontrol treatment, including the present Countercontrol-Plus treatment, is the requirement to regularize and consolidate sleep time. That is, scheduling consistent bedtimes and arising times and avoiding daytime

napping. This consolidation may be particularly important in treating sleep-maintenance problems in older adults who are susceptible to desynchronization of internal circadian rhythms (Regestein, 1980). Change in circadian rhythms may be due to a generalized deterioration of regulatory mechanisms associated with the normal aging process and possibly exacerbated by the break down of normal daily routines (Shock, 1977). The temporal elements of Stimulus Control Instructions may help regulate internal circadian rhythms for this older age group.

The finding that the durations of nocturnal arousals were more resistant to change than sleep onset latency is consistent with most studies evaluating insomnia treatments in older adults (e.g., Morin et al., 1993a, Riedel et al., 1995). Total sleep time has also been found not to show much improvement in older insomniacs; it seems to have an upper limit of about 6 hours (Anderson et al, 1988, Morin et al., 1993a;, Riedel et al., 1995). Difficulty changing the duration of nocturnal awake time and sleep time to the level of younger adults may reflect the age-related psychophysiological changes in sleep patterns and thus may not be completely amenable to change through cognitive-behavioral strategies. Therefore, in this population, a better index for a sleep maintenance insomnia problem may be the individual's perception of his/her sleep as problematic rather than an arbitrarily determined quantitative criterion of amount of wake or sleep times.

The finding that self-reported, quantitative sleep parameters can be changed in older adults is important. Improvement in these variables suggests a possible reversal, albeit, within certain limits, of the expected developmental changes. As mentioned earlier, the absence of objective data (e.g., polysomnography) is a limitation as self-report data are not corroborated with more objective physiological indices of sleep. However, studies which have included polysomnographic data have supported this pattern of change in older insomniacs (e.g., Engle-

Friedman et al., 1992). Furthermore, it may be the perception of improvement regardless of objective features which is most important to the individual suffering from a sleep problem.

Improvement on Subjective, Qualitative Sleep Variables

The importance of the subjective quality of the sleep experience is evidenced by improvement on subjective sleep variables. All three intervention groups showed improved ratings on Sleep Quality, Insomnia Frequency and Sleep Self-Efficacy Expectations; not surprisingly, only the High Distress subsample experienced a reduction in Insomnia Distress. Several other studies have also found changes in sleep quality after cognitive-behavioral treatments (Engle-Friedman et al., 1992); insomnia distress and sleep self-efficacy expectations have received less research attention.

The present results indicate that both the subjective qualitative and the more quantitative aspects, like total sleep time, can be altered. This is important since persons who feel that the quality of their sleep is good, that they have control over their sleep, and that they are less distressed about the insomnia problem are less likely to require and seek out sleep treatment.

The intercorrelations between the sleep-wake parameters and the subjective sleep variables provide a preliminary glance at the relationship between quantitative and qualitative aspects of the sleep experience in older insomniacs. Ratings of sleep quality were highly correlated with reports of WASO, TST and SE ($rs > .70$). This finding suggests that subjective measurement of insomnia may be greatly simplified in clinical practice. One easily made rating of sleep quality may replace several estimates of wake and sleep times.

Importance of Initial Insomnia Distress: Although all the participants in this study expressed the desire to receive treatment for their insomnia problem, they manifested variable frequencies of distress

related to insomnia. In fact, distress frequency was found to be only moderately correlated with sleep-wake parameters (*rs* range from .33 to .46), supporting the view that distress represents a different aspect of the insomnia experience (Fichten et al., 1995). It was only the highly distressed insomniacs that showed significant improvement in distress frequency, as well as in cognitive and somatic arousal.

Intervention Effects on Cognitive-Affective Variables

Five measures tapped the presleep cognitive/somatic state. Degree of cognitive and somatic arousal was evaluated by prospective daily monitoring as well as by global questionnaire. A qualitative measure of the pre-sleep cognitive state (Anxious Self-Talk - ASSQ) was also included. In the investigation of the whole sample, only scores on one measure consistently improved over time (ASSQ), while for the highly distressed participants, cognitive and somatic pre-sleep arousal also improved. The two diary variables measuring physical tension and mental activity did not show significant improvement over time. This may be a measurement artifact given the 5-point scale format. Alternately, these measures may reflect the actual day to day experiences of presleep mental and physical arousal, which were not affected by the interventions. The reductions in the questionnaire measures of cognitive and somatic arousal as well as in the anxious quality of presleep cognitions (ASSQ) may reflect a sense of better psychological adjustment. Some support for this hypothesis lies in the finding that Anxious Self-Talk was found to be positively correlated to psychological measures. (Regrettably, changes in psychological measures were not evaluated in this study.) Possibly, results may also suggest that participants that are more psychologically maladjusted initially - (i.e., greater, though not pathological, levels of cognitive arousal, distress, and psychological disturbance) are more likely to improve with brief cognitive-behavioral interventions or just daily self-monitoring.

Stability of Daytime Functioning Parameters

Daytime functioning variables (including two diary measures of morning restedness and daytime functioning, as well as two questionnaire measures of daytime fatigue and sleepiness) showed no concomitant improvement over time. This finding suggests that daytime functioning is unrelated to the nighttime sleep experience. This suggestion is supported by other findings indicating no difference in subjective (e.g., Mendelson, Garnett, Gillin & Weingarter, 1984; Sugarman, Stern & Walsh, 1985) and physiological measures (Seidel et al., 1984; Seidel and Dement, 1982) of sleepiness between good and poor sleepers. In the present study, fatigue and sleepiness were also highly correlated with psychological maladjustment variables, as have been found in other studies (e.g., Fichten et al., 1995), which suggests that daytime functioning might be more related to anxiety and depression than to sleep. Therefore, although impaired daytime functioning is a typical characteristic of the insomnia complaint, it does not necessarily respond to interventions which are effective in alleviating nighttime sleep difficulties. The implication is that insomnia interventions should also include anxiety and depression as targets for change.

Maintenance of Gains

In addition to showing short-term benefits, the findings indicate that participants who were exposed to the two treatment conditions (including participants who had previously been in the measurement only group) maintained their gains on many variables and further improved after an average of about 18 months, on Insomnia Frequency and Insomnia Distress. The gains made at long term follow-up should be evaluated within the context of a much reduced sample size. The sample that completed the long-term evaluation was found to have had better baseline and post-treatment sleep scores than non-completers. Therefore, the reduced insomnia frequency, and distress may simply reflect better

functioning in the completers. Alternately, the absence of continued gains on other outcome measures at long-term follow-up may be due to other factors such as those suggested by Engle-Friedman et al., (1992): support, attention and encouragement for participating decreased, and participants were not required to complete sleep diaries from the end of follow-up until the long-term follow-up period.

Although it is tempting to attribute the maintenance and continued gains of the intervention groups to the countercontrol-plus treatments, this cannot be done with certainty since a self-monitoring comparison group was not available at follow-up. The trend towards longer-term benefits of combined treatment and self-monitoring suggests some interesting research as to the mechanisms of change. For example, What exactly do participants learn? What do they do differently after treatment has ended?

Clinical Significance

Although all three intervention groups showed statistically significant improvement, clinically significant change was not high. About one quarter of the participants with an initial sleep onset problem significantly improved their sleep latency to a normal level (<30 minutes), while only one participant with a sleep maintenance problem had his waking time reduced to less than thirty minutes. Sleep Efficiency moved from a dysfunctional to a functional level for only 18% of participants. Data on Insomnia Distress frequency showed that some improvement occurred for 52% of participants, but only 26% improved by two scale points while also moving from a high level of distress (>5) to a low level of distress (<5). For the cognitive measure, ASSQ, although the majority of participants (71%) improved somewhat, only 5% showed clinically significant improvement.

Few insomnia outcome studies have examined clinically significant change. Those which did are difficult to compare since no standardized

evaluation of clinical significance is used. In general, these studies have found that between 30% and 60% of individuals show reliable, clinically significant improvement on subjective sleep-wake parameters with treatment (Espie et al., 1989; Lacks & Powlishta, 1989; Morin et al., 1994; Riedel et al., 1995). In the present study, comparable results were found only for SOL (i.e., 29% of participants showed clinically significant change). However, an important part of the insomnia experience has not been evaluated for clinically significant change: comparisons for insomnia distress and cognitive variables are not available since these have not been investigated.

These present results underscore the importance of examining individual improvement in all aspects of the insomnia experience and not solely relying on average group changes. Given the heterogeneity of insomnia, it is not surprising that there are variations in who benefits from interventions such as self-monitoring and such focused interventions as were examined in this study. Why treatment is effective for some and not others needs to be explained. Regrettably, due to the small sample size, the discriminatory variables between the successes and failures could not be reliably evaluated. Future research should examine who benefits from what interventions in order to tailor treatment to the individual needs of each insomniac.

Credibility, Satisfaction and Compliance

The assessment of a treatment's effectiveness goes beyond evaluating changes in multiple sleep-wake variables. In order for a treatment to be effective, or even just attempted by potential patients, it should be viewed as credible and acceptable. Adequate compliance is also important, especially with insomnia therapy since most of the work is done at home. Credibility, satisfaction and compliance, however, are infrequently evaluated in insomnia outcome research. In the evaluation of a new treatment, the assessment of such factors is even more

necessary. In the present study, credibility and satisfaction were equivalent for the two treatment groups, and the scores seemed to be high. However, the lack of attention to these variables in outcome research precludes comparison of these measures across studies.

Compliance to treatment instructions is also infrequently evaluated. Investigators at times report anecdotal information regarding participants' reports of difficulty complying (e.g., Davies et al., 1986). However, empirical data is not reported. Thus, there are no standard methods of assessing compliance. Indeed, as experienced by the present investigator, assessment of treatment compliance is challenging. Some of the issues that arise include: How can one obtain accurate reports of nocturnal waking durations without having participants watch the clock? How can one subsequently get participants to honestly report whether they complied with the treatment instructions each time they should (i.e., in this study, using the audiotapes when awake more than 15 minutes)? What amount of compliance is acceptable or even necessary for treatment effectiveness? In the present study decisions with respect to these questions had to be made without empirical information.

Overall, treatment compliance was found to be high for both treatments, with 90% of Relaxation treatment and 67% of the Audiobook treatment participants using the tapes most of the time. Compliance was better for sleep onset difficulties than for sleep maintenance difficulties (especially for the relaxation group). This is consistent with previous reports of difficulty with the countercontrol and stimulus control instructions of doing something (e.g., getting out of bed, turning on the light to read) in the middle of the night during unwanted wakefulness episodes (Davies et al., 1986). This raises the question, Why is compliance difficult, particularly in the middle of the night? Does the present treatment still involve a task that is too onerous to perform (i.e., turning on a tape recorder and/or listening to an

audiotape)? Is low compliance a reflection of the lack of motivation to perform any task in the middle of the night? Is this lack of motivation perhaps related to psychological factors?

Lack of Treatment Effects

The efficacy of the Countercontrol- Plus Audiobook technique (as well as the Countercontrol Plus Relaxation) in the treatment of insomnia, may be underestimated for a number of reasons: The interventions were brief (2 weeks). Most evaluated cognitive behavioral treatments have had longer durations, usually lasting more than four weeks. There has been some suggestion in the insomnia literature that passive relaxation may require six treatment sessions to be as effective as progressive relaxation which may require four sessions (Shealy, 1979).

Most studies incorporate some sleep hygiene instructions in order to safeguard against interference from physiological arousal from substances(e.g., caffeine) or activities (e.g., exercise). These instructions were not included in the present study in order to evaluate the treatment's unique contribution to outcome. This may have however, weakened the treatment effect.

No attempt was made to personalize treatment in any way. For instance, there was no consideration of possible individual necessity for longer practice time in order to get familiar with the equipment and perhaps, the novel act of listening to audiobooks. There was no evaluation of individual differences in the previous use of sleep inducing strategies similar to those of the current treatment, such as watching television, listening to radio talk shows or practising some type of relaxation. There was no attempt to match participants to a treatment, either of their own choosing or different from the strategies that they have already unsuccessfully tried (e.g., relaxation). The Countercontrol-Plus treatments involved restrictions regarding personal

preferences as well. Participants had a limited number of choices of audiobooks and only one type of relaxation technique was provided.

With some modification (e.g., longer and more personalized treatment), Countercontrol-Plus Audiobook and Countercontrol-Plus Relaxation have the potential of being effective components in insomnia treatment packages.

The present study went beyond the initial goal of evaluating the effectiveness of a new insomnia treatment strategy. In the process it highlighted the multifaceted nature of the insomnia complaint and the complexities of implementing an appropriate insomnia treatment.

REFERENCES

Alperson, J., & Biglan, A. (1979). Self-administered treatment of sleep onset insomnia and the importance of age. Behavior Therapy, 10, 347-356.

Alsten, C., Davey, R., & Jackson, T.B. (1995). Preliminary evaluation of a "Sleep Training" program to enhance the quality and quantity of aircrew sleep. Proceedings: 9th Annual Meeting of the Association of Professional Sleep Societies, Rochester, MN.: APSS.

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

Anderson, M.W., Zendell, S.M., Rosa, D.P., Rubinstein, M.L., Herrera, C.O., Simons, O., Caruso, L., & Speilman, A.J. (1988). Comparison of sleep restriction therapy and stimulus control in older insomniacs. Sleep Research, 17, 141.

Angst, J., Vollrath, R.K., & Dobler-Mikola, A. (1989). The Zurich study: VII. Symptoms, classifications, and prevalence. European Archives of Psychiatry and Neuroscience, 238, 185-293.

Ascher, L.M., & Efran, J.S. (1978). Use of paradoxical intention in a behavioral program for sleep onset insomnia. Journal of Consulting and Clinical Psychology, 46(3), 547-550.

Ascher, L.M., & Turner, R.M. (1979). Paradoxical intention and insomnia: An experimental investigation. Behavior Research & Therapy, 17(4), 408-411.

ASDA (Diagnostic Classification Steering Committee), Thorpy, M. J., Chairman. (1990). International classification of sleep disorders: Diagnostic and coding manual. Rochester, MN.: American Sleep Disorders Association.

Balter, M.B., & Uhlenhuth, E.H. (1992). New epidemiologic findings about insomnia and its treatment. Journal of Clinical Psychiatry, 53(12), 34-39.

Bernstein, D.A., & Borkovec, T.D. (1973). Progressive Relaxation training: A manual for the helping professions. Champaign, IL.: Research Press.

Beutler, L.E., Thornsby, J.I., & Karacan, D. (1978). Psychological variables in the diagnosis and treatment of insomnia. In R.L. Williams & I. Karacan (Eds.), Sleep disorders: Diagnosis and Treatment. New York: John Wiley & Sons.

Bixler, E.O., Kales, A., Soldatos, C.R., Kales, J.D., & Healey, S. (1979). Prevalence of sleep disorders in the Los Angeles metropolitan area. American Journal of Psychiatry, 136(10), 1257-1262.

Bliwise, D.L. (1993). Review: Sleep in normal aging and dementia. Sleep, 16(1), 40-81.

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 Sciences and Medicine, 34, 49-55.

Bootzin, R.R. (1977). Effect of self-control procedures for insomnia. In R. Stuart (Ed.), Behavioral self-management: Strategies, technique and outcome (pp.176-195). N.Y: Brunner/Mazel

Bootzin, R.R., & Engle-Friedman, M. (1981). The assessment of insomnia. Behavioral Assessment, 3,107-126.

Bootzin, R.R., Engle-Friedman, M., & Hazelwood, L. (1983). Insomnia. In P.M. Lewinsohn & L. Teri (Eds.), Clinical geropsychology: New directions in assessment and treatment (pp. 81-115). New York: Pergamon.

Bootzin R. R., & Nicassio, P. M. (1978). Behavioral treatments for insomnia. In M. Hersen, R. Eisler, & P. Miller (Eds.), Progress in behavior modification, Vol. 6. New York: Academic Press.

Borkovec, T.D. (1979). Pseudo (experimental) -insomnia and idiopathic (objective) insomnia: Theoretical and therapeutic issues. Advances in Behaviour Research and Therapy, 2, 27-55.

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

Borkovec, T.D., & Fowles, D.C. (1973). Controlled investigation of the effects of progressive and hypnotic relaxation insomnia. Journal of Abnormal Psychology, 82, 153-158.

Borkovec, T.D., Grayson, J.B., O'Brien, G.T., & Weerts, T.C. (1979). Relaxation treatment of pseudoinsomnia and idiopathic insomnia: An electroencephalographic evaluation. Journal of Applied Behavioral Analysis, 12, 37-54.

Borkovec, T.D., & Hennings, B.L. (1978). The role of physiological attention-focusing in the relaxation treatment of sleep disturbance, general tension, and specific stress reaction. Behavior Research and Therapy, 16, 17-19.

Borkovec, T.D., Kaloupek, D., & Slama, K. (1975). The facilitative effect of muscle tension release in the relaxation treatment of sleep disturbance. Behavior Therapy, 6, 301-309.

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(6), 607-609.

Borkovec, T.D., & Nau, S.D. (1972). Credibility of analogue therapy rationales. Journal of Behavior Therapy and Experimental Psychology, 3, 257-260.

Borkovec, T.D., Weerts, T.C. (1976). Effects of progressive relaxation on disturbance: An electroencephalographic evaluation. Psychosomatic Medicine, 38(3), 173-180.

Brabbins, C.J., Dewey, M.E., Copeland, J.R.M. Davidson, A., McWilliam, C., Saunders, P., Sharma, V.K., & Sullivan, C. (1993). Insomnia in the elderly: Prevalence gender differences and relationships with morbidity and mortality. International Journal of Geriatric Psychiatry, 8, 473-480.

Buysse, D.J., & Reynolds III, C.F. (1990). Insomnia. In M.J. Thorpy (Ed.), Handbook of sleep disorders (pp. 375-433). New York: Marcel Dekker Inc.

Buysse, D.J., Reynolds III, C.F., Monk, T.H., Hoch, C.C., Yeager, A.L., & Kupfer, D.J. (1991). Quantification of subjective sleep quality in healthy elderly men and women using the Pittsburgh Sleep Quality Index (PSLQ). Sleep, 14(4), 331-338.

Carr-Kaffashan, L., & Woolfolk, R.L. (1979). Active and placebo effects in treatment of moderate and severe insomnia. Journal of Consulting and Clinical Psychology, 47(6), 1072-1080.

Carskadon, M.A., & Dement, W.C. (1989). Normal human sleep: An overview. In M.H. Kryger, T. Roth, & W.C. Dement (Eds.), Principles and practices of sleep medicine: Section 1, Normal sleep and its variations (pp. 3-13). Philadelphia: W.B. Saunders Co.

Carskadon, M.A., Dement, W.C., Mitler, M.M., Roth, T., Westbrook, P.R., & Keenan, S. (1986). Guidelines for the multiple sleep latency test (MSLT): A standard measure of sleepiness. Sleep, 9, 519-524.

Chambers, M.J., & Alexander, S.D. (1992). Assessment and prediction of outcome for a brief behavioral insomnia treatment program. Journal of Behavior Therapy and Experimental Psychiatry, 23(4),289-297.

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

Cioffi, D., & Holloway, J. (1993). Delayed costs of suppressed pain. Journal of Personality and Social Psychology, 64(2), 274-282.

Coates, T.J., Killen, J.D., George, J., Marchini, E., Silverman, S., & Thoresen, C. (1982). Estimating sleep parameters: A multi-trait - multi-method analysis. Journal of Consulting and Clinical Psychology, 50(3), 345-352.

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(3), 243-250.

Coates, T.J., & Thoresen, C.E. (1979). Treating arousals during sleep using behavioral self-management. Journal of Consulting and Clinical Psychology, 47, 603-605.

Cook, M.A., & Lacks, P. (1984, November). The effectiveness of booster sessions in the treatment of sleep onset insomnia. Paper presented at the annual meeting of the Association for the Advancement of Behavior Therapy, Philadelphia, PA.

Coren, S. (1988). Prediction of insomnia from arousability predisposition scores: Scale development and cross validation. Behaviour Research and Therapy, 26(5), 415-420.

Coursey, R.D., Buchsbaum, M., & Frankel, B.L. (1975). Personality measures and evoked responses in chronic insomniacs. Journal of Abnormal Psychology, 84(3), 239-249.

Coursey, R.D., Frankel, B.L., Gaarder, K.R., & Mott, D.E. (1980). A comparison of relaxation techniques with electrosleep therapy for chronic sleep-onset insomnia: A sleep EEG Study. Biofeedback and Self-Regulation, 5, 57-73.

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

Davies, D.R. (1989). A multiple treatment approach to the group treatment of insomnia: A follow-up study. Behavioral Psychotherapy, 17(4), 323-331.

Davies, R., Lacks, P., Storandt, M., & Bertelson, A.P. (1986). Countercontrol treatment of sleep-maintenance insomnia in relation to age. Psychology and Aging, 1, 233-238.

Dement, W. (1972). Some must watch while some must sleep. San Francisco: Freeman.

Dement, W.C., Miles, L.E., & Carskadon, M.A. (1982). "White paper" on sleep and aging. Journal of the American Geriatrics Society, 30, 25-50.

Derogatis, L. R. (1977). The Psychopathology Rating Scale: A brief description. Unpublished manuscript.

Derogatis, L.R., Rickels, K., & Rock, A.F. (1976). The SCL-90 and the MMPI: A step in the validation of a new self-report scale. British Journal of Psychiatry, 128, 280-289.

Digman, J. M. (1990). Personality structure: Emergence of the 5-Factor model. Annual Review of Psychology, 41, 417-440.

Dorsey, C., & Bootzin, R.R. (1987). Subjective and psychophysiologic insomnia: Multiple Sleep Latency Test, sleep tendency, and personality. Sleep Research, 16, 328.

Edinger, J. D., Hoelscher, T. J., Marsh, G. R., Lipper, S., & Ionescu-Pioggia, M. (1992). A cognitive-behavioral for sleep-maintenance insomnia in older adults. Psychology and Aging, 7(2), 282-289.

Edinger, J.D., Lipper, S., & Wheller, B. (1989). Hospital ward policy and patients' sleep patterns: A multiple baseline study. Rehabilitation Psychology, 34(1), 43-50.

Engle-Friedman, M., Bootzin, R., Hazelwood, L., & Tsao, C. (1992). An evaluation of behavioral treatments for insomnia in the older adult. Journal of Clinical Psychology, 48(1), 77-90.

Espie, C.A., Brooks, D.N., & Lindsay, W.R. (1989). An evaluation of tailored psychological treatment of insomnia. Journal of Behavioral Therapy and Experimental Psychiatry, 20(2), 143-153.

Espie, C. A., & Lindsay, W. R. (1987). Cognitive strategies for the management of severe sleep - maintenance insomnia: A preliminary investigation. Behavioural Psychotherapy, 15, 388-395.

Espie, C.A., Lindsay, W.R., Brooks, D.N., Hood, E.M., & Turvey, T. (1989). A controlled comparative investigation of psychological treatments for chronic sleep-onset insomnia. Behavior Research & Therapy, (1), 79-88.

Eysenck, H. J., & Eysenck, S. B. G. (1968). Manual: Eysenck Personality Inventory. San Diego: Educational and Industrial Testing Service.

Feinberg, I., Koreska, R., & Hetter, N. (1967). EEG sleep patterns as a function of normal and pathological aging in man. Journal of Psychiatric Research, 5, 107.

Fichten, C.S. (1990). Passive relaxation exercises [Audiotape recording]. Montreal: Sir Mortimer B. Davis - Jewish General Hospital.

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

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(6), 425-432.

Freedman, R.R., & Papsdorf, J.D. (1976). Biofeedback and progressive relaxation treatment of sleep-onset insomnia: A controlled, all night investigation. Biofeedback and Self-Regulation, 1, 253-271.

Freedman, R. R., & Sattler, H. L. (1982). Physiological and psychological factors in sleep-onset insomnia. Journal of Abnormal Psychology, 91(5), 380-389.

Friedman, L., Bliwise, D.L., Yesavage, J.A., & Salom, S.S. (1991). A preliminary study comparing sleep restriction and relaxation treatments for insomnia in older adults. Journal of Gerontology: Psychological Sciences, 46(1), 1-8.

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(1), 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 Association of Professional Sleep Societies, Rochester, MN.: APSS.

Gislason, T., & Almqvist, M. (1987). Somatic disease 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(1), 31-39.

Gourash Bliwise, N. (1992). Factors related to sleep quality in healthy elderly women. Psychology and Aging, 7(1), 83-88.

Gross, T.F. (1990). General test and stats anxiety in real examinations: State is not test anxiety. Educational Research Quarterly, 14(3), 11-20.

Gross, R.T., Borkovec, T.D. (1982). Effects of a cognitive intrusion manipulation on the sleep-onset latency of good sleepers. Behavior Therapy, 13, 112-116.

Habte-Gabr, E., Wallace, R.B., Colsher, P.L., Hulbert, J.R., White, L.R., Smith, I.M. (1991). Sleep patterns in rural elders: Demographic, health, and psychobehavioral correlates. Journal of Clinical Epidemiology, 44,5-13.

Hale, W. D., Cochran, C. D., & Hedgepeth, B. E. (1984). Norms for the elderly on the Brief Symptom Inventory. Journal of Consulting and Clinical Psychology, 52, 321-322.

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.

Hauri, P. (1977). Current concepts: The sleep disorder. Kalamazoo: Upjohn.

Hauri, P. (1989). Primary insomnia. In M.H. Kryger, T. Roth, & W.C. Dement (Eds.), Principles and practices of sleep medicine (pp. 442-447). Philadelphia, PA.: W.B. Saunders.

Haynes, S. N., Adams, A., & Franzen, M. (1981). The effects of presleep stress on sleep-onset insomnia. Journal of Abnormal Psychology, 90(6), 601-606.

Haynes, S.N., Fitzgerald, S.G., Shute, G., O'Meary, M. (1985). Responses of psychophysiologic and subjective insomniacs to auditory stimuli during sleep: A replication and extension. Journal of Abnormal Psychology, 94(3), 338-345.

Haynes, S.N., Mosely, D., & McGowan, W.T. (1975). Relaxation training and biofeedback in the reduction of frontalis muscle tension. Psychophysiology, 12, 547-552.

Haynes, S.N., Sides, H., & Lockwood, G. (1977). Relaxation instructions and frontalis electromyographic feedback intervention with sleep onset insomnia. Behavior Therapy, 8, 644-652.

Haynes, S.N., Woodward, S., Moran, R., & Alexander, D. (1974). Relaxation treatment of insomnia. Behavior Therapy, 5, 555-558.

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

Heide, F.J. & Borkovec, T.D. (1983). Relaxation-induced anxiety: Paradoxical anxiety enhancement due to relaxation training. Journal of Consulting and Clinical Psychology, 51(2), 171-182.

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. The Medical Journal of Australia, 162, 22-24.

Hirshkowitz, M., Hamilton III, C.R., Rando, K.C., Bellamy, M., Williams, R.L., & Karacan, I. (1990). State-trait anxiety scores in adults with sleep complaints. Sleep Research, 19, 163.

Hoddes, E., Zarcone, V., Smythe, H., Phillips, R., & Dement, W. C. (1973). Quantification of sleepiness: A new approach. Psychophysiology, 10, 431-437.

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

Hohagen, F., Rink, K., Kappler, C., Schramm, E., Riemann, D., Weyerer, S., & Berger, M. (1993). Prevalence and treatment of insomnia in general practice: A longitudinal study. European Archives of Psychiatry and Clinical Neuroscience, 242(6), 329-336.

Jackson, T.B., & Alsten, C. (1994). Audiogenic sleep training system: Handbook for use with audiogenic natural sleep and relaxation series audiocassettes. Idyllwild, CA: Inner Health.

Jackson, T.B., & Alsten, C. (1995). Replacement of sedative-hypnotics with a multimodality, tape recorded insomnia treatment program on a locked psychiatric unit. Proceedings: 9th Annual Meeting of the Association of Professional Sleep Societies, Rochester, MN.: APSS.

Jacobs, G.D., Benson, H.,& Friedman, R. (1993). Home based central nervous system assessment of a multifactor behavioral intervention for chronic sleep-onset insomnia. Behavior Therapy, 24, 159-174.

Jacobson, F. (1938). Progressive relaxation (2nd ed.). Chicago: University of Chicago Press.

Jacobson, N.S., & Traux, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. Journal of Consulting and Clinical Psychology, 59, 12-19.

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(7), 589-597.

Jason, L. (1975). Rapid improvement in insomnia following self-monitoring. Journal of Behavior Research and Experimental Psychology, 6, 349-350.

Johnson, R.A., & Lichstein, K.L. (1994). Relaxation vs. sleep compression/education in the treatment of geriatric insomnia (p. 339). Convention Proceedings for the 28th Annual AABT Convention, San Diego, CA.

Kahn, E., & Fisher, C. (1969). The sleep characteristics of normal-aged male. Journal of Nervous and Mental Disease, 148, 477-494.

Kales, J. (1975). Aging and Sleep. In R. Goldman & M. Rochstein (Eds.), The physiology and pathology of human aging (pp. 117). New York: Academic Press.

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., Caldwell, A.B., Soldatos, C.R., Bixler, E.O., & Kales, J.D. (1983). Biopsychobehavioral correlates of insomnia, II. Pattern specificity and consistency with the Minnesota Multiphasic Personality Inventory. Psychosomatic Medicine, 45(4), 341-356.

Kales, A., & Kales, J.D. (1984). Evaluation and treatment of insomnia. New York: Oxford University 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(11), 1371-1376.

Kales, A., Scharf, M.B., & Kales, J.D. (1978). Rebound insomnia: A new clinical syndrome. Science, 201, 1039-1040.

Kales, A., & Vgontzas, A.N. (1992). Predisposition to and development and persistence of chronic insomnia: Importance of psychobehavioral factors. Archives of Internal Medicine, 152, 1570-1572.

Karacan, I., Thornby, J.I., & Williams, R.L. (1983). Sleep disturbance: A community survey. In C. Guilleminault & E. Lugaresi (Eds.), Sleep/wake disorders: Natural history, epidemiology, and long-term evolution (pp. 37-60). New York: Raven.

Karacan, I., Thornby, J.I., Anch, M., Hozer, C.E., Warheitt, G.J., Schwab, J., & Williams, R.L. (1976). Prevalence of sleep disturbance in a primary urban Florida county. Social Science and Medicine, 10, 239-244.

Kay, D.C. Blackburn, A.B., Buckingham, J.A., & Karacan, I. (1976). Human pharmacology of sleep. In R.L. Williams & I. Karacan (Eds.), Pharmacology of Sleep. New York: Wiley.

Kazdin, A.E. (1974). Self-monitoring and behavior changes. In M.J. Mahoney & C.E. Thoresen (Eds.), Self-control: Power to the person. Monterey, CA.: Brooks Cole.

Kendall, P. C., & Hollon, S. D. (1989). Anxious self-talk: Development of the Anxious Self-Statements Questionnaire (ASSQ). Cognitive Therapy and Research, 13(1), 81-93.

Klink, M., & Quan, S.F. (1987). Prevalence of reported sleep disturbances in a general adult population and their relationship to obstructive airways disease. Chest, 91, 540-546.

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 Press.

Lacks, P. (1988). Daily sleep diary. In M. Hersen & A. S. Bellack (Eds.), Dictionary of behavioral assessment techniques. (pp. 162-164). New York: Pergamon.

Lacks, P., Bertelson, A.D., Gans, L., & Kunkel, J. (1983). The effectiveness of three behavioral treatments for different degrees of sleep onset insomnia. Behavior Therapy, 14, 593-605.

Lacks, P., Bertelson, A.D., Sugarman, J., & Kunkel, J. (1983). The treatment of sleep maintenance insomnia with stimulus-control techniques. Behavior Research Therapy, 21(3), 291-295.

Lacks, P., & Morin, C.M. (1992). Insomnia. Clinician's Research Digest, 10(12), 5.

Lacks, P., & Powlishta, K. (1989). Improvement following behavioral treatment for insomnia: Clinical significance, long term maintenance and predictors of outcome. Behavior Therapy, 20, 117-134.

Ladouceur, R., & Gros-Louis, Y. (1986). Paradoxical intention vs. stimulus control in the treatment of severe insomnia. Journal of Behavior Therapy and Experimental Psychiatry, 17(4), 267-269.

Larsen, D., Attkinson, C., Hargreaves, W., & Nguyen, T. (1979). Assessment of client/patient satisfaction: Development of a general scale. Evaluation and Program Planning, 2, 197-207.

Levey, A.B., Aldez, J.A., Watts, F.N., & Coyle, K. (1991). Case histories and shorter communications: Articulatory suppression and the treatment of insomnia. Behavior Research Therapy, 29(1), 85-89.

Levin, D., Bertelson, A. D., & Lacks, P. (1984). MMPI differences among mild and severe insomniacs and good sleepers. Journal of Personality Assessment, 48(2), 126-129.

Libman, E., Creti, L., Amsel, R., Brender, W., & Fichten, C.S. (1995a). Behaviors during awake times in older good and poor sleepers: The Sleep Behaviors Scale-60+. Manuscript in preparation.

Libman, E., Creti, L., & Fichten, C. S. (1987). Determining what patients should know about transurethral prostatectomy. Patient Education and Counselling, 9, 145-153.

Libman, E, Fichten, C. S., Creti, L., Weinstein, N., Amsel, R., & Brender, W. (1989a). Sleeping and waking state measurement of erectile function in an aging male population. Psychological Assessment: A Journal of Consulting and Clinical Psychology, 1(4), 284-291.

Libman, E, Fichten, C. S., Creti, L., Weinstein, N., Amsel, R., & Brender, W. (1989b). Transurethral prostatectomy: Differential effects of age category and presurgery sexual functioning on postprostatectomy sexual adjustment. Journal of Behavioral Medicine, 12(5), 469-485.

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. (1993). Relaxation for insomnia and hypnotic medication use in older women. Psychology and Aging, 8(1), 103-111.

Lichstein, K.L., Johnson, R.S., Fawcett, K., & McCabe, K. (1991, November). Relaxation therapy for geriatric insomnia. Poster presented at the annual meeting of the Association of Behavior Therapy, New York.

Lichstein, K.L., Riedel, B.W., & Grieve, R. (1994). Fair tests of clinical trials: A treatment implementation model. Advances in Behaviour Research and Therapy, 16, 1-29.

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(8), 693-702.

Lick, J.R., & Heffler, D. (1977). Relaxation training and attention placebo in the treatment of severe insomnia. Journal of Consulting and Clinical Psychology, 45(2), 153-161.

Liljenberg, B., Almqvist, M., Hetta, J., Roos, B. -E., & Agren, H. (1988). The prevalence of insomnia: The importance of operationally defined criteria. Annals of Clinical Research, 20, 393-398.

Lugaresi, E., Cirignotta, F., Zucconi, M., Mondini, S., Lenzi, P.I., & Coccagna, G. (1983). Good and poor sleepers: Epidemiological survey of the San Marino population. In C. Guilleminault & E. Lugaresi (Eds.), Sleep/wake disorders: Natural history, epidemiology, and long term evolution (pp. 1-12). New York: Raven Press.

Lundh, L.G., Lundqvist, K., Broman, J. E., & Hetta, J. (1991). Vicious cycles of sleeplessness, sleep phobia, and sleep-incompatible behaviors in patients with persistent insomnia. Scandinavian Journal of Behavior Therapy, 20(3-4), 101-114.

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.

McClusky, H.Y., Milby, J.B., Switzer, P.K., Williams, V., & Wooten, V. (1991). Efficacy of behavioral versus triazozm treatment in persistent sleep-onset insomnia. American Journal of Psychiatry, 148(1), 121-126.

McGhie, A., & Russell, S.M. (1962). The subjective assessment of normal sleep patterns. The Journal of Mental Science, 108(456), 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., Garnett, D., Gillin, J.C., & Weingartner, H. (1984). The experience of insomnia and daytime and nighttime functioning. Psychiatry Research, 12, 235-250.

Meyer, T.J., Miller, M.L., Metzger, R.L. & Borkovec, T.D., (1990). Development and validation of the Penn State Worry Questionnaire. Behavior Research and Therapy, 28(6), 487-495.

Michelson, L., Mavissakalian, M., & Marchione, K. (1985). Cognitive and behavioral treatments of agoraphobia: Clinical, behavioral, and psychophysiological outcomes. Journal of Consulting and Clinical Psychology, 53(6), 913-925.

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

Mitchell, K.R. (1979). Behavioral treatment of presleep tension and intrusive cognitions in patients with severe predormital insomnia. Journal of Behavioral Medicine, 2(1), 57-69.

Mitchell, K.R., & White, R.G. (1977). Self-management of severe predormital insomnia. Journal of Behavior Therapy and Experimental Psychiatry, 8, 57-83.

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

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(4), 322-329.

Monroe, L.J. (1967). Psychological and physiological differences between good and poor sleepers. Journal of Abnormal Psychology, 72, 255-264.

Morawetz, D. (1989). Behavioral self-help treatment for insomnia: A controlled evaluation. Behavior Therapy, 20, 365-379.

Morgan, K., Dallosso, H., Ebrahim, S., Arie, T., & Fentem, P. H. (1988). Characteristics of subjective insomnia in the elderly living at home. Age and Aging, 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 aged 65-74. Age and Aging, 18, 117-122.

Morin, C.M., & Arzin, N.H. (1987). Stimulus control imagery training in treating sleep-maintenance insomnia. Journal of Consulting and Clinical Psychology, 55, 260-262.

Morin, C.M., & Azrin, N.H. (1988). Behavioral and cognitive treatments of geriatric insomnia. Journal of Consulting and Clinical Psychology, 56(5), 748-753.

Morin, C.M., Colecchi, C.A., Ling, W.D., & Sood, R.K. (1995). Cognitive behavior therapy to facilitate benzopdiazepine discontinuation among hypnotic-dependent patients with insomnia. Behavior Therapy, 26, 733-745.

Morin, C.M., Colecchi, C.A., Stone, J., Sood, R.K., & Brink, D. (1995). Cognitive-behavior therapy and pharmacotherapy for insomnia: Update of a placebo-controlled clinical trial. Proceedings: 9th Annual Meeting of the Association of Professional Sleep Societies, Rochester, MN: APSS.

Morin, C. M., Culbert, J. P., & Schwartz, S. M. (1994). Nonpharmacological interventions for insomnia: A meta-analysis of treatment efficacy. American Journal of Psychiatry, 151(8), 1172-1180.

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. (1993a). Cognitive-behavior therapy for late-life insomnia. Journal of Consulting and Clinical Psychology, 61(1), 137-146.

Morin, C. M., Kowatch, R. A., & O'Shanick, G. (1990). Sleep restriction for the inpatient treatment of insomnia. Sleep, 13, 183-186.

Morin, C. M., Kowatch, R. A., & Wade, J. (1989). Behavioral management of sleep disturbances secondary to chronic pain. Journal of Behavior Therapy and Experimental Psychiatry, 20, 295-302.

Morin, C.M., Stone, J., McDonald, K., Jones, S. (1994). Psychological management of insomnia: A clinical replication series with 100 patients. Behavior Therapy, 26, 291-309.

Morin, C. M., Stone, J., Trinkle, D., Mercer, J., & Remsberg, S. (1993b). Dysfunctional beliefs and attitudes about sleep among older adults with and without insomnia complaints. Psychology and Aging, 8(3), 463-467.

Murtagh, D. R. R., & Greenwood, K.M. (1995). Identifying effective psychology treatment for insomnia: A meta-analysis. Journal of Consulting and Clinical Psychology, 63, 79-89.

Nicassio, P., & Bootzin, R. (1974). A comparison of progressive relaxation and autogenic training as treatments of insomnia. Journal of Abnormal Psychology, 83, 253-260.

Nicassio, P., Boylan, M.B., & McCabe, T.G. (1982). Progressive relaxation EMG biofeedback and biofeedback placebo in the treatment of sleep onset insomnia. British Journal of Medical Psychology, 55, 159-166.

Nicassio, P. M., & Buchanan, D. C. (1981). Clinical application of behavior therapy for insomnia. Comprehensive Psychiatry, 22, 263-271.

Nicassio, P.M., Mendlowitz, D.R., Fussel, G.G., & Petras, L.O. (1985). The phenomenology of the pre-sleep state: The development of the Pre-Sleep Arousal Scale. Behaviour Research and Therapy, 23, 263-271.

Paulsen, V. M., & Shaver, J. L. (1991). Stress, support, psychological states and sleep. Social Science and Medicine, 32(11), 1237-1243.

Piccione, P., Talllarigo, R., Zorick, F., Witig, R., & Roth, T. (1981). Personality differences between insomniacs and non-insomniacs psychiatry outpatients. Journal of Clinical Psychiatry, 42(7), 261-263.

Puder, R., Lacks, P., Bertelson, A.D., & Storandt, M. (1983). Short-term stimulus control treatment of Insomnia in older adults. Behavior Therapy, 14, 424-429.

Rechtschaffen, A., & Kales, A. (Eds.) (1968). A Manual of Standardized Terminology, Techniques, and Scoring Systems for Sleep Stages of Human Subjects. Washington, DC: Public Health Service, Government Printing Office.

Regestein, Q.R. (1980). Insomnia and sleep disturbances in the aged: Sleep and insomnia in the elderly. Journal of Geriatric Psychiatry, 13, 153-171.

Riedel, B.W., Lichstein, K.L., & Dwyer, W.O. (1995). Sleep compression and sleep education for older insomniacs: Self-help versus therapist guidance. Psychology and Aging, 10(1), 54-63.

Riedel, B.W., Lichstein, K.L., Peterson, B.A., Epperson, M.T., Means, M.K., & Aguillard, R.N. (1995). Stimulus control and sleep medication withdrawal. Proceedings: 9th Annual Meeting of the Association of Professional Sleep Societies, Rochester, MN.: APSS.

Roth, T., Kramer, M., & Lutz, T. (1976). The nature of insomnia: A descriptive summary of a sleep clinic population. Comprehensive Psychology, 17, 217-220.

Sanavio, E. (1988). Pre-sleep cognitive intrusions and treatment of onset-insomnia. Behavior Research Therapy, 26(6), 451-459.

Sanavio, E., Vidotto, G., Bettinardi, O., Rolletto, T., & Zorzi, M. (1990). Behavior therapy for DIMS: Comparison of three treatment procedures with follow-up. Behavioral Psychotherapy, 18, 151-167.

Schmidt-Nowara, W.W.,Beck, A.A., & Jessop, C.A. (1991). An experimental evaluation of sleep restriction to treat chronic insomnia and reduce hypnotic use. Sleep Research, 20,323.

Schoichet, S.C., Bertelson, A.D., & Lacks, P. (1985). Stimulus control and meditation as treatments for sleep maintenance insomnia. Presentation at the Annual Meeting of the Association for Advancement of Behavior Therapy, Houston, Texas.

Schoichet, S.L., Bertelson, A.D., & Lacks, P. (1988). Is sleep hygiene a sufficient treatment for sleep- maintenance insomnia? Behavior Therapy, 19, 183-190.

Schneider-Helmert, D. (1987). Twenty-four-hour sleep-wake function and personality patterns in chronic insomniacs and healthy controls. Sleep, 10(5), 452-462.

Schoicket, S.L., Bertelson, A.D., & Lacks, P. (1988). Is sleep hygiene a sufficient treatment for sleep maintenance insomnia. Behavior Therapy, 19, 183-190.

Schultz, J.H., & Luthe, W. (1959). Autogenic training: A psychophysiologic approach in psychotherapy. New York: Grune & Stratton.

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(3), 230-238.

Seidel, W.F., & Dement, W.C. (1982). Sleepiness in insomnia: Evaluation and treatment. Sleep, 5, S182-S190.

Shealy, R.C. (1979). The effectiveness of various treatment techniques on different degrees and durations of sleep-onset insomnia. Behavior Research Therapy, 17, 541-546.

Shock, N.W. (1977). Systems integration. In C.E. Finch & L. Hayflick (Eds.), Handbook of the Biology of Aging. New York: Van Nostrand Reynolds.

Smirne, S., Franceschi, M., Zamproni, P., Crippa, D., & Ferini-Strambi, L. (1983). Prevalence of sleep disorders in an unselected population. In C. Guilleminault & E. Lugaresi (Eds.), Sleep/wake disorders: Natural history, epidemiology, and long-term evolution (pp. 61-71). New York: Raven.

Soldatos, C.R. (1994). Insomnia in relation to depression and anxiety: Epidemiologic considerations. Journal of Psychosomatic Research, 38(Suppl. 1), 3-8.

Soldatos, C.R., Kales, J.D., Scharf, M.B., Bixler, E.O., & Kales, A. (1980). Cigarette smoking associated with sleep difficulty. Science, 207, 551-553.

Spielman, A.J., Saskin, P., & Thorpy, M.J. (1987). Treatment of chronic insomnia by restriction of time in bed. Sleep, 10, 45-56.

Steinmark, S., & Borkovec, T. (1974). Active and placebo treatment effects on moderate insomnia under counterdemand instructions. Journal of Abnormal Psychology, 83, 157-163.

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(421-427.

Sugarman, J.L., Stern, J.A., & Walsh, J.K. (1985). Daytime alertness in subjective and objective insomnia: Some preliminary findings. Biological Psychiatry, 20, 741-750.

Tait, H. (1992). Sleep problems: Whom do they affect? Canadian Social Trends, 27, 8-10.

Tatsuoka, M. (1970). Selected Topics in Advanced Statistics. Institution for Personality and Testing.

Thoresen, C.E., Coates, T.J., Kirmil-Gray, K., & Rosekind, M. (1981). Behavioral self-management in treating sleep maintenance insomnia. Journal of Behavioural Medicine, 4, 41-52.

Turner, R.M., & Ascher, L.M. (1979a). A within-subject analysis of stimulus control therapy with severe sleep-onset insomnia. Behavior Research & Therapy, 17, 107-112.

Turner, R.M., & Ascher, L.M. (1979b). Controlled comparison of progressive relaxation, stimulus control, and paradoxical intention therapies for insomnia. Journal of Consulting and Clinical Psychology, 47(3), 500-508.

Turner, R.M., & Ascher, L.M. (1982). Therapist factor in the treatment of insomnia. Behavior Research and Therapy, 20, 33-40.

Turner, R.M., & DiTomasso, R.A. (1983). The behavioral treatment of insomnia: A review and methodological analysis of the evidence. International Journal of Mental Health, 9, 129-148.

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

Van Oot, P.H., Lane, T.W., & Borkovec, T.D. (1983). Sleep disturbances. In H. Adams& P.B. Sutker (Eds.), Comprehensive Handbook of Psychopathology. London: Plenum Press.

Vitiello, M.V., & Prinz, P.N. (1990). Sleep and sleep disorders in normal aging. In M.J. Thorpy (Ed.), Handbook of sleep disorders (pp. 139-151). New York: Marcel Dekker Inc.

Vollrath, M., Wicki, W., & Angst, J. (1989). The Zurich Study: VII. Insomnia: Association with depression, anxiety, somatic syndromes, and course of insomnia. European Archives of Psychiatry and Neuroscience, 239, 113-124.

Walsh, J. (Undated). Improving sleep. Royal Victoria Hospital. Montreal, Canada.

Webb, W.B., & Campbell, S.S. (1980). Awakenings and the return to sleep in an older population. Sleep, 3(1), 41-46.

Weyerer, S., & Dilling, H. (1991). Prevalence and treatment of insomnia in the community: Results from the Upper Bavarian Field Study. Sleep, 14(5), 392-398.

White, J. L. (1983). The relationship of minor daily stress in pre-sleep arousal to sleep onset latency and quality of sleep. Unpublished doctoral dissertation, California School of Professional Psychology, San Diego, CA.

White, J. L., & Nicassio, P. M. (1990). The relationship between daily stress, pre-sleep arousal and sleep disturbance in good and poor sleepers. Poster presented at the annual meeting of the AABT, San Francisco, CA.

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

Woolfolk, R., Carr-Kaffashan, L.C., McNulty, T.F., & Lehrer, P.M. (1976). Meditation training as a treatment for insomnia. Behavior Therapy, 7, 359-365.

Woolfolk, R.L., & McNulty, T.F. (1983). Relaxation treatment for insomnia: A component analysis. Journal of Consulting and Clinical Psychology, 5(4), 495-503.

World Health Organization. (1992). International Classification of Diseases (ICD-10), Geneva, Switzerland: Author.

Youkilis, H.D., & Bootzin, R.R. (1981). A psychophysiological perspective on the etiology and treatment of insomnia. In S.N. Haynes & L.A. Gannon (Eds.), Psychosomatic disorders: A psychophysiological approach to etiology and treatment. New York: Praeger.

Zorick, F.J., Kribbs, N., Roehrs, T., & Roth, T. (1989). Polysomnographic MMPI characteristics of patients with insomnia. Psychopharmacology, Supl 1(VIII), 2.

Zwart, C.A., & Lisman, S.A. (1979). An analysis of stimulus control treatment of sleep-onset insomnia. Journal of Consulting and Clinical Psychology, 47(1), 113-118.

Appendices

Appendix A

Questionnaires

Background Information Form

1. Sex: Male: ___ Female: ___

2. Age: ___

3. Religion:
   ___ Catholic
   ___ Jewish
   ___ Protestant
   ___ Other
   ___ None

4. Education: Please indicate the levels of education you have completed. Check all those that apply.

   ___ Elementary
   ___ High School
   ___ CEGEP
   ___ Trade
   ___ University
   ___ Post-Graduate

5. Marital Status: Please check all those that apply.

   ___ Now married
   ___ Now living with a partner
   ___ Separated
   ___ Divorced
   ___ Widowed
   ___ Single

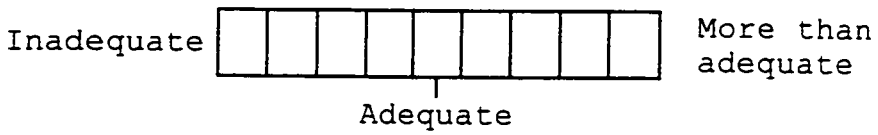
6. Current Living Arrangement:

   ___ Alone
   ___ With spouse/partner
   ___ Other (please specify): _____

7. Employment: Are you employed? Please check all those that apply.

   ___ Full-time
   ___ Part-time
   ___ Retired
   ___ Homemaker
   ___ Volunteer
   ___ Unemployed

8. Income Satisfaction: Put an **X** in the box that best describes how adequate you consider your income to be in meeting your needs.



What was your annual income last year (include you partner's if applicable)? Please circle one.

$10,000 or less	$10,000 - $20,000	$20,000 - $30,000
$30,000 - $40,000	$40,000 - $50,000	more than $50,000

Sleep Questionnaire

9. Do you have insomnia? (problem with falling asleep or going back to sleep after waking up at night or early in the morning) Put an " **X** " in the appropriate box.

Very rarely	1	2	3	4	5	6	7	8	9	10	Very often

10. a) How distressed are you by an insomnia problem?

Not at all	1	2	3	4	5	6	7	8	9	10	Very much

b) For how many years have you had this problem? _____

11. a) How many hours, on average, do you usually sleep per night? _____

b) How many days per week do you nap? _____

FALLING ASLEEP

12. a) How long does it usually take you to <u>fall asleep</u>? _____

b) During a typical week, how often do you have difficulty <u>falling asleep</u>?

Days Per Week: 0 1 2 3 4 5 6 7

c) How often does difficulty falling asleep <u>distress</u> you?

Days Per Week: 0 1 2 3 4 5 6 7

WAKING DURING THE NIGHT

13. Do you usually wake up during the night?
YES _____ NO _____

IF YES: a) How many times per night? _____
b) How often?

Days Per Week: 0 1 2 3 4 5 6 7

c) How often do you have difficulty getting back to sleep?

Days Per Week: 0 1 2 3 4 5 6 7

d) How often does difficulty getting back to sleep distress you?

Days Per Week: 0 1 2 3 4 5 6 7

e) Approximately what is the total amount of time that you are awake during the middle of the night? _____hrs ____mins

WAKING TOO EARLY

14. a) During a typical week, how often do you wake up earlier than you want to?

Days Per Week: 0 1 2 3 4 5 6 7

b) How often do you have difficulty getting back to sleep?

Days Per Week: 0 1 2 3 4 5 6 7

c) How often does difficulty falling asleep again after waking too early distress you?

Days Per Week: 0 1 2 3 4 5 6 7

d) How much earlier do you wake up than you want to?
___ hrs ___ mins

15. Do you have any other problems related to falling or staying asleep?

Please specify: _____

16. How often do you take medication to help you sleep?

Days Per Week: 0 1 2 3 4 5 6 7

17. a) How often do you feel tired during the day because of a lack of sleep?

Days Per Week: 0 1 2 3 4 5 6 7

18. Describe what you do when you have problems falling asleep:

_____

_____

19. How busy are you in a typical week?

I have too little to do	1	2	3	4	5	6	7	8	9	10	I have much t

20. During a typical week (except on weekends):

a) What is the earliest time you go to bed? _____

b) What is the latest time you go to bed? _____

c) What is the usual time you go to bed? _____

21. During a typical week (except on weekends):

a) What is the earliest time you get up in the morning? _____

b) What is the latest time you get up in the morning? _____

c) What is the usual time you get up in the morning? _____

Stanford Sleepiness Scale

Indicate with an " X " which statement best describes how sleepy you feel on most days.

____ feeling active and vital; alert; wide awake

____ functioning at a high level, but not at peak; able to concentrate

____ relaxed; awake; not at full alertness; responsive

____ a little foggy, not at peak; let down

____ foggy; beginning to lose interest in remaining awake; slowed down

____ sleepy; prefer to be lying down; fighting sleep; woozy

____ lost struggle to remain awake

BSI

Name: _____ Patient No.: _____ Technician _____

Location: _____ Visit No.: _____ Mode: S-R _____

Age: _____ Sex: M ___ F ___ Date: _____ Remarks: _____

INSTRUCTIONS

Below is a list of problems and complaints that people sometimes have. Read each one carefully, and select one of th numbered descriptors that best describes HOW MUCH DISCOMFORT THAT PROBLEM HAS CAUSED YOU DURIN THE PAST _____ INCLUDING TODAY. Place that number in the open block to the right of the problem. D not skip any items, and print your number clearly. If you change your mind, erase your first number completely. Rea the example below before beginning, and if you have any questions please ask the technician.

EXAMPLE

HOW MUCH WERE YOU DISTRESSED BY:	Answer	Descriptors
EX. Body Aches . . . . . Ex. ☐		0 Not at all 1 A little bit 2 Moderately 3 Quite a bit 4 Extremely

HOW MUCH WERE YOU DISTRESSED BY:

1. Nervousness of shakiness inside . . . . . ☐
2. Faintness or dizziness . . . . . ☐
3. The idea that someone else can control your thoughts . . . ☐
4. Feeling others are to blame for most of your troubles. . . . ☐
5. Trouble remembering things . . . . . ☐
6. Feeling easily annoyed or irritated . . . . . ☐
7. Pains in heart or chest . . . . . ☐
8. Feeling afraid in open spaces . . . . . ☐
9. Thoughts of ending your life . . . . . ☐
10. Feeling that most people cannot be trusted . . . . . ☐
11. Poor appetite . . . . . ☐
12. Suddenly scared for no reason . . . . . ☐
13. Temper outbursts that you could not control . . . . . ☐
14. Feeling lonely even when you are with people. . . . . ☐
15. Feeling blocked in getting things done. . . . . ☐
16. Feeling lonely . . . . . ☐
17. Feeling blue . . . . . ☐
18. Feeling no interest in things. . . . . ☐
19. Feeling fearful . . . . . ☐
20. Your feelings being easily hurt . . . . . ☐
21. Feeling that people are unfriendly or dislike you . . . . . ☐
22. Feeling inferior to others . . . . . ☐
23. Nausea or upset stomach. . . . . ☐
24. Feeling that you are watched or talked about by others . . ☐
25. Trouble falling asleep . . . . . ☐
26. Having to check and doublecheck what you do . . . . . ☐
27. Difficulty making decisions . . . . . ☐

HOW MUCH WERE YOU DISTRESSED BY: Descrip

0 Not a
1 A litt
2 Mode
3 Quite
4 Extre

28. Feeling afraid to travel on buses, subways, or trains . . .
29. Trouble getting your breath. . . . . .
30. Hot or cold spells . . . . . .
31. Having to avoid certain things, places, or activities because they frighten you . . . . . .
32. Your mind going blank. . . . . .
33. Numbness or tingling in parts of your body . . . . . .
34. The idea that you should be punished for your sins . . .
35. Feeling hopeless about the future . . . . . .
36. Trouble concentrating . . . . . .
37. Feeling weak in parts of your body. . . . . .
38. Feeling tense or keyed up . . . . . .
39. Thoughts of death or dying . . . . . .
40. Having urges to beat, injure, or harm someone . . . . . .
41. Having urges to break or smash things . . . . . .
42. Feeling very self-conscious with others . . . . . .
43. Feeling uneasy in crowds . . . . . .
44. Never feeling close to another person . . . . . .
45. Spells of terror or panic . . . . . .
46. Getting into frequent arguments . . . . . .
47. Feeling nervous when you are left alone. . . . . .
48. Others not giving you proper credit for your achievements . . . . . .
49. Feeling so restless you couldn't sit still . . . . . .
50. Feelings of worthlessness . . . . . .
51. Feeling that people will take advantage of you if you let them. . . . . .
52. Feelings of guilt . . . . . .
53. The idea that something is wrong with your mind . . . . .

Pre-Sleep Arousal Scale

During last night's sleep period, while you were in bed and trying to fall asleep, did you at any time have any of the following experiences? Please indicate (by circling the appropriate number) the degree to which you experienced each of those listed below.

		Not at all	A little	Moderately	A lot	Extremely
1.	Heart racing, pounding, or beating irregularly	1	2	3	4	5
2.	A jittery, nervous feeling in your body	1	2	3	4	5
3.	Worry about falling asleep	1	2	3	4	5
4.	Review or ponder events of the day	1	2	3	4	5
5.	Shortness of breath or laboured breathing	1	2	3	4	5
6.	Depressing or anxious thoughts	1	2	3	4	5
7.	A tight, tense feeling in your muscles	1	2	3	4	5
8.	Worry about problems other than sleep	1	2	3	4	5
9.	Being mentally alert, active	1	2	3	4	5
10.	Cold feeling in you hands, feet or your body in general	1	2	3	4	5
11.	Can't shut off your thoughts	1	2	3	4	5
12.	Have stomach upset (knot or nervous feeling in stomach, nausea, gas, etc.)	1	2	3	4	5
13.	Perspiration in palms of your hands or other parts of your body	1	2	3	4	5
14.	Thoughts keep running through your head	1	2	3	4	5
15.	Dry feeling in mouth or throat	1	2	3	4	5
16.	Distracted by sounds (e.g., ticking clock, house noises, traffic)	1	2	3	4	5

17. Was last night's sleep period typical of most nights?
yes _____ no _____

Sleep Self-Efficacy Scale

For the following 9 items, please rate (by circling a number from 1 to 5) your ability to carry out each behavior. If you feel able to accomplish a behavior some of the time but not always, you should indicate a lower level of confidence.

Indicate how confident you are that you can:

1. Lie in bed, feeling physically relaxed.

1	2	3	4	5
Not at all confident				very confident

2. Lie in bed, feeling mentally relaxed.

1	2	3	4	5
Not at all confident				very confident

3. Lie in bed with your thoughts "turned off."

1	2	3	4	5
Not at all confident				very confident

4. Fall asleep at night in under 30 minutes.

1	2	3	4	5
Not at all confident				very confident

5. Wake up at night fewer than three times.

1	2	3	4	5
Not at all confident				very confident

6. Go back to sleep within 15 minutes of waking in the night.

1	2	3	4	5
Not at all confident				very confident

7. Feel refreshed upon waking in the morning.

1	2	3	4	5
Not at all confident				very confident

8. Wake after a poor night's sleep without feeling upset about it.

1	2	3	4	5
Not at all confident				very confident

9. Not allow a poor night's sleep to interfere with daily activities.

1	2	3	4	5
Not at all confident				very confident

Anxious Self-Statements Questionnaire (ASSQ)

Listed below are a variety of thoughts that pop into people's heads when they are trying to fall asleep. Please read each thought and indicate how frequently, if at all, the thought occurred to you over the last week when you were trying to fall asleep. Please read each item carefully.

Read each item and rate its frequency according to the following scale.

1 - hardly ever had the thought
2 - rarely had the thought
3 - sometimes had the thought
4 - often had the thought
5 - very often had the thought

____ 1. What am I going to do with my life?

____ 2. I'm not going to make it.

____ 3. What will people think of me?

____ 4. What am I going to do?

____ 5. Can I make it?

____ 6. I can't take it.

____ 7. Who can I turn to?

____ 8. I wish I could die.

____ 9. I shouldn't feel this way.

____ 10. I need help.

____ 11. Can I overcome the uncertainties?

____ 12. How will I handle myself?

____ 13. I think I want to cry.

____ 14. I can't get through this.

____ 15. Will I make it?

____ 16. I want to fight back but I'm afraid to do so.

Anxious Self-Statements Questionnaire (ASSQ) (cont'd)

Read each item and rate its frequency according to the following scale.

1 - hardly ever had the thought
2 - rarely had the thought
3 - sometimes had the thought
4 - often had the thought
5 - very often had the thought

____ 17. It's my own fault.

____ 18. Am I going to make it?

____ 19. No one likes me or cares about me.

____ 20. I can't do anything right.

____ 21. I feel totally confused.

____ 22. What will happen to me?

____ 23. I can't stand it.

____ 24. I wish I could escape.

____ 25. I can't escape.

____ 26. I can't stand it anymore.

____ 27. Don't let me be crazy.

____ 28. I wonder if I look as stupid as I feel?

____ 29. I don't want to feel this way.

____ 30. What's going to happen next?

____ 31. I can't take it anymore.

____ 32. I'll never finish.

Penn State Worry Questionnaire

Please indicate the extent to which each statement is like you, using the scale below. Answer questions honestly and accurately and don't let your answers to one question influence your answers to other questions. There are no right and wrong answers.

Scale:
5 - very typical of me
4 - moderately typical of me
3 - somewhat typical of me
2 - slightly typical of me
1 - not at all typical of me

____ 1. If I do not have enough time to do everything, I do not worry about it.

____ 2. My worries overwhelm me.

____ 3. I do not tend to worry about things.

____ 4. Many situations make me worry.

____ 5. I know I should not worry about things, but I just cannot help it.

____ 6. When I am under pressure, I worry a lot.

____ 7. I am always worrying about things.

____ 8. I find it easy to dismiss worrisome things.

____ 9. As soon as I finish one task, I start to worry about everything else I have to do.

____ 10. I never worry about anything.

____ 11. When there is nothing more I can do about a concern, I do not worry about it any more.

____ 12. I have been a worrier all my life.

____ 13. I notice that I have been worrying about things.

____ 14. Once I start worrying, I cannot stop.

____ 15. I worry all the time.

____ 16. I worry about projects until they are all done.

Eysenck Personality Inventory

INSTRUCTIONS

Here are some questions regarding the way you behave, feel, and act. After each question is a space for answering "YES" or "NO." Try and decide whether "YES" or "NO" represents your usual way of acting or feeling. Indicate your response by putting an "X" over the word "YES" or "NO."

Work quickly, and don't spend too much time over any question; we want your first reaction, not a long, drawn-out thought process. The whole questionnaire shouldn't take more than a few minutes. Be sure not to omit any questions. Now turn the page over and go ahead. Work quickly, and remember to answer every question. There are no right and wrong answers and this isn't a test of intelligence or ability, but simply a measure of the way you behave.

Eysenck Personality Inventory (cont'd)

1.	Do you often long for excitement?	YES	NO
2.	Do you often need understanding friends to cheer you up?	YES	NO
3.	Are you usually carefree?	YES	NO
4.	Do you find it hard to take no for an answer?	YES	NO
5.	Do you stop and think things over before doing anything?	YES	NO
6.	If you say you will do something do you always keep your promise, no matter how inconvenient it might be to do so?	YES	NO
7.	Does your mood often go up and down?	YES	NO
8.	Do you generally do and say things quickly without stopping to think.	YES	NO
9.	So you ever feel "just miserable" for no good reason?	YES	NO
10.	Would you do almost anything for a dare?	YES	NO
11.	Do you suddenly feel shy when you talk to an attractive stranger?	YES	NO
12.	Once in a while do you lose your temper and get angry?	YES	NO
13.	Do you often do things on the spur of the moment?	YES	NO
14.	Do you often worry about things that you should not have done or said?	YES	NO
15.	Generally do you prefer reading to meeting people?	YES	NO
16.	Are your feelings easily hurt?	YES	NO
17.	Do you like going out a lot?	YES	NO
18.	Do you occasionally have thoughts and ideas that you would not like other people to know about?	YES	NO
19.	Are you sometimes bubbling over with energy and sometimes very sluggish?	YES	NO
20.	Do you prefer to have a few but special friends?	YES	NO
21.	Do you daydream a lot?	YES	NO
22.	When people shout at you, do you shout back?	YES	NO
23.	Are you often troubled about feelings of guilty?	YES	NO
24.	Are all your habits good and desirable ones?	YES	NO
25.	Can you usually let yourself go and enjoy yourself at a gay party?	YES	NO
26.	Would you call yourself tense or "highly-strung?"	YES	NO

Eysenck Personality Inventory (cont'd)

27.	Do other people think of you as being very lively?	YES	NO
28.	After you have done something important, do you often come away feeling you could have done better?	YES	NO
29.	Are you mostly quiet when you are with other people?	YES	NO
30.	Do you sometimes gossip?	YES	NO
31.	Do ideas run through your head so that you cannot sleep?	YES	NO
32.	If there is something you want to know about, would you rather look it up in a book than talk to someone about it?	YES	NO
33.	Do you get palpitations or thumping in your heart?	YES	NO
34.	Do you like the kind of work that you need to pay close attention to?	YES	NO
35.	Do you get attacks of shaking or trembling?	YES	NO
36.	Would you always declare everything at customs, even if you knew that you could never be found out?	YES	NO
37.	Do you hate being with a crowd who plays jokes on one another?	YES	NO
38.	Are you an irritable person?	YES	NO
39.	Do you like doing things in which you have to act quickly?	YES	NO
40.	Do you worry about awful things that might happen?	YES	NO
41.	Are you slow and unhurried in the way you move?	YES	NO
42.	Have you ever been late for an appointment or work?	YES	NO
43.	Do you have many nightmares?	YES	NO
44.	Do you like talking to people so much that you would never miss a chance of talking to a stranger?	YES	NO
45.	Are you troubled by aches an pains?	YES	NO
46.	Would you be very unhappy if you could not see lots of people most of the time?	YES	NO
47.	Would you call yourself a nervous person?	YES	NO
48.	Of all the people you know are there some whom you definitely do not like?	YES	NO
49.	Would you say you were fairly self-confident?	YES	NO
50.	Are you easily hurt when people find fault with you or your work?	YES	NO

Eysenck Personality Inventory (cont'd)

51.	Do you find it really hard to enjoy yourself at a lively party?	YES	NO
52.	Are you troubled with feelings of inferiority?	YES	NO
53.	Can you easily get some life into a rather dull party?	YES	NO
54.	Do you sometimes talk about things you know nothing about?	YES	NO
55.	Do you worry about your health?	YES	NO
56.	Do you like playing pranks on others?	YES	NO
57.	Do you suffer from sleeplessness?	YES	NO

PLEASE CHECK TO SEE THAT YOU HAVE ANSWERED ALL THE QUESTIONS

Intervention Evaluation Form

1. How logical does this type of treatment seem to you? Put an "X" in the appropriate box.

not very logical	1	2	3	4	5	6	7	8	9	10	very logical

2. How confident are you that this treatment will be successful in improving your sleep?

not very confident	1	2	3	4	5	6	7	8	9	10	very confident

3. How confident would you be in recommending this treatment to a friend who had a sleep problem?

not very confident	1	2	3	4	5	6	7	8	9	10	very confident

4. How successful do you feel this treatment would be in helping with sleep problems?

not very successful	1	2	3	4	5	6	7	8	9	10	very successful

The Client Satisfaction Questionnaire (CSQ)

Please help us improve our program by answering some questions about the services you have received at the _____. We are interested in your honest opinions, whether they are positive or negative. *Please answer all of the questions.* We also welcome your comments and suggestions. Thank you very much, we appreciate your help.

CIRCLE YOUR ANSWER:

1. How would you rate the quality of service you received?

4	3	2	1
Excellent	Good	Fair	Poor

2. Did you get the kind of service you wanted?

1	2	3	4
No, definitely not	No, not really	Yes, generally	Yes, definitely

*3. To what extent has our program met your needs?

4	3	2	1
Almost all of my needs have been met	Most of my needs have been met	Only a few of my needs have been met	None of my needs have been met

4. If a friend were in need of similar help, would you recommend our program to him/her?

1	2	3	4
No, definitely not	No, I don't think so	Yes, I think so	Yes, definitely

5. How satisfied are you with the amount of help you received?

1	2	3	4
Quite dissatisfied	Indifferent or mildly dissatisfied	Mostly satisfied	Very satisfied

6. Have the services you received helped you to deal more effectively with you problems?

4	3	2	4
Yes, they helped a great deal	Yes, they helped somewhat	No, they really didn't help	No, they seemed to make things worse

*7. In an overall, general sense, how satisfied are you with the service you received?

4	3	2	1
Very satisfied	Mostly satisfied	Indifferent or mildly dissatisfied	Quite dissatisfied

*8. If you were to seek help again, would you come back to our program?

1	2	3	4
No, definitely not	No, I don't think so	Yes, I think so	Yes, definitely

DAY: _____ DATE:_____

DAILY SLEEP DIARY

1. Roughly how many hours did you sleep last night? _____

2. How difficult was it for you to fall asleep? Put an "X" in the appropriate box

Very difficult	1	2	3	4	5	Very easy

3. Rate the quality of last night's sleep:

Very poor	1	2	3	4	5	Very good

4. What was the level of physical tension (example: jittery, nervous feeling, tight, tense muscles) when you went to bed last night?

Very tense	1	2	3	4	5	Very relaxed

5. Rate your level of mental activity (example: worry, can't shut of your thoughts) when you went to bed last night:

Very active	1	2	3	4	5	Very quiet

6. How rested do you feel this morning?

Very poorly rested	1	2	3	4	5	Very well rested

7. How well do you think you were functioning yesterday?

Very poorly	1	2	3	4	5	Very well

8. a) Did you nap yesterday? ____ NO ____ YES

   b) **If yes**, what is the total number of hours and minutes you napped? ___ hrs ___min

9. a) What time did you go to bed last night? _____

   b) What time did you turn off the lights? _____

10. a) How long did it take you to fall asleep last night? ____ hrs ____ min

    b) What did you do while you were awake? _____

    _____

11. a) How many times did you awaken during the night? _____

    b) Approximately what is the total number of hours and minutes you stayed awake during the night? ____ hrs ____ min

    c) What did you do while you were awake? _____

    _____

12. a) How many times did you wake up in the morning earlier than you wanted to? ____

    b) Approximately what is the total number of hours and minutes you stayed awake? ____hrs ____ min

    c) What did you do while you were awake? _____

    _____

13. What time did you wake up this morning (last awakening)? _____

14. What time did you actually get out of bed this morning? _____

15. a) Did you take anything to help you sleep? ____ NO ____ YES

    b) **If yes,** what? _____

    c) When? _____

Comments: _____

_____

_____

Appendix B

Consent Form - Sleep and Aging Study
Consent Form - Treatment Study

Sleep and Aging Study

CONSENT FORM

1. I am informed that this study is an attempt to evaluate how sleep patterns relate to work, leisure activities and lifestyle.

2. I am being asked to take part in this study. If I agree, I understand that I will be expected to complete a battery of brief questionnaires designed to assess the nature of my sleep pattern, my lifestyle, and aspects of my physical and psychological well being. This will require about one hour of participation.

3. I understand that I may discuss any questions or concerns I have about this study with the Project Coordinator and the Patient Representative, Roslyn Davidson, 340-8222, local 5833.

4. I have the right to withdraw from the study at any time without it affecting my care and to which I am entitled.

5. I understand that if the results of this study are published, my part in the study will be completely anonymous and my privacy will be completely protected.

6. On the basis of this information, I _____ willingly consent to participate as a subject in this study conducted at the Jewish General Hospital.

Date: _____ Participant: _____

Project Coordinator: _____

Witness: _____

Treatment Study

CONSENT FORM

1. I am informed that this study is an attempt to evaluate sleep patterns and the effectiveness of a technique to manage sleep disorder.

2. I am willing to answer some questions about my physical and psychological status and the nature of my sleep pattern and I am willing to complete a battery of brief questionnaires on these topics from one to three times. I am willing to complete a brief daily sleep diary for up to six weeks.

3. I understand that the evaluation procedure includes a tape recorder, pillow speaker and audiotapes which are to be used at home.

4. I understand that I am free to ask any questions concerning the procedure used in this study at any time. If for any reason, I experience discomfort or concern during participation in this project, I understand I am free to discuss this with the project coordinator and request appropriate recommendations or referrals and the option of terminating my participation.

5. I understand that if results of this study are published, my part in the study will be completely anonymous and my privacy will be completely protected.

6. On the basis of this information, I _____ willingly consent to participate as a subject in this study conducted at the Jewish General Hospital.

Date: _____ Participant: _____

Project Coordinator: _____

Witness: _____

Appendix C

Treatment Contracts

Treatment Contract

Countercontrol-Plus Relaxation

I, _____, agree to carry out the treatment program specified by the Sleep and Aging Project to improve my sleep. For a period of 14 nights, I will listen to the relaxation tape each time I have difficulty getting to sleep. I will also complete a Daily Sleep Diary each morning for 14 days. I understand that if I fail to listen to the tape on more than 2 consecutive sleepless nights I will be required to terminate the treatment program.

I understand that the equipment I will use in this treatment program belongs to the Jewish General Hospital and I undertake to have it returned to the Jewish General Hospital by _____. The equipment includes a taperecorder, an adaptor, a pillow speaker and a relaxation tape.

Date: _____ Participant: _____

Witness: _____

Treatment Contract

Countercontrol-Plus Audiobook

I, _____, agree to carry out the treatment program specified by the Sleep and Aging Project to improve my sleep. For a period of 14 nights, I will listen to the relaxation tape each time I have difficulty getting to sleep. I will also complete a Daily Sleep Diary each morning for 14 days. I understand that if I fail to listen to the tape on more than 2 consecutive sleepless nights I will be required to terminate the treatment program.

I understand that the equipment I will use in this treatment program belongs to the Jewish General Hospital and I undertake to have it returned to the Jewish General Hospital by _____. The equipment includes a taperecorder, an adaptor, a pillow speaker and a relaxation tape.

Date: _____ Participant: _____

Witness: _____

Appendix D

Take Home Treatment Instructions

Take Home Treatment Instructions

Daytime Practices

Day 1: listen to the tape for 10 minutes - twice a day

Day 2: listen to the tape for 20 minutes - twice a day

Day 3: listen to the tape for 30 minutes - twice a day

During the Night

AFTER you have practised for 3 days you can use the tape at night. You are to use the tapes EVERY time you have difficulty falling asleep.

Set the taperecorder and tape up before bedtime. Set the volume so that it is just comfortably audible This is what you are to do:

1) If after 10 minutes after you've turned out the lights you are not asleep (or if the middle of the night if you wake up) you are to turn on the taperecorder.

2) Make sure to listen to the tape - if you find yourself thinking about something else - bring your attention back to the tape. Of course, if you find yourself drifting off to sleep, let it happen. The tape will stop itself (or you may want to turn it off).

3) In the morning fill in the DAILY SLEEP DIARY - EVERY MORNING for two weeks. Once it is filled out we would like you to call us so we can record your answers. If a member of our project is not available you should read your answers on the telephone answering machine.

Sleep and Aging Project - telephone: 340-8222, local 5626.

Appendix E

Telephone Screening Interview
Structured Sleep History Interview
Long-term Follow-Up Interview

Telephone Screening Interview

My name is _____. I am part of the research team of the Sleep and Aging Project (and am working with Dr. _____). We are studying sleep in people over 60. The information we collect will be helping us to understand more about what makes people sleep well or poorly and will help us in developing an effective treatment for insomnia.

Let me tell you about what is involved. We would like to see you for about 1 hour to 1 hour and ½ to answer some questions and fill in some questionnaires about your sleep patterns. Of course this will all be confidential. Once the questionnaires have been completed you will have an opportunity to discuss any concerns you may have related to sleep.

Does this sound like something you would be willing to do?

IF YES

I would like to ask you a few questions just to make sure that your situation fits the needs of this particular study.

1) Since we are studying sleep in people over age 55, are you over 55?

2) Since all the questionaries are in English, do you think you will have difficulty reading them?

3) Are you suffering from any serious medical or personal problems right now?
   How does it affect you life and sleep?
   Are you currently seeking professional help for this?

4) When was the last time you took medication to help you fall asleep?

IF LESS THAN 6 MONTHS AGO:
- how much medication (dosage)?
- how often (should be <3 times per week)?
- for how long?

Thank you, you are just the kind of person we are looking for. May we set up an appointment that is convenient for you to come to the hospital? (ASK THEM TO BRING ANY MEDICATION THEY ARE CURRENTLY TAKING)

OR

Thank you for your time. You have been very helpful. For this part of the study we are looking for people who:

1) are older than 60, or

2) have no major personal or medical problem right now, or

3) who do not frequently use medication to help them fall asleep, or

4) who have not taken medication in the last 6 months

We may be calling you at a later date. If you have any questions about this study I would be happy to try to answer them. If you are interested in the results of the study you can give us a call in about 8 months at 340-8266.

Thank you again.

Structured Sleep History Interview

I AM GOING TO ASK YOU SOME QUESTIONS ABOUT YOUR SLEEP PATTERNS.

How often do you feel exhausted during the day?___ days/week

1. **APNEA**

   a) i: Do you snore? Yes____ No____

   ii: Has a bed partner ever complained of your snoring? Yes____ No____

   IF YES:

   b) INTERVIEWER'S JUDGEMENT OF OBESITY:

   No _____ Moderate _____ Yes _____

   c) Do you ever wake up in the middle of the night and feel unable to breathe? _____ Yes _____ No

   d) Has a bed partner ever noticed that you seem to stop breathing? _____ Yes _____ No

   e) How often do you wake up with a headache? _____ days/week.

   If YES to c) or d) or e):

   f) How often do you have this problem? _____

   g) How long have you had this problem? _____

EXCLUSION CRITERIA: Snoring and at least 2 of the following, with a duration of > 2 months:
- unable to breath (> 2/wk)
- headache (> 2/wk)
- fatigue (> 2/wk)

2. **MYOCLONUS AND RESTLESS LEG**

   a) Do your legs ever bother you after you go to bed at night (e.g., cramps, jerking movements, crawling sensations)? _____ Yes _____ No

b) At night, do you feel like something is crawling on your legs and you have to shake it off or move your legs? ____ Yes ____ No

c) Do you ever wake up because of a cramp in your leg? ____ Yes ____ No

d) Have you or your bed partner noticed that parts of your body jerk at night? ____ Yes ____ No

If YES to any of the above:

e) How often do you have this problem? _____

f) How long have you had this problem? _____

EXCLUSION CRITERIA: a) or b) or c) or d): frequency > 2/wk.

3. **PARASOMNIAS**

a) i) How often do you have nightmares? _____

IF MORE THAN 6 NIGHTMARES PER YEAR:

ii) How often do they wake you up? _____

b) i) How often do you wake up afraid with no dream recall, or you only recall a frightening image? _____

IF POSITIVE:

ii) At times, do you notice sweating, fast pulse? ____ Yes ____ No

iii) How long has this been happening? _____

c) i) How often do you sleepwalk? _____

IF POSITIVE:

ii) How long has this been happening? _____

EXCLUSION CRITERIA: a) or b) or c: frequency > 1/wk **&** duration > 1 month

4. **HYPERSOMNIA**

a) i) Do you have any problem waking up?
____ Yes ____ No

IF YES:

ii) How often? _____

b) i) Do you have difficulty staying awake during the day when you really want to be awake?
____ Yes ____ No

ii) Does this happen while you are driving, at a table with friends, while at work, etc?
____ Yes ____ No

IF YES:

iii) When exactly does this happen?
_____

iv) How often does this happen? _____

EXCLUSION CRITERIA: b) iv: frequency > 1/wk.

5. **SLEEP-WAKE SCHEDULE**

a) i) Do you work the night shift or a rotating or split shift? ____ Yes ____ No

IF YES:

ii) How often? _____

iii) How long have you had this shift? _____

EXCLUSION CRITERIA: Poor sleeper and shift change in the last six months.

b) i) Do you travel across time zones?
____ Yes ____ No

IF YES:

ii) When was the last time? _____

iii) Did you get jet lag? ____ Yes ____ No

IF YES, ASK PARTICIPANT TO RETURN IN ONE MONTH WITHOUT JET LAG.

6. **MEDICAL**

a) Have you recently taken any prescription or over-the-counter medication for sleeping problems?
____ Yes ____ No

b) Have you recently discontinued the use of these drugs? ____ Yes ____ No

IF YES TO a) OR b), RECORD THE ANSWERS TO THE FOLLOWING IN THE TABLE PROVIDED:

c) What medication and amount are/were you taking?

d) How many nights a week do/did you usually take this medication?

e) How long have you been taking sleeping medication?

f) If discontinued use of drugs, when did you stop?

MEDICATIONS	AMOUNT	NIGHTS/WEEK	DURATION	WHEN STOPPED

EXCLUSION CRITERIA: Frequency of medication use > 3/wk and/or discontinued use of medication < 2 months ago.

7. a) Are you currently taking any other medication?
____ Yes ____ No

IF YES:

b) <u>What medication is it?</u>	c) <u>What illness is it prescribed for?</u>

d) Do you feel that any medications interfere with your sleep? ____ Yes ____ No

IF YES:

e) Which medications? _____

f) How do they interfere? _____

g) How often do you take them? _____

EXCLUSION CRITERIA: Frequency of medication that interfere with sleep > 2/wk.

8. a) Do you have any other problems or illnesses which interfere with your sleep? ____ Yes ____ No

IF YES:

b) What are they? _____

EXCLUSION CRITERIA: Interviewer judgement

9. a) i) During the past year, have you been severely depressed? ____ Yes ____ No

IF YES:

ii) How long did it last? _____

iii) Are you currently depressed? ____ Yes____ No

b) Are you currently taking medication for medication for depression? ____ Yes ____ No

IF YES:

c) What is it? _____

EXCLUSION CRITERIA: If YES for i) and ii) > 1 year or iii) or b)

10. a) Have you been hospitalized in the past year? ____ Yes ____ No

IF YES:

b) For what? _____

EXCLUSION CRITERIA: Interviewer judgement

11. a) Do you ever have trouble sleeping because of pain?
____ Yes ____ No

IF YES:

b) How often does it disturb you sleep? _____

EXCLUSION CRITERIA: Frequency > 1/week

12. a) How many times per night do you wake up to use the bathroom? _____

IF MORE THAN TWICE:

b) How long has this been happening? _____

c) Is it illness related? ____ Yes ____ No

IF YES:

d) What is the problem? _____

EXCLUSION CRITERIA: If illness causes difficulty falling back to sleep.

13. **EXPECTATIONS**

a) How long would you like to be able to sleep each night? ____ hrs.

b) Relative to other people your age, do you think your sleep is:

better ____ worse ____ or the same ____

IF BETTER OR WORSE:

c) How does it differ? _____

14. a) Is it easier for you to fall asleep in places other than your bedroom? ____ Yes ____ No

IF YES:

b) How often do you fall asleep in places other than your bedroom? ____days/week

c) Where do you usually fall asleep? _____

15. What do you do when you can't fall asleep?

_____

_____

16. a) On weekends (or your days off), do you sleep more than an hour later than your usual bed time?
____ Yes ____ No

b) Do you go to bed more than an hour later than you usual bed time? ____ Yes ____ No

c) i) Are there certain days of the week when you experience more difficulty falling asleep than on other days? ____ Yes ____ No

IF YES:

ii) When?(How does it relate to your days off?)

_____

_____

iii) What is the sleeping difficulty? (i.e., difficulty falling asleep at night, waking too early)

_____

_____

17. a)How much alcohol do you drink? _____

b) At what time of the day do you usually drink? _____

18. a) Have you previously received treatment for sleeping problems? ____ Yes ____ No

IF YES:

b) What was the treatment? _____

c) When did you receive it? _____

19. a) Have you tried self-help remedies for your sleeping problems? ____ Yes ____ No

IF YES:

b) What have you tried? _____

c) How effective was it? _____

20. Is there anything else related to your sleep that you think I should know but have not asked you about?

_____

_____

_____

Long-term Follow-Up Interview
Sleep Questionnaire

In answering these questions, refer to the last typical week.

9. Do you have insomnia? (problem with falling asleep or going back to sleep after waking up at night or early in the morning) Put an " **X** " in the appropriate box.

very often	1	2	3	4	5	6	7	8	9	10	very rarely

10. a) How distressed are you by an insomnia problem?

not at all	1	2	3	4	5	6	7	8	9	10	very much

11. a) How many hours, on average, do you usually sleep per night? _____

b) How many days per week do you nap? _____

FALLING ASLEEP

12. a) How long does it usually take you to <u>fall asleep</u>? _____

b) During a typical week, how often do you have difficulty <u>falling asleep</u>?

Days Per Week: 0 1 2 3 4 5 6 7

c) How often does difficulty falling asleep <u>distress</u> you?

Days Per Week: 0 1 2 3 4 5 6 7

WAKING DURING THE NIGHT

13. Do you usually wake up during the night?
____ Yes ____ No

IF YES:

a) How many times per night? _____

b) How often?

Days Per Week: 0 1 2 3 4 5 6 7

c) How often do you have <u>difficulty getting back to sleep</u>?

Days Per Week: 0 1 2 3 4 5 6 7

d) How often does difficulty <u>getting back to sleep</u> distress you?

Days Per Week: 0 1 2 3 4 5 6 7

e) Approximately, what is the total amount of time that you are awake during the middle of the night? ____ hrs ____ mins

Appendix F

Baseline Data

Appendix F1

Chi-Square Comparisons: Equivalence of the Three Intervention Groups on Demographic Variables

Variables	Degrees of Freedom (df)	Chi-Square (x^2)
Sex	2	.17
Marital Status	2	1.31
Living Arrangement	4	1.25
Education Level	4	3.77*
Employment Status	2	9.15**
Income Category	2	4.15*
Religion	8	14.45

Note. N = 41 for all variables except Living Arrangement (N=40) and Income Category (N=33)

* $p < .05$
** $p < .01$

Appendix F2

Chi-Square Comparisons: Sex Differences on Demographic Variables

Variables	Degrees of Freedom (df)	Chi-Square (x^2)
Marital Status	1	2.34
Living Arrangement	2	1.21
Education Level	2	3.32
Employment Status	1	.42
Income Category	1	.29
Religion	4	.31

Note. All comparisons are nonsignificant.

Appendix F3

Chi-Square Comparisons: Equivalence of the Three Intervention Groups on Problem Specific Variables

Variables	Degrees of Freedom (df)	Chi-Square (x^2)
Type of Insomnia Problem		
Onset Only	2	1.15
Maintenance Only	2	2.80
Onset & Maintenance	2	5.01
No Diagnosable Problem	2	1.62
Sleep Medication Use		
Number of Subjects	2	.95

Note. N = 41

Appendix F4

ANOVA Summary Table for Differences Among Intervention Groups on Sleep-Wake Parameters at Baseline

Source	SS	MS	df	F	p
SOL					
Group	.03	.01	2	.04	.96
Error	13.14	.35	38		
WASO					
Group	3.63	1.82	2	1.30	.29
Error	53.26	1.40	38		
TST					
Group	2.95	1.48	2	.89	.42
Error	62.95	1.66	38		
SE					
Group	.09	.04	2	1.56	.22
Error	1.05	.03	38		

Note. N = 41

Appendix F5

ANOVA Summary Table for Differences Among Intervention Groups on Subjective Sleep Variables at Baseline

Source	SS	MS	df	F	p
Sleep Quality					
Group	.54	.27	2	.59	.56
Error	17.37	.46	38		
Insomnia Frequency					
Group	.20	.10	2	.03	.96
Error	116.29	3.00	38		
Distress Frequency					
Group	1.98	.99	2	.18	.83
Error	195.10	5.42	36		
Sleep Self-Efficacy					
Group	39.68	19.84	2	.59	.56
Error	1280.22	33.69	38		

Note. N = 41, except Distress Frequency (N = 39)

Appendix F6

ANOVA Summary Table for Differences Among Intervention Groups on Lifestyle Sleep Variables at Baseline

Source	SS	MS	df	F	p
Bedtime					
Group	.15	.08	2	.09	.92
Error	33.62	.88	38		
Arising Time					
Group	.48	.24	2	.22	.81
Error	41.90	1.10	38		
Time in Bed					
Group	.60	.30	2	.26	.78
Error	44.15	1.16	38		
Naps (days/week)					
Group	8.73	4.37	2	.99	.38
Error	167.38	4.40	38		
Naps (days/week) N=19[a]					
Group	3.44	1.72	2	.34	.72
Error	82.06	5.13	16		

Note. N = 41

[a]Only participants who reported napping

Appendix F7

ANOVA Summary Table for Differences Among Intervention Groups on Daytime Variables at Baseline

Source	SS	MS	df	F	p
Sleepiness					
Group	.81	.40	2		
Error	45.86	1.27	36	.32	.73
Fatigue					
Group	7.24	3.62	2		
Error	143.20	3.77	38	.96	.39
Functioning					
Group	.58	.29	2		
Error	18.53	.49	38	.60	.55
Restedness					
Group	.16	.08	2		
Error	21.10	.56	38	.14	.87

Note. N = 41

Appendix F8

ANOVA Summary Table for Differences Among Intervention Groups on Cognitive-Affective Variables at Baseline

Source	SS	MS	df	F	p
Anxious Self-Statements					
Group	81.27	40.63	2	.09	.91
Error	16454.64	433.02	38		
Cognitive Arousal					
Group	9.14	4.57	2	.17	.85
Error	1032.86	27.18	38		
Mental Activity					
Group	3.20	1.60	2	3.09	.06
Error	19.71	.52	38		
Somatic Arousal					
Group	28.14	14.07	2	2.04	.14
Error	262.35	6.90	38		
Physical Tension					
Group	3.93	1.97	2	4.09	.01
Error	15.24	.40	38		

Note. N = 41

Appendix F9

ANOVA Summary Table for Differences Among

Intervention Groups on Psychological Variables at Baseline

Source	SS	MS	df	F	p
Depression (BSI)					
Total Sample					
Group	1.25	.62	2	1.93	.16
Error	12.26	.32	38		
Males					
Group	1.67	.83	2	1.21	.34
Error	6.90	.69	10		
Females					
Group	.19	.10	2	.54	.59
Error	4.48	.18	25		
Neuroticism					
Group	6.43	3.22	2	.13	.88
Error	915.54	24.74	37		
Worry					
Group	185.00	92.50	2	.41	.67
Error	7461.22	226.10	35		

Appendix F10

T-tests Comparing Sleep-Wake and Subjective Sleep Variable Scores of Males and Females at Baseline

Variable	Group[a]	Mean	T-Value	df	2-Tail Probability
SOL	1	.76	.72	39	.48
	2	.62			
WASO	1	1.67	-.40	39	.69
	2	1.83			
TST	1	5.43	.79	39	.44
	2	5.08			
SE(%)	1	.67	.19	39	.85
	2	.66			
Sleep Quality	1	3.10	.46	39	.65
	2	2.99			
Insomnia Frequency	1	8.39	.55	39	.59
	2	8.08			
Distress Frequency	1	5.89	.16	39	.87
	2	5.77			
Sleep Self-Efficacy	1	23.93	-1.71	39	.10
	2	27.15			

[a]Group 1 = Females (n = 28)
Group 2 = Males (n = 13)

Appendix F11

T-tests Comparing Lifestyle Sleep Variable and Daytime Variable Scores of Males and Females at Baseline

Variable	Group[a]	Mean	T-Value	df	2-Tail Probability
Bedtime	1	23.35	.69	39	.50
	2	23.13			
Arising time	1	31.33	1.84	39	.07
	2	30.71			
Time in Bed	1	7.95	.91	17.69	.37
	2	7.58			
Naps (days/week)[b]	1	2.91	.08	16.82	.94
	2	2.83			
Sleepiness	1	2.14	-1.54	39	.13
	2	2.69			
Fatigue	1	2.36	.78	39	.44
	2	1.85			
Functioning	1	3.75	.87	39	.39
	2	3.55			
Restedness	1	3.36	.42	39	.68
	2	3.25			

[a]Group 1 = Females, n = 28
Group 2 = Males, n = 13
[b]Only participants who reported napping; Females: N=11, Males: N=9

Appendix F12

T-tests Comparing Cognitive Affective and Psychological Variable Scores of Males and Females at Baseline

Variable	Group[a]	Mean	T-Value	df	2-Tail Probability
Anxious Self-Talk	1	55.71	.30	39	.76
	2	53.62			
Cognitive Arousal	1	17.43	.79	39	.44
	2	16.08			
Somatic Arousal	1	10.79	.27	39	.79
	2	10.54			
Mental Activity	1	3.51	.39	39	.70
	2	3.41			
Physical Tension	1	3.67	.99	39	.33
	2	3.44			
Global Severity Index (BSI)	1	.60	.17	39	.86
	2	.57			
Depression (BSI)	1	.50	-.88	39	.38
	2	.68			
Neuroticism (EPI)	1	10.89	.31	39	.76
	2	10.38			
Worry	1	51.86	.71	39	.48
	2	48.54			
Life Satisfaction	1	22.89	1.04	39	.30
	2	20.42			

[a]Group 1 = Females, n = 28
Group 2 = Males, n = 13

Appendix G

Treatment Compliance Scores

Appendix G1

T-tests Comparing Treatment Compliance Scores

for Sleep Onset and Sleep Maintenance Insomnia Episodes

Variable	Group[a]	N	Mean	T-Value	df	2-tail Probability
Relaxation Group						
Intervention Phase	1	15	76.53	-.59	14	.57
	2	15	83.80			
Follow-up Phase	1	12	54.75	.43	11	.68
	2	12	48.75			
Audiobook Group						
Intervention Phase	1	18	51.50	-.73	17	.47
	2	18	58.72			
Follow-up Phase	1	10	44.90	-1.69	9	.13
	2	10	54.90			

[a]Group 1 - Sleep Onset insomnia episodes
Group 2 - Sleep Maintenance insomnia episodes

Appendix H

Completers and Drop-outs

Appendix H1

Baseline Means and Standard Deviations of Post-Intervention Completers and Drop-outs

Variables	Completers[1]		Drop-Outs[2]	
	Mean	SD	Mean	SD
Demographic Variables				
Age	67.49	6.71	69.64	7.16
Income Adequacy				
Problem Specific Variables				
Duration of Insomnia	15.24	13.09	16.09	16.35
Medication Use (Days/week)[3]	1.93	1.27	1.92	.80
Lifestyle Sleep Variables				
Bedtime	23.28	.92	23.18	.82
Arising Time	31.13	1.03	31.18	1.21
Time in Bed	7.83	1.06	8.00	1.06
Napping Frequency (Days/week)[4]				
Sleep-Wake Variables				
SOL	.72	.57	.67	.46
WASO	1.72	1.19	1.75	.95
TST	5.32	1.28	5.77	1.07
SE(%)	67	17	69	13
Subjective Sleep Variables				
Sleep Quality	3.07	.67	3.05	.91
Insomnia Frequency	8.29	1.71	6.45**	2.34
Distress Frequency	5.85	2.28	5.20	2.44
Sleep Self-Efficacy	24.95	5.74	25.09	6.11
Daytime Variables				
Sleepiness	2.33	1.11	2.56	1.01
Fatigue	2.20	1.94	3.05	2.67
Functioning	3.68	.69	3.59	.98
Restedness	3.32	.73	2.83	.76

Appendix H1 (cont'd)

Baseline Means and Standard Deviations of
Post-Intervention Completers and Drop-outs

Variables	Completers[1]		Drop-Outs[2]	
	Mean	SD	Mean	SD
Cognitive Affective Variables				
Anxious Self-Statements	55.05	20.33	60.18	35.58
Cognitive Arousal	17.00	5.10	16.82	8.10
Somatic Arousal	10.71	2.70	9.91	3.59
Mental Activity	3.47	.76	3.32	1.15
Physical Tension	3.60	.69	3.83	.78
Psychological Variables				
Global Severity Index (GSI)	.59	.39	.54	.71
Depression (BSI)	.56	.58	.79	.90
Neuroticism	10.73	4.86	12.70	6.20
Worry	50.78	14.78	50.67	15.68
Life Satisfaction	22.11	7.16	21.55	6.07

[1]Completers: n = 41
[2]Dropouts: n = 11
[3]Includes only participants who used medication.
[4]Includes only participants who reported napping.
** $p<.01$: T-test comparison of completers and drop-outs.

Appendix H2

Baseline Means and Standard Deviations
of Follow-up Completers and Drop-outs

Variables	Completers[1]		Drop-Outs[2]	
	Mean	SD	Mean	SD
Demographic Variables				
Age	67.97	6.51	66.14	7.99
Income Adequacy	5.22	1.77	5.86	1.57
Problem Specific Variables				
Duration of Insomnia	15.06	12.15	17.71	18.08
Medication Use (Days/week)[3]	2.22	1.56	1.33	.58
Lifestyle Sleep Variables				
Bedtime	23.37	.93	22.82	.88
Arising Time	31.09	1.08	31.46	.77
Time in Bed	7.69	.99	8.64*	1.07
Napping Frequency (Days/week)[4]	2.81	2.14	3.50	3.54
Psychological Variables				
Global Severity Index (GSI)	.59	.42	.55	.26
Depression (BSI)	.57	.63	.45	.28
Neuroticism	10.18	4.90	12.71	4.03
Worry	49.91	13.79	56.00	14.72
Life Satisfaction	21.71	6.86	24.29	8.67

[1]Completers: n = 33
[2]Dropouts: n = 7
[3]Includes only participants who used medication.
[4]Includes only participants who reported napping.
*$p<.05$: T-test comparison of completers and drop-outs.

Appendix H3

Baseline and Post-Intervention Means and Standard Deviations of Follow-Up Completers and Drop-outs

	Baseline		Post-Intervention	
Variables	Mean	SD	Mean	SD
Sleep-Wake Variable				
SOL				
completers	.71	.59	.50	.39
dropouts	.76	.58	.49	.29
WASO				
completers	1.71	1.13	1.28	.93
dropouts	1.89	1.58	1.65	1.46
TST				
completers	5.36	1.18	5.74	1.01
dropouts	5.09	1.88	5.44	1.57
SE(%)				
completers	68	15	73	14
dropouts	59	23	65	20
Subjective Sleep Variables				
Sleep Quality				
completers	3.05	.70	3.33	.74
dropouts	3.12	.63	3.52	.75
Insomnia Frequency				
completers	8.21	1.80	6.36	2.52
dropouts	8.86	1.22	7.86	1.46
Distress Frequency				
completers	5.58	2.24	5.39	2.53
dropouts	7.29	1.80	5.70	2.43
Sleep Self-Efficacy				
completers	24.70	5.28	28.52	6.55
dropouts	25.43	8.14	28.00	7.83

Appendix H3 (cont'd)
Baseline and Post-Intervention Means and Standard Deviations of Follow-Up Completers and Drop-outs

	Baseline		Post-Intervention	
Variables	Mean	SD	Mean	SD
Daytime Functioning Variables				
Sleepiness				
completers	2.36	1.17	2.38	1.29
dropouts	2.14	.69	2.20	1.07
Fatigue				
completers	2.18	1.99	2.35	1.76
dropouts	2.00	1.83	2.00	1.29
Functioning				
completers	3.67	.72	3.71	.73
dropouts	3.77	.66	4.11	.67
Restedness				
completers	3.30	.75	3.41	.73
dropouts	3.40	.74	3.59	1.01
Cognitive Variables				
Anxious Self-Statements				
completers	52.67	18.04	46.85	14.41
dropouts	60.43	26.01	54.00	26.88
Cognitive Arousal				
completers	17.12	5.21	15.76	4.77
dropouts	17.14	4.95	16.86	4.91
Somatic Arousal				
completers	10.73	2.50	10.52	3.29
dropouts	10.71	3.86	9.43	.98
Mental Activity				
completers	3.40	.77	3.57	.83
dropouts	3.83	.67	3.76	1.04
Physical Tension				
completers	3.57	.72	3.57	.83
dropouts	3.70	.62	3.94	.67

Note. All Group comparisons are nonsignificant.

Appendix H4

Baseline Means and Standard Deviations for Long-Term Follow-up Sleep Questionnaire Completers and Non-Completers

Variables	Completers[1]		Non-Completers[2]	
	Mean	SD	Mean	SD
Demographic Variables				
Age	68.70	6.59	64.13	4.70
Income Adequacy	4.96	1.82	5.29	.95
Problem Specific Variables				
Duration of Insomnia	15.78	13.22	10.50	8.52
Medication Use (Days/week)[3]	2.00	1.58	1.67	.58
Lifestyle Sleep Variables				
Bedtime	23.41	1.03	23.44	.56
Arising Time	31.13	1.11	30.97	1.14
Time in Bed	7.67	.96	7.53	1.17
Napping Frequency (Days/week)[4]	2.92	2.05	1.38	.75
Psychological Variables				
Global Severity Index (GSI)	.56	.35	.80	.56
Depression (BSI)	.55	.60	.71	.80
Neuroticism	10.26	5.03	11.25	4.62
Worry	48.96	12.40	58.00	13.30
Life Satisfaction	21.33	6.78	20.63	6.59

Note. All Group comparisons are nonsignificant.

[1]Completers: n = 23
[2]Noncompleters: n = 8
[3]Includes only participants who used medication.
[4]Includes only participants who reported napping.

Appendix H5

Baseline, Post-Intervention, and Follow-Up Means and Standard Deviations of Long-Term Follow-Up Sleep Questionnaire Completers and Non-Completers

Variables	Status[1]	Baseline		Post-Intervention		Follow-Up	
		Mean	SD	Mean	SD	Mean	SD
Sleep-Wake Variables							
SOL	completers	.57	.38	.39	.32	.37	.23
	dropouts	.86	.48	.68	.46	.75**	.52
WASO	completers	1.51	.94	1.11	.83	.95	.76
	dropouts	1.93	1.48	1.51	1.13	1.28	1.13
TST	completers	5.51	1.03	5.93	.89	6.07	.82
	dropouts	5.15	1.59	5.36	1.31	5.29	1.20
SE(%)	completers	71	13	76	13	79	11
	dropouts	64	21	68	16	67*	14
Subjective Sleep Variables							
Sleep Quality	completers	3.18	.68	3.50	.74	3.60	.79
	dropouts	2.83	.72	2.89	.67	2.90*	.59
Insomnia Frequency	completers	8.26	1.96	6.48	2.48	5.35	2.69
	dropouts	7.88*	1.46	5.63	2.83	6.25	2.61
Distress Frequency	completers	5.17	2.10	5.57	2.33	4.91	2.78
	dropouts	7.00	2.67	4.99	3.42	5.50	3.21
Sleep Self-Efficacy	completers	25.74	4.89	29.39	6.04	30.81	5.94
	dropouts	20.25*	3.62	25.50	8.19	25.25*	7.48

[1]Completers: N=23, Non-Completers: N=8.

Appendix H5 (cont'd)

Baseline, Post-Intervention, and Follow-Up Means and Standard Deviations of Long-Term Follow-Up Sleep Questionnaire Completers and Non-Completers

		Baseline		Post-Intervention		Follow-Up	
Variables	Status	Mean	SD	Mean	SD	Mean	SD
Daytime Variables							
Sleepiness	completers	2.26	1.25	2.04	.93	2.52	1.08
	dropouts	2.88	.84	3.55*	1.64	2.44	1.05
Fatigue	completers	1.96	2.08	2.17	1.83	2.35	1.43
	dropouts	2.50	1.77	2.94	1.78	2.88	2.17
Functioning	completers	3.75	.77	3.81	.73	3.85	.72
	dropouts	3.34	.53	3.27	.60	3.18*	.83
Restedness	completers	3.43	.80	3.56	.72	3.64	.80
	dropouts	3.01	.60	3.02	.66	3.12	.58
Cognitive-Affective Variables							
Anxious Self-Statements	completers	49.57	15.79	44.00	10.53	41.87	10.46
	dropouts	66.50*	18.52	58.75*	18.68	50.25	21.02
Cognitive Arousal	completers	16.09	4.17	15.09	4.24	15.61	5.84
	dropouts	21.50**	5.63	18.63	5.68	16.50	5.71
Somatic Arousal	completers	10.61	2.64	10.78	3.70	10.18	2.50
	dropouts	11.38	2.26	10.25	2.19	9.13	1.64
Mental Activity	completers	3.55	.77	3.70	.80	3.68	.89
	dropouts	2.83**	.43	2.93*	.52	3.11	.57
Physical Tension	completers	3.63	.70	3.66	.81	3.71	.74
	dropouts	3.10*	.36	3.05	.59	3.29	.39

Appendix I

Whole Sample Analyses

Appendix I1

3x2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among Intervention Groups on Sleep-Wake Parameters

Source	SS	MS	df	F	p
SOL					
Group	.16	.08	2	.23	.80
Error	13.02	.34	38		
Time	.58	.58	1	3.62	.07
Group X Time	.08	.04	2	.24	.79
Error	6.05	.16	38		
WASO					
Group	3.99	2.00	2	.89	.42
Error	85.52	2.25	38		
Time	1.54	1.54	1	6.08	.02
Group X Time	.55	.28	2	1.08	.35
Error	9.65	.25	38		
TST					
Group	3.12	1.56	2	.60	.56
Error	99.42	2.62	38		
Time	1.80	1.80	1	7.98	.01
Group X Time	.80	.40	2	1.76	.19
Error	8.58	.23	38		
SE					
Group	.06	.03	2	.67	.52
Error	1.71	.04	38		
Time	.03	.03	1	8.80	.01
Group X Time	.03	.02	2	4.40	.02
Error	.14	.00	38		

Appendix I2

3X2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among Intervention Groups on Subjective Sleep Variables

Source	SS	MS	df	F	p
Sleep Quality					
Group	.41	.21	2	.28	.76
Error	28.21	.74	38		
Time	1.55	1.55	1	6.22	.02
Group X Time	.21	.10	2	.41	.66
Error	9.48	.25	38		
Insomnia Frequency					
Group	4.04	2.02	2	.31	.74
Error	6.57	249.76	38		
Time	46.07	46.07	1	31.00	.00
Group X Time	4.66	2.33	2	1.57	.22
Error	56.46	1.49	38		
Distress Frequency					
Group	2.16	1.08	2	.14	.87
Error	286.51	7.54	38		
Time	2.69	2.69	1	.81	.37
Group X Time	8.07	4.04	2	1.21	.31
Error	126.79	3.34	38		
Sleep Self- Efficacy					
Group	94.44	47.22	2	.78	.47
Error	2296.07	60.42	38		
Time	170.37	170.37	1	12.14	.001
Group X Time	3.74	1.87	2	.13	.88
Error					

Appendix I3

3X2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among Intervention Groups on Daytime Variables

Source	SS	MS	df	F	p
Sleepiness					
Group	.47	.23	2	.13	.88
Error	70.19	1.85	38		
Time	.01	.01	1	.02	.89
Group X Time	.71	.36	2	.53	.59
Error	25.45	.67	38		
Fatigue					
Group	1.50	.75	2	.17	.85
Error	170.70	4.49	38		
Time	1.08	1.08	1	.55	.46
Group X Time	6.85	3.42	2	1.73	.19
Error	75.18	1.98	38		
Functioning					
Group	.00	.00	2	.00	.998
Error	33.98	.89	38		
Time	.00	.00	1	.00	.98
Group X Time	1.04	.52	2	2.86	.07
Error	6.89	.18	38		
Restedness					
Group	.32	.16	2	.17	.84
Error	35.43	.93	38		
Time	.12	.12	1	.57	.45
Group X Time	.66	.33	2	1.61	.21
Error	7.78	.20	38		

Appendix I4

3X2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among Intervention Groups on Cognitive-Affective Variables

Source	SS	MS	df	F	p
Anxious Self-Talk					
Group	414.47	207.23	2	.29	.75
Error	27096.77	713.07	38		
Time	464.29	464.29	1	5.57	.02
Group X Time	123.58	61.79	2	.74	.48
Error	3166.64	83.33	38		
Cognitive Arousal					
Group	19.88	9.94	2	.23	.80
Error	1655.14	43.56	38		
Time	1.16	1.16	1	.06	.80
Group X Time	19.88	9.94	2	.56	.58
Error	679.14	17.87	38		
Mental Activity					
Group	3.02	1.51	2	1.38	.26
Error	41.67	1.10	38		
Time	.15	.15	1	.81	.37
Group X Time	.74	.37	2	1.98	.15
Error	7.12	.19	38		
Somatic Arousal					
Group	24.84	12.42	2	1.33	.28
Error	355.11	9.34	38		
Time	2.53	2.53	1	.65	.43
Group X Time	6.89	3.44	2	.88	.43
Error	148.87	3.92	38		
Physical Tension					
Group	5.49	2.75	2	2.98	.06
Error	34.98	.92	38		
Time	.00	.00	1	.01	.94
Group X Time	.22	.11	2	.66	.52
Error	6.46	.17	38		

Appendix I5

2X2 ANOVA Summary Table: Baseline to Post Intervention Changes Among the Two Treatment Groups on Sleep-Wake Parameters

Source	SS	MS	df	F	p
SOL					
Group	.06	.06	1	.18	.68
Error	13.25	.35	38		
Time	1.07	1.07	1	8.19	.01
Group X Time	.14	.14	1	1.10	.30
Error	4.96	.13	38		
WASO					
Group	.87	.87	1	.38	.54
Error	85.75	2.26	38		
Time	3.27	3.27	1	11.94	.001
Group X Time	.36	.36	1	1.31	.26
Error	10.41	.27	38		
TST					
Group	1.25	1.25	1	.46	.50
Error	103.91	2.73	38		
Time	2.88	2.88	1	13.57	.001
Group X Time	.17	.17	1	.82	.37
Error	8.07	.21	38		
SE					
Group	.01	.01	1	.25	.62
Error	1.84	.05	38		
Time	.06	.06	1	17.42	.001
Group X Time	.02	.02	1	5.18	.03
Error	.13	.00	38		

Appendix I6

2X2 ANOVA Summary Tables: Baseline to Post Intervention Among the Two Treatment Groups on Subjective Sleep Variables

Source	SS	MS	df	F	p
Quality					
Group	.98	.98	1	1.36	.25
Error	27.23	.72	38		
Time	1.86	1.86	1	6.70	.01
Group X Time	.15	.15	1	.52	.47
Error	10.56	.28	38		
Insomnia Frequency					
Group	4.11	4.11	1	.62	.44
Error	251.84	6.63	38		
Time	58.80	58.80	1	26.00	.00
Group X Time	2.25	2.25	1	.99	.33
Error	85.95	2.26	38		
Distress Frequency					
Group	1.96	1.96	1	.24	.63
Error	306.48	8.07	38		
Time	4.16	4.16	1	1.30	.26
Group X Time	6.08	6.08	1	1.89	.18
Error	121.91	3.21	38		
Sleep Self-Efficacy					
Group	9.48	9.48	1	.15	.70
Error	2449.27	64.45	38		
Time	256.97	256.97	1	16.90	.00
Group X Time	.97	.97	1	.06	.80
Error	577.83	15.21	38		

Appendix I7

2X2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among Intervention Groups on Daytime Variables

Source	SS	MS	df	F	p
Sleepiness					
Group	.06	.06	1	.06	.87
Error	79.11	2.08	38		
Time	.01	.01	1	.02	.90
Group X Time	.10	.10	1	.14	.71
Error	28.06	.74	38		
Fatigue					
Group	1.92	1.92	1	.42	.52
Error	174.38	4.59	38		
Time	.49	.49	1	.24	.63
Group X Time	3.12	3.12	1	1.53	.22
Error	77.63	2.04	38		
Functioning					
Group	.62	.62	1	.74	.39
Error	31.82	.84	38		
Time	.19	.19	1	1.00	.32
Group X Time	.01	.01	1	.03	.86
Error	7.14	.19	38		
Restedness					
Group	.05	.05	1	.06	.81
Error	35.20	.93	38		
Time	.30	.30	1	1.28	.27
Group X Time	.16	.16	1	.68	.41
Error	8.99	.24	38		

Appendix I8

2X2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among Treatment Groups on Cognitive-Affective Variables

Source	SS	MS	df	F	p
Anxious Self-Talk					
Group	.35	.35	1	.00	.98
Error	23326.84	613.86	38		
Time	742.71	742.71	1	11.23	.002
Group X Time	248.61	248.61	1	3.76	.06
Error	2512.78	66.13	38		
Cognitive Arousal					
Group	17.29	17.29	1	.44	.51
Error	1485.09	39.08	38		
Time	29.05	29.05	1	2.86	.10
Group X Time	8.05	8.05	1	.79	.38
Error	385.83	10.15	38		
Mental Activity					
Group	3.48	3.48	1	3.27	.08
Error	40.46	1.06	38		
Time	.33	.33	1	1.63	.21
Group X Time	.04	.04	1	.18	.67
Error	7.70	.20	38		
Somatic Arousal					
Group	3.17	3.17	1	.29	.59
Error	410.78	10.81	38		
Time	2.60	2.60	1	.44	.51
Group X Time	12.20	12.20	1	2.08	.16
Error	222.60	5.86	38		
Physical Tension					
Group	3.52	3.52	1	3.80	.06
Error	35.23	.93	38		
Time	.04	.04	1	.28	.60
Group X Time	.00	.00	1	.00	.95
Error	.15	5.60	38		

Appendix I9

Baseline and Post-Intervention Means and Standard Deviations for the Whole Sample (based on two group comparisons)

Variables	Baseline		Post-Intervention	
	M	SD	M	SD
	Sleep-Wake Parameters			
SOL	.72	.58	.49	.37
WASO	1.74	1.20	1.34	1.03
TST	5.31	1.30	5.69	1.10
SE (%)	.67	.17	.72	.15
	Subjective Sleep Variables			
Sleep Quality[b]	3.06	.68	3.36	.74
Insomnia Frequency[a]	8.33	1.72	6.63	2.43
Distress Frequency[a]	5.88	2.24	5.45	2.48
Sleep Self-Efficacy[b]	24.83	5.76	28.43	6.69
	Daytime Variables			
Restedness[b]	3.32	.74	3.44	.77
Functioning[b]	3.68	.70	3.48	.72
Sleepiness(SSS)[a]	2.32	1.10	2.35	1.25
Fatigue[b]	2.15	1.94	2.29	1.68
	Cognitive-Affective Variables			
Anxious Self-Talk[a]	54.03	19.49	48.10	17.00
Cognitive Arousal[a]	17.13	5.11	15.95	4.75
Somatic Arousal[a]	10.73	2.73	10.33	3.03
Mental Activity[b]	3.48	.77	3.61	.86
Physical Tension[b]	3.59	.70	3.64	.81

Note. N=40.

[a] Higher scores indicate worse adaptation
[b] Higher scores indicate better adaptation

Appendix I10

2x3 ANOVA Summary Table: Differences Among Intervention Groups across Three Testing Times on Sleep-Wake Parameters

Source	SS	MS	df	df[a]	F	p	p[a]
SOL							
Group	.33	.33	1		.86	.36	
Error	11.70	.38	31				
Time	1.27	.63	2	1.39	5.08	.01	.02
Group X Time	.17	.08	2	1.39	.68	.51	.46
Error	7.73	.12	62	43.00			
WASO							
Group	.86	.86	1		.34	.57	
Error	78.97	2.55	31				
Time	7.36	3.68	2	1.83	20.30	.00	.000
Group X Time	1.64	.82	2	1.83	4.53	.02	.02
Error	11.24	.18	62	56.68			
TST							
Group	2.30	2.30	1		.80	.38	
Error	89.30	2.88	31				
Time	4.87	2.44	2	1.83	11.09	.000	.000
Group X Time	.59	.30	2	1.83	1.35	.27	.27
Error	13.62	.22	62	56.60			
SE							
Group	.03	.03	1		.57	.46	
Error	1.54	.05	31				
Time	.10	.05	2	1.94	13.32	.000	.000
Group X Time	.03	.01	2	1.94	3.50	.04	.04
Error	.23	.00	62	60.15			

[a]Greenhouse-Geisser Epsilon Correction applied.

Appendix I11

2X3 ANOVA Summary Tables: Differences Among Intervention Groups Across Three Testing Times on Subjective Sleep Variables

Source	SS	MS	df	df[a]	F	p	p[a]
Quality							
Group	2.80	2.80	1		2.37	.13	
Error	36.71	1.18	31				
Time	2.79	1.40	2	1.53	6.77	.01	.01
Group X Time	.24	.12	2	1.53	.59	.56	.52
Error	12.79	.21	62	47.41			
Insomnia Frequency							
Group	17.37	17.37	1		1.82	.19	
Error	277.30	9.56	29				
Time	114.63	57.32	2	1.76	16.04	.000	.000
Group X Time	5.73	2.87	2	1.76	.80	.45	.44
Error	207.28	3.57	58	51.12			
Distress Frequency							
Group	.64	.64	1		.05	.83	
Error	381.19	13.14	29				
Time	5.52	2.76	2	1.91	.74	.48	.48
Group X Time	3.11	1.56	2	1.91	.42	.66	.65
Error	215.64	3.72	58	55.44			
Sleep Self-Efficacy							
Group	80.86	80.86	1		.90	.35	
Error	2596.18	89.52	29				
Time	428.77	214.39	2	1.79	15.09	.000	.000
Group X Time	8.92	4.46	2	1.79	.31	.73	.71
Error	824.28	14.21	58	51.79			

[a]Greenhouse-Geisser Epsilon Correction applied.

Appendix I12

2x3 ANOVA Summary Table: Differences Among Intervention Groups Across Three Testing Times on Daytime Functioning

Source	SS	MS	df	df[a]	F	p	p[a]
Sleepiness							
Group	.18	.18	1		.06	.80	
Error	81.18	2.80	29				
Time	.12	.06	2	1.92	.08	.93	.92
Group X Time	.10	.05	2	1.92	.07	.94	.93
Error	44.96	.78	58	55.71			
Fatigue							
Group	1.66	1.66	1		.22	.65	
Error	223.07	7.69	29				
Time	2.67	1.34	2	1.43	1.10	.34	.32
Group X Time	2.22	1.11	2	1.43	.91	.41	.38
Error	70.49	1.22	58	41.35			
Functioning							
Group	2.32	2.32	1		1.67	.21	
Error	43.25	1.40	31				
Time	.05	.03	2	1.72	.25	.78	.74
Group X Time	.18	.09	2	1.72	.84	.44	.42
Error	6.63	.11	62	53.17			
Restedness							
Group	1.10	1.10	1		.84	.37	
Error	40.72	1.31	31				
Time	.77	.39	2	1.67	2.27	.11	.12
Group X Time	.40	.20	2	1.67	1.16	.32	.31
Error	10.58	.17	62	51.67			

[a]Greenhouse-Geisser Epsilon Correction applied.

Appendix I13

2X3 ANOVA Summary Table: Differences Among Intervention Groups Across Three Testing Times on Cognitive-Affective Variables

Source	SS	MS	df	df[a]	F	p	p[a]
Anxious Self-Talk							
Group	41.59	41.59	1		.07	.79	
Error	17650.07	588.34	30				
Time	1830.22	915.11	2	1.45	13.79	.000	.000
Group X Time	239.43	119.71	2	1.45	1.80	.17	.18
Error	3982.14	66.37	60	43.53			
Cognitive Arousal							
Group	.88	.88	1		.02	.90	
Error	1484.96	51.21	29				
Time	55.33	27.67	2	1.49	1.67	.20	.20
Group X Time	11.76	5.88	2	1.49	.36	.70	.64
Error	958.32	16.52	58	43.21			
Mental Activity							
Group	4.05	4.05	1		2.48	.13	
Error	50.59	1.63	31				
Time	.67	.34	2	1.95	2.27	.11	.11
Group X Time	.15	.08	2	1.95	.51	.61	.60
Error	9.22	.15	62	60.53			
Somatic Arousal							
Group	1.56	1.56	1		.10	.75	
Error	442.87	15.27	29				
Time	14.07	7.03	2	1.65	1.75	.18	.19
Group X Time	15.25	7.63	2	1.65	1.90	.16	.17
Error	232.98	4.02	58	47.77			
Physical Tension							
Group	3.70	3.70		1	2.58	.12	
Error	44.40	1.43		31			
Time	.19	.10	2	1.93	.90	.41	.41
Group X Time	.04	.02	2	1.93	.20	.82	.81
Error	6.60	.11	62	59.97			

[a]Greenhouse-Geisser Epsilon Correction applied.

Appendix I14

2x3 ANOVA Summary Table: Differences Among Intervention Groups Across Three Testing Times (with Self-Monitoring Subjects Excluded)

Source	SS	MS	df	df[a]	F	p	p[a]
SOL							
Group	.28	.28	1				
Error	6.98	.33	21		.84	.37	
Time	.50	.25	2	1.69	2.86	.07	.08
Group X Time	.24	.12	2	1.69	1.35	.27	.27
Error	3.69	.09	42	35.42			
WASO							
Group	.23	.23	1		.09	.77	
Error	55.89	2.66	21				
Time	6.18	3.09	2	1.97	17.97	.000	.000
Group X Time	1.03	.52	2	1.97	2.99	.06	.10
Error	7.23	.17	42	41.30			
TST							
Group	2.18	2.18	1		.62	.44	
Error	73.89	3.52	21				
Time	4.35	2.18	2	1.95	9.55	.000	.000
Group X Time	.06	.03	2	1.95	.13	.88	.87
Error	9.57	.23	42	40.95			
SE							
Group	.00	.00	1		.03	.88	
Error	1.34	.06	21				
Time	.10	.05	2	1.88	16.12	.000	.000
Group X Time	.02	.01	2	1.88	2.64	.08	.09
Error	.13	.00	42	39.42			

Appendix I14 (cont'd)
2x3 ANOVA Summary Table: Differences Among Intervention Groups across Three Testing Times (with Self-Monitoring Subjects Excluded)

Source	SS	MS	df	df[a]	F	p	p[a]
Quality							
Group	1.37	1.37	1		1.00	.33	
Error	28.82	1.37	21				
Time	1.59	.79	2	1.70	3.99	.03	.03
Group X Time	.19	.09	2	1.70	.46	.63	.60
Error	8.37	.20	42	35.80			
Insomnia Frequency							
Group	9.47	9.47	1		1.14	.30	
Error	166.06	8.30	20				
Time	87.48	43.74	2	1.60	13.75	.000	.000
Group X Time	5.30	2.65	2	1.60	.83	.44	.42
Error	127.21	3.18	42	32.06			
Distress Frequency							
Group	.07	.07	1		.00	.95	
Error	308.60	15.43	20				
Time	5.29	2.65	2	1.99	.74	.49	.49
Group X Time	4.82	2.41	2	1.99	.67	.52	.52
Error	143.95	3.60	40	39.85			
Sleep Self-Efficacy							
Group	6.40	6.40	1		.06	.81	
Error	2123.44	106.17	20				
Time	202.92	101.46	2	1.55	7.35	.002	.005
Group X Time	9.87	4.93	2	1.55	.36	.70	.65
Error	552.06	13.80	40	30.96			

[a]Greenhouse-Geisser Epsilon Correction applied.

Appendix I14 (cont'd)
2x3 ANOVA Summary Table: Differences Among Intervention Groups across Three Testing Times (with Self-Monitoring Subjects Excluded)

Source	SS	MS	df	df[a]	F	p	p[a]
Sleepiness							
Group	.38	.38	1		.13	.72	
Error	59.05	2.95	20				
Time	.86	.43	2	1.97	.56	.57	.57
Group X Time	1.15	.58	2	1.97	.76	.48	.48
Error	30.50	.76	40	39.43			
Fatigue							
Group	3.64	3.64	1		.53	.48	
Error	138.14	6.91	20				
Time	1.64	.82	2	1.28	.60	.55	.48
Group X Time	3.64	1.82	2	1.28	1.34	.27	.27
Error	54.55	1.36	40	25.56			
Functioning							
Group	.14	.14	1		.08	.77	
Error	34.24	1.63	21				
Time	.16	.08	2	1.93	.88	.42	.42
Group X Time	.02	.01	2	1.93	.10	.90	.90
Error	3.92	.09	42	40.43			
Restedness							
Group	.02	.02	1		.01	.91	
Error	28.89	1.38	21				
Time	.63	.31	2	1.76	1.77	.18	.19
Group X Time	.09	.05	2	1.76	.25	.78	.75
Error	7.44	.18	42	36.97			

[a]Greenhouse-Geisser Epsilon Correction applied.

Appendix I14 (cont'd)
2x3 ANOVA Summary Table: Differences Among Intervention Groups across Three Testing Times (with Self-Monitoring Subjects Excluded)

Source	SS	MS	df	df[a]	F	p	p[a]
Anxious Self-Talk							
Group	815.52	815.52	1		1.12	.30	
Error	14619.52	730.92	20				
Time	939.48	469.74	2	1.42	7.05	.002	.007
Group X Time	35.12	17.56	2	1.42	.26	.77	.69
Error	2665.39	66.63	40	28.48			
Cognitive Arousal							
Group	.24	.24	1		.00	.95	
Error	1123.38	56.17	20				
Time	52.97	26.49	2	1.36	2.24	.12	.14
Group X Time	8.16	4.08	2	1.36	.35	.71	.63
Error	472.00	11.80	40	27.28			
Mental Activity							
Group	4.59	4.59	1		2.84	.11	
Error	33.97	1.62	21				
Time	.43	.22	2	1.87	1.33	.28	.28
Group X Time	.26	.13	2	1.87	.80	.46	.45
Error	2.82	.16	42	39.18			
Somatic Arousal							
Group	23.12	23.12	1		1.58	.22	
Error	292.53	14.63	20				
Time	10.97	5.48	2	1.87	2.01	.15	.15
Group X Time	2.53	1.27	2	37.30	.46	.63	.62
Error	109.05	2.73	40	37.30			
Physical Tension							
Group	3.43	3.43	1		2.38	.14	
Error	30.28	1.44	21				
Time	.16	.08	2	1.81	.75	.48	.47
Group X Time	.02	.01	2	1.81	.08	.92	.91
Error	4.53	.11	42	38.10			

[a]Greenhouse-Geisser Epsilon Correction applied.

Appendix I15

ANOVA Summary Table: Differences in Sleep-Wake Parameters Across 4 Testing Times

Source	SS	MS	df	df[a]	F	p	p[a]
Daily Sleep Diary Variables							
SOL							
Time	.12	.04	3	2.19	.53	.67	>.05
Error	2.40	.07	33	24.09			
WASO							
Time	1.24	.41	3	2.04	1.55	.22	>.05
Error	8.82	.27	33	22.44			
TST							
Time	1.51	.50	3	1.89	2.60	.07	>.05
Error	6.38	.19	33	20.79			
SE							
Time	.02	.01	3	1.98	2.25	.101	>.05
Error	.11	.00	33	21.78			
Sleep Questionnaire Variables							
SOL							
Time	2.13	.71	3	1.20	2.47	.07	>.05
Error	18.99	.29	66	26.40			
WASO							
Time	35.94	11.98	3	1.98	7.10	.000	<.01
Error	111.44	1.69	66	43.56			
TST							
Time	3.34	1.11	3	1.92	2.77	.05	>.05
Error	26.56	.40	66	42.24			
SE							
Time	.04	.01	3	2.07	2.43	.07	>.05
Error	.36	.01	66	45.54			

[a]Greenhouse-Geisser Epsilon Correction applied.

Appendix I16

ANOVA Summary Table: Differences in Subjective Sleep Variables, Daytime Variables, and Cognitive-Affective Variables Across 4 Testing Times for High Distress Sample

Source	SS	MS	df	df[a]	F	p	p[a]
Sleep Quality							
Time	1.06	.35	3	1.74	1.52	.23	>.05
Error	7.67	.23	33	19.14			
Insomnia Frequency							
Time	197.86	65.95	3	2.37	16.34	.000	<.01
Error	266.39	4.04	66	52.14			
Distress Frequency							
Time	96.55	32.18	3	2.78	8.15	.000	<.01
Error	260.70	3.95	66	61.38			
Daytime Fatigue							
Time	11.95	3.98	3	2.25	2.18	.099	>.05
Error	120.80	1.83	66	49.50			
Daytime Functioning							
Time	.04	.01	3	2.28	.15	.93	>.05
Error	2.94	.09	33	25.08			
Morning Restedness							
Time	.39	.13	3	1.98	.81	.497	>.05
Error	5.35	.16	33	21.78			
Mental Activity							
Time	.66	.22	3	2.40	1.27	.30	>.05
Error	5.74	.17	33	26.40			
Physical Tension							
Time	.10	.03	3	2.13	.20	.894	>.05
Error	5.44	.16	33	23.43			

[a]Greenhouse-Geisser Epsilon Correction applied.

Appendix I17

Baseline and Post-Intervention Means and Standard Deviations of All Dependent Variables For Three Intervention Groups

Variables	Testing Time[1]	Intervention Groups: Audiobook M	Audiobook SD	Relaxation M	Relaxation SD	Self-Monitoring M	Self-Monitoring SD
Sleep-Wake Variables							
SOL	1	.68	.56	.73	.40	.74	.77
	2	.52	.35	.48	.43	.65	.40
WASO	1	1.87	1.39	1.98	1.01	1.29	1.11
	2	1.57	1.02	1.51	1.18	1.23	.92
TST	1	5.30	1.42	5.01	1.31	5.67	1.09
	2	5.77	1.38	5.41	1.06	5.69	.69
SE(%)	1	66	18	62	17	73	14
	2	69	17	71	17	72	6
Subjective Sleep Variables							
Sleep Quality	1	3.13	.86	2.91	.57	3.17	.55
	2	3.41	.84	3.31	.68	3.32	.65
Distress Frequency	1	8.29	1.54	8.21	2.16	8.39	1.45
	2	7.43	1.83	6.57	2.14	6.39	2.69
Insomnia Frequency	1	5.79	2.81	6.14	2.32	5.62	1.39
	2	6.00	2.45	4.92	2.79	5.54	1.81
Sleep Self-Efficacy	1	24.43	7.18	24.14	5.83	26.39	3.75
	2	26.71	6.38	27.36	7.80	29.54	4.37

[1]Testing Time 1 = Baseline, Testing Time 2 = Post-Intervention

Appendix I17 (cont'd)

Baseline and Post-Intervention Means and Standard Deviations of All Dependent Variables For Three Intervention Groups

		Intervention Groups					
		Audiobook		Relaxation		Self-Monitoring	
Variables	Testing Time	Mean	SD	Mean	SD	Mean	SD
Daytime Variables							
Sleepiness	1	2.50	1.09	2.29	1.20	2.15	.99
	2	2.21	.98	2.42	1.54	2.23	.73
Fatigue	1	2.64	1.78	1.64	1.78	2.31	2.25
	2	2.21	1.58	2.61	1.82	2.46	1.51
Functioning	1	3.57	.69	3.64	.68	3.85	.73
	2	3.79	.85	3.73	.73	3.54	.71
Restedness	1	3.25	.73	3.33	.75	3.40	.75
	2	3.41	.85	3.57	.78	3.22	.64
Cognitive-Affective Variables							
Anxious Self-Statements	1	57.00	22.81	54.14	18.96	53.92	20.45
	2	53.93	22.93	45.93	13.26	50.92	19.76
Cognitive Arousal	1	16.43	6.64	17.57	4.38	17.00	4.18
	2	16.14	4.83	16.14	4.79	18.00	7.64
Somatic Arousal	1	11.86	3.23	10.14	2.07	10.08	2.43
	2	10.71	3.12	10.00	1.92	10.31	2.36
Mental Activity	1	3.65	.85	3.09	.64	3.70	.65
	2	3.71	.91	3.42	.77	3.57	.94

Appendix J

High Distress Sample Analyses

Appendix J1

ANOVA Summary Table: Differences Among Intervention Groups on Sleep-Wake Parameters at Baseline for the High Distress Sample

Source	SS	MS	df	F	p
SOL					
Group	.09	.05	2	.11	.89
Error	10.64	.41	26		
WASO					
Group	7.04	3.52	2	2.18	.13
Error	42.05	1.62	26		
TST					
Group	4.58	2.29	2	1.22	.31
Error	48.80	1.88	26		
SE					
Group	.16	.08	2	2.75	.08
Error	.77	.03	26		

Appendix J2

ANOVA Summary Table: Differences Among Intervention Groups on Subjective Sleep Variables at Baseline for the High Distress Sample

Source	SS	MS	df	F	p
Sleep Quality					
Group	.67	.33	2	.75	.48
Error	11.64	.45	26		
Insomnia Frequency					
Group	2.92	1.46	2	.58	.57
Error	65.84	2.53	26		
Distress Frequency					
Group	15.01	7.50	2	2.82	.08
Error	69.13	2.66	26		
Sleep Self-Efficacy					
Group	152.25	76.13	2	2.69	.09
Error	734.51	28.25	26		

Appendix J3

ANOVA Summary Table: Differences Among Intervention Groups on Daytime Variables at Baseline for the High Distress Sample

Source	SS	MS	df	F	p
Sleepiness					
Group	3.05	1.52	2	1.11	.35
Error	35.78	1.38	26		
Fatigue					
Group	16.41	8.20	2	2.25	.13
Error	94.63	3.64	26		
Functioning					
Group	1.09	.55	2	1.05	.37
Error	13.59	.52	26		
Restedness					
Group	.29	.14	2	.22	.80
Error	16.72	.64	26		

Appendix J4

3X2 ANOVA Summary Table: Differences Among Intervention Groups on Cognitive-Affective Variables at Baseline for the High Distress Sample

Source	SS	MS	df	F	p
Anxious Self-Talk					
Group	569.93	284.96	2	.58	.57
Error	12838.63	493.79	26		
Cognitive Arousal					
Group	25.89	12.94	2	.47	.63
Error	723.35	27.82	26		
Mental Activity					
Group	1.78	.89	2	1.84	.18
Error	12.59	.48	26		
Somatic Arousal					
Group	62.14	31.07	2	4.87	.02
Error	166.00	6.38	26		
Physical Tension					
Group	3.67	1.83	2	4.82	.02
Error	9.90	.38	26		

Appendix J5

3x2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among the Three Intervention Groups on Sleep-Wake Parameters for the High Distress Sample

Source	SS	MS	df	F	p
SOL					
Group	.28	.14	2	.41	.67
Error	8.85	.34	26		
Time	.76	.76	1	3.49	.07
Group X Time	.17	.09	2	.39	.68
Error	5.64	.22	26		
WASO					
Group	9.85	4.93	2	1.97	.16
Error	64.95	2.50	26		
Time	1.12	1.12	1	3.73	.06
Group X Time	.39	.20	2	.66	.53
Error	7.80	.30	26		
TST					
Group	1.66	.83	2	.20	.82
Error	106.13	4.08	26		
Time	6.15	6.15	1	9.85	.00
Group X Time	1.29	.65	2	1.03	.37
Error	16.24	.62	26		
SE					
Group	.09	.05	2	.68	.51
Error	1.77	.07	26		
Time	.03	.03	1	2.09	.16
Group X Time	.02	.01	2	.71	.50
Error	.32	.01	26		

Appendix J6

3X2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among the Three Intervention Groups on Subjective Sleep Variables for the High Distress Sample

Source	SS	MS	df	F	p
Sleep Quality					
Group	.49	.25	2	.31	.74
Error	20.99	.81	26		
Time	2.00	2.00	1	6.30	.02
Group X Time	.33	.16	2	.52	.60
Error	8.25	.32	26		
Insomnia Frequency					
Group	8.32	4.16	2	.69	.51
Error	157.68	6.06	26		
Time	35.38	35.38	1	20.17	.00
Group X Time	5.92	2.96	2	1.09	.20
Error	45.60	1.75	26		
Sleep Self-Efficacy					
Group	302.51	151.28	2	2.61	.09
Error	1504.92	57.88	26		
Time	171.50	171.50	1	11.85	.01
Group X Time	.31	.16	2	.01	.99
Error	376.27	14.47	26		
Distress Frequency					
Group	20.60	10.30	2	1.87	.17
Error	142.82	5.49	26		
Time	16.27	16.27	1	5.24	.03
Group X Time	2.77	1.38	2	.45	.65
Error	80.72	3.10	26		

Appendix J7

3X2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among the Three Intervention Groups on Daytime Variables for the High Distress Sample

Source	SS	MS	df	F	p
Sleepiness					
Group	2.93	1.47	2	.69	.51
Error	55.34	2.13	26		
Time	.20	.20	1	.22	.64
Group X Time	.78	.39	2	.43	.66
Error	23.57	.91	26		
Fatigue					
Group	7.21	3.61	2	.85	.44
Error	110.27	4.24	26		
Time	.29	.29	1	.14	.71
Group X Time	10.05	5.02	2	2.48	.10
Error	52.68	2.03	26		
Functioning					
Group	.32	.16	2	.18	.84
Error	23.90	.92	26		
Time	.01	.01	1	.07	.80
Group X Time	.90	.45	2	2.30	.12
Error	5.10	.20	26		
Restedness					
Group	.52	.26	2	.22	.80
Error	30.17	1.16	26		
Time	.07	.07	1	.33	.57
Group X Time	.41	.20	2	1.03	.37
Error	5.12	.20	26		

Appendix J8

3X2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among the Three Intervention Groups on Cognitive-Affective Variables for the High Distress Sample

Source	SS	MS	df	F	p
Anxious Self-Talk					
Group	2001.10	1000.55	2	1.26	.30
Error	20686.31	795.63	26		
Time	400.56	400.56	1	5.06	.03
Group X Time	157.79	78.90	2	1.00	.38
Error	2058.31	79.17	26		
Cognitive Arousal					
Group	38.99	19.49	2	.49	.62
Error	1030.40	39.63	26		
Time	15.56	15.56	1	.83	.37
Group X Time	19.35	9.67	2	.52	.60
Error	485.59	18.68	26		
Mental Activity					
Group	1.06	.53	2	.48	.62
Error	28.52	1.10	26		
Time	.25	.25	1	1.05	.32
Group X Time	.81	.40	2	1.71	.20
Error	6.14	.24	26		
Somatic Arousal					
Group	60.00	30.00	2	4.23	.03
Error	184.34	7.09	26		
Time	9.38	9.38	1	2.45	.13
Group X Time	11.98	5.99	2	1.56	.23
Error	99.68	3.83	26		
Physical Tension					
Group	4.40	2.20	2	2.34	.12
Error	24.45	.94	26		
Time	.06	.06	1	.28	.60
Group X Time	.39	.19	2	.89	.42
Error	5.63	.22	26		

Appendix J9

2X2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among the Two Treatment Groups on Sleep-Wake Parameters for the High Distress Sample

Source	SS	MS	df	F	p
SOL					
Group	.75	.75	1	2.22	.15
Error	8.78	.34	26		
Time	1.39	1.39	1	8.11	.01
Group X Time	.19	.19	1	1.09	.31
Error	4.46	.17	26		
WASO					
Group	5.42	5.42	1	2.13	.16
Error	66.11	2.54	26		
Time	2.31	2.31	1	6.92	.01
Group X Time	.13	.13	1	.39	.54
Error	8.66	.33	26		
TST					
Group	3.10	3.10	1	.99	.33
Error	81.57	3.14	26		
Time	2.77	2.77	1	10.83	.00
Group X Time	.21	.21	1	.81	.38
Error	6.66	.26	26		
SE					
Group	.08	.08	1	1.55	.22
Error	1.41	.05	26		
Time	.05	.05	1	12.55	.00
Group X Time	.02	.02	1	3.75	.06
Error	.10	.00	26		

Appendix J10

2X2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among the Two Treatment Groups on Subjective Sleep Variables for the High Distress Sample

Source	SS	MS	df	F	p
Sleep Quality					
Group	1.29	1.29	1	1.70	.20
Error	19.67	.76	26		
Time	2.07	2.07	1	5.93	.02
Group X Time	.06	.06	1	.16	.69
Error	9.08	.35	26		
Insomnia Frequency					
Group	.18	.18	1	.03	.86
Error	150.30	5.78	26		
Time	40.51	40.51	1	18.82	.00
Group X Time	1.08	1.08	1	.50	.48
Error	55.97	2.15	26		
Distress Frequency					
Group	.00	.00	1	.00	.99
Error	166.05	6.39	26		
Time	14.58	14.58	1	4.54	.04
Group X Time	3.01	3.01	1	.94	.34
Error	83.47	3.21	26		
Sleep Self-Efficacy					
Group	.05	.05	1	.00	.98
Error	1934.37	74.40	26		
Time	260.01	260.01	1	16.87	.00
Group X Time	3.72	3.72	1	.24	.63
Error	400.71	15.41	26		

Appendix J11

2X2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among the Two Treatment Groups on Daytime Variables for the High Distress Sample

Source	SS	MS	df	F	p
Sleepiness					
Group	.01	.01	1	.01	.94
Error	69.34	2.67	26		
Time	.00	.00	1	.00	.97
Group X Time	.07	.07	1	.07	.79
Error	25.93	1.00	26		
Fatigue					
Group	.66	.66	1	.13	.72
Error	127.97	4.92	26		
Time	.18	.18	1	.08	.78
Group X Time	4.18	4.18	1	1.93	.18
Error	56.30	2.17	26		
Functioning					
Group	.25	.25	1	.28	.60
Error	23.36	.90	26		
Time	.14	.14	1	.74	.40
Group X Time	.01	.01	1	.03	.87
Error	5.03	.19	26		
Restedness					
Group	.03	.03	1	.03	.87
Error	30.51	1.17	26		
Time	.10	.10	1	.46	.50
Group X Time	.05	.05	1	.22	.64
Error	5.66	.22	26		

Appendix J12

2X2 ANOVA Summary Table: Baseline to Post-Intervention Changes Among the Two Treatment Groups on Cognitive-Affective Variables for the High Distress Sample

Source	SS	MS	df	F	p
Anxious Self-Talk					
Group	119.18	119.18	1	.16	.70
Error	19936.30	766.78	26		
Time	495.43	495.43	1	8.39	.0
Group X Time	319.00	319.00	1	5.40	.03
Error	1536.05	59.08	26		
Cognitive Arousal					
Group	3.57	3.57	1	.09	.76
Error	999.93	38.46	26		
Time	49.83	49.83	1	5.16	.03
Group X Time	1.62	1.62	1	.17	.69
Error	251.09	9.66	26		
Mental Activity					
Group	2.61	2.61	1	2.62	.12
Error	25.96	1.00	26		
Time	.39	.39	1	1.48	.23
Group X Time	.09	.09	1	.36	.56
Error	6.80	.26	26		
Somatic Arousal					
Group	30.43	30.43	1	3.86	.06
Error	205.05	7.89	26		
Time	16.41	16.41	1	5.01	.03
Group X Time	4.83	4.83	1	1.48	.24
Error	85.22	3.28	26		
Physical Tension					
Group	2.55	2.55	1	2.71	.11
Error	24.42	.94	26		
Time	.18	.18	1	1.00	.33
Group X Time	.07	.07	1	.39	.54
Error	4.72	.18	26		

Appendix J13

Means and Standard Deviations at Baseline and Post-Intervention of High Distress Participants (three group comparison)

Variables	Baseline		Post-Intervention	
	M	SD	M	SD
	Sleep-Wake Parameters			
SOL	.83	.62	.61	.39
WASO	1.91	1.32	1.65	1.10
TST	4.62	1.57	5.26	1.41
SE (%)	60	21	65	19
	Subjective Sleep Variables			
Sleep Quality	2.98	.66	3.34	.80
Insomnia Frequency	8.79	1.57	7.21	2.31
Distress Frequency	6.83	1.73	5.79	2.41
Sleep Self-Efficacy	23.79	5.63	27.24	6.81
	Daytime Variables			
Daytime Sleepiness(SSS)	2.38	1.18	2.28	1.25
Daytime Fatigue	2.41	1.99	2.55	1.57
Daytime Functioning	3.72	.72	3.73	.75
Morning Restedness	3.38	.78	3.43	.83
	Cognitive-Affective Variables			
Anxious Self-Talk	56.35	21.88	51.03	20.26
Cognitive Arousal	17.48	5.17	16.55	5.43
Mental Activity	3.47	.72	3.59	.89
Somatic Arousal	10.83	2.85	10.07	2.14
Physical Tension	3.56	.70	3.62	.87

Note. N=29

Appendix J14

ANOVA Summary Table: Differences in Sleep-Wake Parameters and Subjective Sleep Variables Across Three Testing Times for the High Distress Sample

Source	SS	MS	df	df[a]	F	p	p[a]
SOL							
Time	1.42	.71	2	1.26	4.57	.02	<.05
Error	6.85	.16	44	27.72			
WASO							
Time	4.45	2.22	2	1.60	10.62	.000	<.01
Error	9.21	.21	44	35.20			
TST							
Time	4.11	2.05	2	1.74	8.26	.001	<.01
Error	10.93	.25	44	38.28			
SE							
Time	.06	.03	2	1.80	6.69	.003	<.01
Error	.20	.00	44	39.60			
Sleep Quality							
Time	2.71	1.35	2	1.36	5.96	.005	<.01
Error	10.00	.23	44	29.92			
Insomnia Frequency							
Time	77.18	38.59	2	1.80	10.12	.000	<.01
Error	160.15	3.81	42	37.80			
Insomnia Distress							
Time	15.87	7.93	2	1.84	2.33	.109	>.05
Error	142.86	3.40	42	38.64			
Sleep Self-Efficacy							
Time	404.73	202.36	2	1.84	13.15	.000	<.01
Error	646.12	15.38	42	38.64			

[a]Greenhouse-Geisser Epsilon Correction applied.

Appendix J15

ANOVA Summary Table: Difference in Daytime Variables and Cognitive-Affective Variables Across Three Testing Times for the High Distress Sample

Source	SS	MS	df	df[a]	F	p	p[a]
Sleepiness							
Time	.06	.03	2	1.84	.03	.97	>.05
Error	39.79	.95	42	38.22			
Fatigue							
Time	.69	.34	2	1.48	.25	.78	>.05
Error	57.14	1.36	42	31.08			
Functioning							
Time	.01	.00	2	1.82	.03	.97	>.05
Error	4.27	.10	44	40.04			
Restedness							
Time	.30	.15	2	1.62	1.09	.34	>.05
Error	6.07	.14	44	35.64			
Anxious Self-Talk							
Time	1364.21	682.11	2	1.40	9.26	.000	<.01
Error	3095.12	73.69	42	29.40			
Cognitive Arousal							
Time	86.69	43.35	2	1.32	3.09	.06	>.05
Error	588.44	14.01	42	27.72			
Mental Activity							
Time	.94	.47	2	1.94	2.79	.07	>.05
Error	7.37	.17	44	42.68			
Somatic Arousal							
Time	23.42	11.71	2	1.98	5.32	.009	<.01
Error	92.46	2.20	42	41.58			
Physical Tension							
Time	.34	.17	2	1.92	1.38	.26	>.05
Error	5.47	.12	44	42.24			

[a]Greenhouse-Geisser Epsilon Correction applied.

Appendix J16

ANOVA Summary Table: Difference in Sleep-Wake Parameters Across 4 Testing Times for the High Distress Sample

Source	SS	MS	df	df[a]	F	p	p[a]
Daily Sleep Diary							
SOL							
Time	.16	.05	3	2.10	.69	.57	>.05
Error	2.15	.08	27	18.90			
WASO							
Time	.81	.27	3	1.97	.91	.45	>.05
Error	8.01	.30	27	17.71			
TST							
Time	1.21	.40	3	1.89	1.74	.18	>.05
Error	6.27	.23	27	17.01			
SE							
Time	.02	.01	3	1.98	1.36	.28	>.05
Error	.11	.00	27	17.82			
Sleep Questionnaire							
SOL							
Time	3.65	1.22	3	1.16	3.06	.04	>.05
Error	16.72	.40	42	16.20			
WASO							
Time	38.42	12.81	3	1.88	5.81	.002	<.01
Error	92.62	2.21	42	26.25			
TST							
Time	4.82	1.61	3	1.83	3.03	.04	>.05
Error	22.26	.53	42	25.62			
SE							
Time	.04	.01	3	1.98	1.64	.20	>.05
Error	.32	.01	42	27.72			

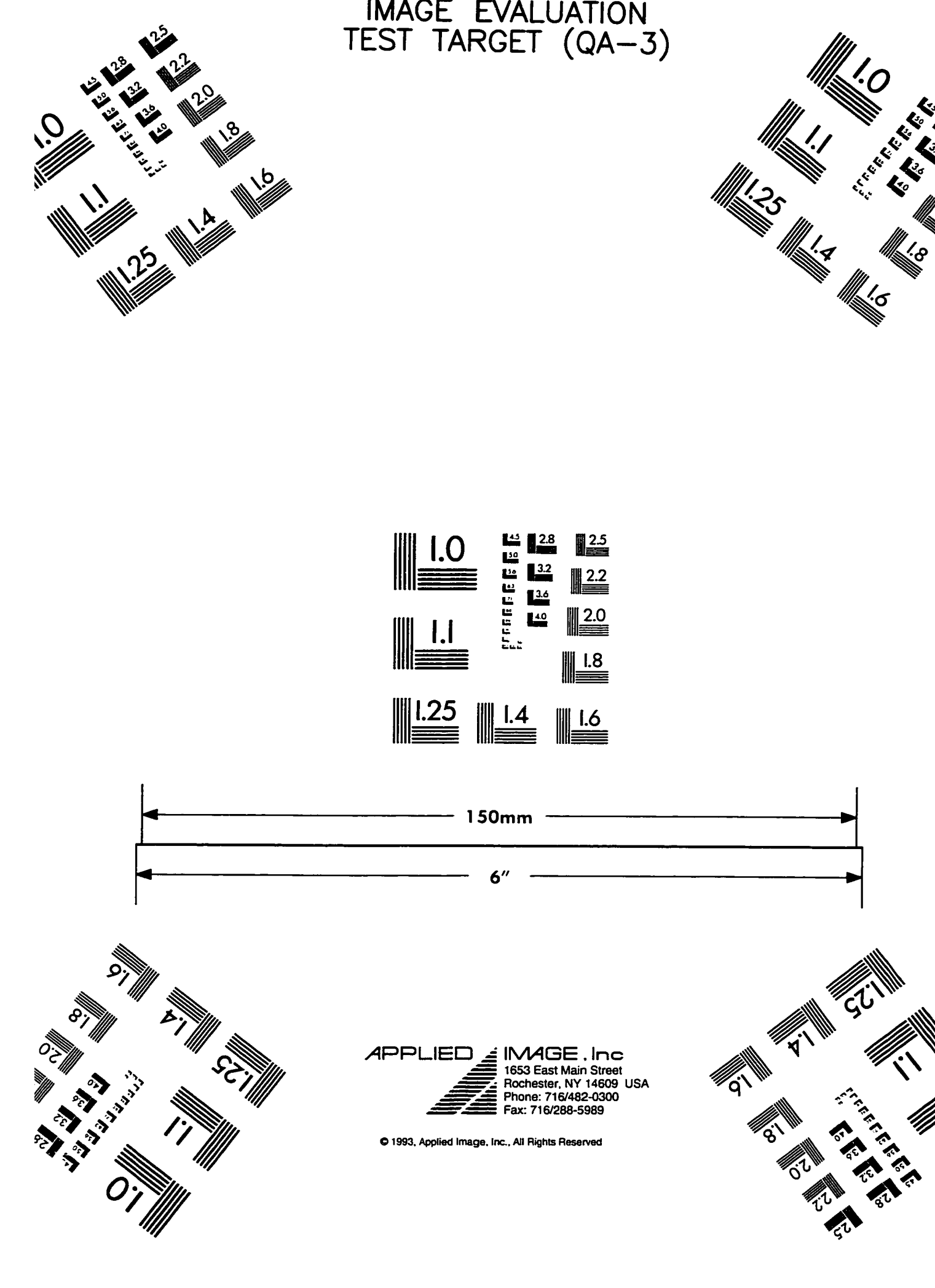
[a]Greenhouse-Geisser Epsilon Correction applied.

Appendix J17

ANOVA Summary Table: Difference in Subjective Sleep Variables, Daytime Variables, and Cognitive-Affective Variables Across 4 Testing Times for the High Distress Sample

Source	SS	MS	df	df[a]	F	p	p[a]
Sleep Quality							
Time	.92	.31	3	1.56	1.24	.314	>.05
Error	6.64	.25	27	14.04			
Insomnia Frequency							
Time	154.58	51.53	3	2.48	12.76	.000	<.01
Error	169.58	4.04	42	34.69			
Distress Frequency							
Time	86.20	28.73	3	2.60	6.96	.001	<.01
Error	73.30	4.13	42	36.38			
Fatigue							
Time	16.45	5.48	3	2.46	3.73	.018	<.05
Error	61.80	1.47	42	22.14			
Functioning							
Time	.06	.02	3	1.18	.21	.89	>.05
Error	2.38	.09	27	16.20			
Restedness							
Time	.10	.03	3	2.16	.26	.85	>.05
Error	3.54	.13	27	19.44			
Mental Activity							
Time	.59	.20	3	2.04	1.24	.32	>.05
Error	4.27	.16	27	18.36			
Physical Tension							
Time	.13	.04	3	2.28	.23	.88	>.05
Error	5.08	.19	27	20.52			

[a]Greenhouse-Geisser Epsilon Correction applied.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1.4
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2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
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