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Behavioral and Cognitive Treatments of Geriatric Insomnia

Charles M. Morin
Medical College of Virginia/Virginia Commonwealth University

Nathan H. Azrin
Nova University

Geriatric insomnia is a prevalent problem that has not received adequate controlled evaluation of psychological treatments. The present study evaluated behavioral and cognitive methods, relative to a wait-list control condition, for treating 27 elderly subjects (mean age = 67 years) with sleep-maintenance insomnia. Both treatment methods, stimulus control and imagery training, produced significant improvement on the main outcome measure of awakening duration. Stimulus control yielded higher improvement rates than either imagery training or the control condition on awakening duration and total sleep-time measures. Sleep improvements were maintained by the two treatment methods at 3- and 12-month follow-ups. The results were corroborated by collateral ratings obtained from significant others. Subjective estimates of awakening duration and sleep latency correlated highly with objective measures recorded on an electromechanical timer. The findings suggest that geriatric insomnia can be effectively treated with psychological interventions and that behavioral procedures are more beneficial than cognitive procedures for sleep maintenance problems.

Insomnia is a widespread health problem among the elderly. More than 25% of people aged 60 years or older report difficulty initiating and/or maintaining sleep (Mellinger, Balter, & Uhlenhuth, 1985). Insomnia complaints increase with age, and disorders of maintaining sleep are especially prevalent among the elderly (Dement, Miles, & Carskadon, 1982; Webb & Campbell, 1980). Sleep-maintenance insomnia is a more pervasive and debilitating condition than onset insomnia and has proved refractory to treatment (Bootzin, Engle-Friedman, & Hazelwood, 1983).

Pharmacotherapy is the most widely used method for treating insomnia. Thirty-nine percent of prescriptions for hypnotics are written for persons over 60 years of age (Institute of Medicine, 1979) and, in nursing facilities, 94% of the elderly have been prescribed sedative hypnotics (U.S. Public Health Service, 1976). Most sleeping medications are effective only temporarily, impair cognitive and psychomotor functions, and alter the sleep architecture (Morin & Kwentus, in press). They are especially hazardous to health in older people because of the reduced metabolic functioning that results with age and the higher incidence of sleep-related respiratory impairments (Mendelson, 1980). Although their short-term use may be indicated as an adjunct for acute insomnia, alternative nonpharmacological methods are warranted for the management of chronic insomnia in the elderly (Morin & Rapp, 1987).

Behavioral and cognitive interventions have proved reasonably successful for treating insomnia in young and middle-aged adults (Borkovec, 1982; Lacks, 1987; Lichstein & Fisher, 1985; Morin & Kwentus, in press). Stimulus control procedures, relaxation-based methods, and cognitive strategies have been shown effective for both sleep onset (Lacks, Bertelson, Gans, & Kunkel, 1983; Turner & Ascher, 1979; Woolfolk & McNulty, 1983) and sleep maintenance problems (Coates & Thoresen, 1979; Lacks, Bertelson, Sugerman, & Kunkel, 1983; Morin & Azrin, 1987; Thoresen, Coates, Kirmil-Gray, & Rosekind, 1981). Their potential benefits for geriatric insomnia remain to be documented. Although a few studies have explored the treatment of sleep disturbances in relation to age (Alperson & Biglan, 1979; Davies, Lacks, Storandt, & Bertelson, 1986; Hoelscher & Edinger, 1988; Puder, Lacks, Bertelson, & Storandt, 1983), outcome research has predominantly focused on either sleep-onset insomnia (in contrast with maintenance insomnia) or on younger rather than older adults. Additional empirical studies are warranted, especially with the elderly and, specifically, with those presenting disorders of sleep maintenance.

The present investigation evaluated the clinical efficacy of stimulus control and imagery training against a wait-list condition for treating sleep-maintenance insomnia in the elderly. Because previous cognitive–behavioral research has relied almost exclusively on self-report measures to evaluate outcome, concerns have been raised about the claimed efficacy of these treatment methods (Institute of Medicine, 1979). In this study, an electromechanical recording device and collateral ratings from significant others were used to supplement daily sleep diaries in documenting sleep changes.

Method

Subjects

Prospective subjects were recruited through media advertisements. Selection criteria required that subjects (a) be 55 years of age or older;

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Correspondence concerning this article should be addressed to Charles M. Morin, Medical College of Virginia/Virginia Commonwealth University, Department of Psychiatry, Richmond, Virginia 23298-0268.

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(b) have sleep-maintenance insomnia, defined as the time awake after sleep onset greater than 30 min/night for a minimum of 3 nights per week; (c) have had sleep-maintenance insomnia for at least 6 months; (d) complain of at least one daytime sequela (e.g., fatigue, impaired functioning, mood disturbances) attributed to poor sleep; (e) take no sleep medication or be stabilized on current medication for at least 6 weeks. Subjects were excluded if they (a) were currently receiving psychiatric care; (b) scored 23 or more (cutoff score for severe depression) on the Beck Depression Inventory (BDI; Beck, 1967); (c) presented symptomatic evidence of sleep apnea, restless legs syndrome, or periodic leg movements (Association of Sleep Disorders Centers, 1979); or (d) reported medical conditions directly related to their insomnia.

Subjects underwent a multistep screening process including a phone screening, an orientation meeting during which all the assessment forms were completed, and a clinical interview if questions about the etiological nature of the insomnia. Sleep diary data collected during the 2-week baseline period were used to ascertain that criteria for sleep-maintenance insomnia (e.g., awakening duration) were met. Of the 135 persons who inquired about the study, 85 expressed interest and were screened by phone. Of those, 36 initially appeared to meet the experimental criteria and came in for the intake session. Reasons for exclusion from the study during initial screening were transportation/scheduling problems (45%), failure to meet age (20%) or insomnia (15%) criteria, or reports of a more severe physical illness etiologically related to sleep disturbances (10%). Of those who completed the pretest evaluation, 5 subjects declined treatment prior to group assignment, and 3 were excluded due to noncompliance with sleep monitoring during baseline. The remaining 28 subjects were ranked on the main outcome measure of awakening duration and were randomly assigned within severity blocks to either stimulus control (n = 9), imagery training (n = 9), or a wait-list condition (n = 10), with the constraint that conditions were kept comparable on sleep medication usage. One imagery training subject was discarded after the first treatment session due to initial miscreening (i.e., restless legs syndrome). The final sample consisted of 17 women and 10 men with a mean age of 67.4 years and an average education level of 13.4 years (see Table 1). The subjects were community residents who were predominantly married (67%), retired (70%), and using sleeping aids (56%). Their average insomnia duration was 19 years. Seventy-eight percent had one or more diagnosed chronic medical disorders, with heart problems and pain-related conditions being the most prevalent.

Table 1
Subject Demographic and Clinical Characteristics

Variable	SC	IT	WL	Total
Sex				
Male	3	2	5	10
Female	6	6	5	17
Age (years)				
M	68.4	67.5	66.4	67.4
SD	5.7	4.9	6.4	5.6
Education (years)				
M	14.4	12.1	13.6	13.4
SD	4.1	3.5	3.3	3.6
Marital status				
Married	8	5	5	18
Divorced/separated	1	1	1	3
Widowed	0	2	4	6
Occupation				
Employed	2	0	1	3
Not employed	7	8	9	24
Insomnia duration (years)				
M	24.5	10.0	22.0	19.0
SD	24.7	10.4	19.0	19.0
Sleeping aids				
Subjects (n)	4	5	6	15
Nights/week (n)	5.3	6.2	3.0	4.8
Medical conditions (n)				
M	1.9	1.9	1.3	1.7
SD	1.4	1.9	1.2	1.4

Note. SC = stimulus control; IT = imagery training; WL = wait list.

Apparatus: Switch-Activated Clock

To objectively record the duration of nighttime awakening and the latency to sleep onset, a switch-activated clock was issued to each subject. This sleep-assessment device (Franklin, 1981) consists of a remote hand-held switch connected to a portable battery-operated clock. A momentary switch-connection is designed such that the clock runs only when pressure is applied to the switch lever. On retiring to bed, the patient activates the clock by holding the switch in his or her hand and depressing the lever with the thumb. Upon falling asleep, the patient relaxes thumb pressure, which releases the switch-lever and automatically stops the clock. Subjects were instructed to set the clock at a predetermined time upon retiring and to press the switch when ready to go to sleep. Upon the first awakening at night, they monitored the time displayed on the clock and again pressed the switch lever to record the duration of the current awakening. The first time recorded was used to calculate the latency to sleep onset, and subsequent recordings were used to measure wake time after sleep onset. Validation of the device against polysomnographic (PSG) measurement (Morin & Schoen, 1986) showed that the switch was released within 5 min of PSG-defined sleep onset with the correspondence being closer to Stage 2 than Stage 1 sleep. Epoch-by-epoch scoring (wake vs. sleep) yielded an 86% agreement coefficient. The device was used to check reliability at pre- and posttreatment.

Measures

Sleep diaries. Daily sleep diaries were used as the primary means of data collection. All subjects completed a daily sleep log for a 2-week baseline period, a 4-week treatment phase, and an additional 1 week at 3- and 12-month follow-ups. Measures derived from the sleep diary were number and duration of awakenings, sleep-onset latency, total sleep time, and medication intake. To maximize independence of the switch-activated clock recordings from subjective estimates, the subjects were provided with two separate monitoring forms. They were instructed to fill out the sleep diary first and, only afterwards, to look up at the clock and log this data on their other monitoring sheets.

Significant-other ratings. As a measure of social and clinical validation of treatment outcome, independent ratings (on a 5-point scale) were obtained from the subjects' significant others on the following items: (a) perceived severity, (b) degree of interference with daily functioning (e.g., mood, fatigue, performance), (c) noticeability of impairment due to sleep problem, and (d) degree of improvement (posttreatment only). The significant others were 17 spouses, 6 friends, and 3 family members who all expressed a high level of awareness (mean rating = 4.1) of the subjects' sleeping problem. They were asked to mail their rating forms directly to the project without discussing it with the person involved in the study.

Patients' outcome ratings. Each subject rated (on a 5-point scale) the severity, interference, and noticeability of her or his sleeping problem. Posttreatment ratings of improvement and of satisfaction with progress in treatment were also collected.

Treatment credibility measure. After the first and last treatment session, the treated subjects provided anonymous ratings (on a 5-point scale) of expectancies for success, treatment plausibility, and confidence

in recommending treatment to a friend with insomnia. Two additional items pertaining to the perceived competency and warmness/support of therapists were added at posttreatment.

Convergent measures. A detailed sleep and medical history questionnaire was administered to all subjects prior to entering treatment to screen those whose insomnia might be secondary to medical, psychopathological, or to other sleep disorders. The BDI (Beck, 1967) and the State–Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970) were also administered before and after treatment.

Procedures

During the intake session, all prospective subjects were provided with an overview of the effects and side effects of sedative-hypnotic drugs on sleep. Subjects were instructed to continue taking the drugs they took before the study started but to refrain from trying new drugs for the duration of the study. They were told that if they elected to reduce or discontinue any sleeping aids, they should proceed (with their physician's consent) very gradually and only after they became proficient at using the treatment procedures. Participants signed a consent form and provided a $40 refundable deposit.

Treatment Conditions

Subjects in both treatment conditions attended six therapy sessions that were conducted in groups of 3–5 persons and lasted 60–75 min. The sessions were conducted twice a week for the first 2 weeks and once a week thereafter. They were devoted to describing the treatment procedures and their rationale, reviewing sleep diaries and progress, discussing problems encountered during home practice, and devising methods for enhancing compliance with treatment requirements. Both treatment methods were presented as effective psychological techniques for overcoming insomnia problems.

Stimulus control (SC). The stimulus control treatment (Bootzin et al., 1983) consists of a set of instructions designed to curtail sleep-incompatible behaviors and to regulate the circadian rhythm. Subjects were instructed to (a) go to bed only when sleepy at night, (b) use the bed and bedroom only for sleep and sex (i.e., no reading, TV watching, eating, working, or worrying either during the day or at night), (c) get out of bed and go in another room whenever they were unable to fall asleep or to return to sleep within 15–20 min and return to bed only when they felt sleepy again, (d) repeat this last procedure as often as necessary throughout the night, (e) arise in the morning at the same time regardless of the amount of sleep obtained on the previous night, and (f) not nap during the day. The subjects were given a written description of the treatment procedures and their rationale.

Imagery training (IT). This treatment was modeled after the procedures developed for sleep-onset insomnia by Woolfolk and McNulty (1983). It consists of attention-focusing techniques whereby the individual is instructed to imagine a sequence of neutral objects. Six common objects were used in the present study: a candle, a light bulb, an hour glass, a kite, a stairway, and a palm tree on a beach. During the training sessions, the therapist provided standardized instructions and guided practice. With their eyes closed, subjects concentrated on the image of the designated objects and focused their attention on the purely descriptive properties (e.g., shape, color, movement, and texture) of the stimuli. Color drawings of these objects were initially used as a prompt and then were gradually faded as subjects reported proficiency. Each object was imagined for 2 min, and the sequence of the six objects was repeated twice per session. The subjects were instructed to practice the visual-imagery exercises once during the day and whenever they were unable to fall asleep or to return to sleep at night. Imagery techniques were aimed at controlling cognitive arousal by focusing attention on neutral stimuli. A written description of the procedures was given to each participant.

Wait-list control (WL). Wait-list subjects were asked to delay treatment for 6 weeks and to monitor their sleep during this period. They were then administered the stimulus control treatment.

Follow-Up

Subjects in both treatment groups were contacted by mail 3 and 12 months after treatment completion and were asked to complete a sleep diary for a 1-week period on each occasion.

Therapists

Two advanced graduate students in clinical psychology served as therapists. They received training and were provided with a detailed manual outlining each treatment session. Weekly supervision meetings were held to maintain consistency between therapists, and audiotapes of therapy sessions were regularly reviewed to assure adherence to the treatment protocol. Each therapist was assigned to half of the subjects in each treatment condition.

Results

Preliminary Analyses

Analyses of variance (ANOVAs) and chi-square tests revealed no significant pretreatment group differences on demographic, clinical, or sleep/wake measures. A 2 × 2 (Group × Therapist) ANOVA yielded no therapist effect or Therapist × Treatment interaction on any of the sleep measures. Both therapists were rated as highly competent and supportive, and no difference on either of these variables was obtained. One-way (treatment) ANOVAs on credibility, expectancy, and confidence ratings revealed that SC was more credible than IT, $F(1, 15) = 4.54$, $p < .05$, but both treatments generated equivalent expectancy and confidence levels.

Sleep/Wake Measures

Posttreatment status. The sleep data were analyzed using 3 × 2 (Group × Time) repeated-measures ANOVAs, and significant effects were followed by Newman-Keuls post hoc comparisons. A multivariate procedure combining the four dependent variables was initially planned. However, due to the low correlations ($r < 0.39$) among the measures and to the small subject-to-variable ratio, it was felt that univariate analyses were more appropriate. Group means and standard deviations for the sleep/wake measures across assessment phases are displayed in Table 2. Figure 1 illustrates group changes over time on awakening duration. Significant time effects were obtained for awakening duration, $F(1, 24) = 7.46$, $p < .02$; sleep latency, $F(1, 24) = 13.45$, $p < .01$; awakening frequency, $F(1, 24) = 5.11$, $p < .04$; and total sleep time, $F(1, 24) = 7.87$, $p < .01$. A significant Group × Time interaction was obtained for awakening duration, $F(1, 24) = 4.02$, $p < .04$, and total sleep time, $F(1, 24) = 7.93$, $p < .01$. Tests of simple effects showed significant pre- to posttreatment reductions of awakening duration for both treatment methods ($ps < .05$) and significant increased in total sleep time for SC ($p < .05$). Neither of these variables was significantly changed in the WL condition. Newman-Keuls post hoc comparisons revealed that SC subjects reduced their awakening duration significantly ($p < .05$) more than WL subjects. The IT

Table 2
Group Means and Standard Deviations for Sleep/Awake Measures Over Time

Measure/group	Pretreatment		Posttreatment		Follow-up			
					3 month		12 month	
Measure/group	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Awakening duration								
Stimulus control	76.74	36.31	42.88	43.57	30.08	29.19	35.32	37.90
Imagery training	72.97	28.87	56.75	23.69	55.27	37.01	59.37	18.86
Wait list	67.42	26.52	71.40	39.22				
Awakening frequency								
Stimulus control	2.49	0.83	1.92	1.13	1.98	0.88	1.69	1.08
Imagery training	3.04	1.30	2.46	1.24	2.59	1.35	2.49	1.08
Wait list	2.84	1.22	2.61	1.07				
Sleep-onset latency								
Stimulus control	55.60	38.56	39.82	29.23	22.41	23.70	23.03	13.61
Imagery training	37.66	17.97	26.34	15.84	17.39	7.27	24.90	14.63
Wait list	51.97	35.50	30.98	19.56				
Total sleep time								
Stimulus control	289.76	67.66	354.40	83.26	361.55	101.78	326.84	99.09
Imagery training	351.08	48.27	360.63	64.69	362.31	53.78	336.68	71.61
Wait list	347.94	66.02	340.16	70.29				

Note. All variables, except awakening frequency, are in minutes per night.

condition did not differ significantly from either of these two conditions. The SC group increased its total sleep time significantly more than either the IT ($p < .05$) or the WL ($p < .01$) groups.

Follow-up. Changes for the two treatment groups through the 12-month follow-up were analyzed using 2 × 4 (Group × Time) ANOVAs. Significant time effects were obtained for awakening duration, $F(3, 36) = 5.63$, $p < .01$, and sleep latency, $F(3, 36) = 4.30$, $p < .02$. Post hoc comparisons showed that posttreatment, 3-month, and 12-month follow-up scores on awakening duration for both conditions were all significantly lower than baseline values ($ps < .05$). On sleep latency, 3- and 12-month follow-up scores were significantly lower than their respective baseline levels ($ps < .05$). No between-groups difference was obtained.

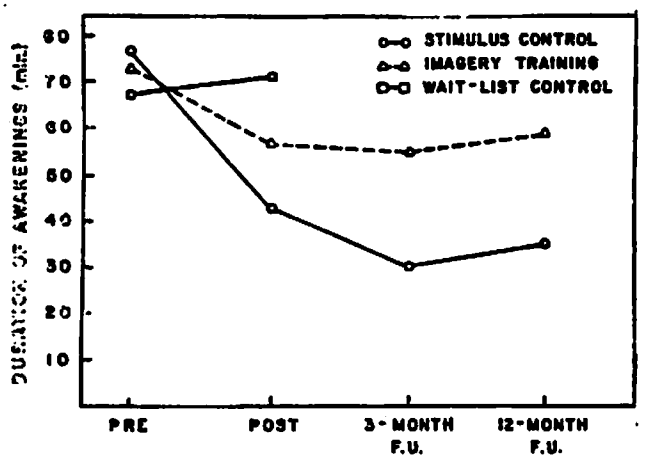

Figure 1. Weekly means of awakening duration over time (F.U. = Follow-up).

Correspondence Between Sleep Diary and Timer Data

Several subjects failed to comply with usage of the device for recording sleep latency and awakening duration. Although baseline data were available for 25 subjects, 7 failed to use the device at posttreatment, leaving 18 for whom data were available for both assessment phases. The data from all 3 conditions were therefore pooled together for calculating the level of correspondence between the sleep diary and the mechanical device. Pearson product-moment correlations between the two assessment methods averaged 0.91 ($ps < .001$) for sleep latency and 0.81 ($p < .001$) for awakening duration for the two assessment phases combined. Matched t tests (two-tailed) on baseline data indicated that the subjects significantly underestimated both sleep-onset latency, $t(24) = -2.92$, $p < .01$, and awakening duration, $t(24) = -2.30$, $p < .03$, as compared with the recorded values on the timer. These differences were no longer significant at posttreatment.

Patients' Outcome Ratings

Patients' ratings of the severity, interference, and noticeability of their sleeping problems were analyzed using a 3 × 2 (Group × Time) multivariate analysis of variance (MANOVA) that yielded a significant time effect, $F(3, 38) = 7.02$, $p < .001$. The SC subjects rated all three impairment indices significantly lower at post- than at pretreatment ($ps < .05$). A significant reduction of problem severity ($p < .05$) was obtained for the IT group, whereas none of the ratings were changed in the WL group. A one-way ANOVA showed that SC subjects were significantly more satisfied with their progress in treatment than were IT patients, $F(1, 15) = 5.41$, $p < .04$. Overall improvement ratings were generally higher, though nonsignificant, for SC than for either IT or WL subjects, $F(2, 22) = 2.15$, *ns*.

Significant-Other Ratings

A 3 × 2 (Group × Time) MANOVA on collateral ratings obtained from significant others yielded a significant effect for time, $F(3, 32) = 4.85, p < .01$. The SC patients were perceived at posttreatment to have improved significantly over pretreatment levels on ratings of severity, interference, and noticeability of sleep problem ($ps < .05$), whereas the IT and WL subjects were not.

Depression and Anxiety Measures

There was no significant group, time, or Group × Time effect on either the BDI, the STAI State measure, or the STAI Trait measure.

Sleep Medication Intake and Treatment Outcome

Changes in sleeping medication usage were assessed with a 3 × 2 (Group × Time) ANOVA. A significant time effect, $F(1, 24) = 4.29, p < .05$, was obtained, with both treatment groups (but not the WL group) reducing their frequency of medication use. This effect was no longer significant at follow-up. A 2 × 2 × 4 (Group × Drug × Time) ANOVA on awakening duration yielded a significant effect for drug, $F(1, 10) = 5.04, p < .05$, suggesting that drug-free patients responded better to treatment regardless of its nature.

Discussion

The present findings suggest that geriatric insomnia can be treated effectively with psychological interventions. Both treatment methods produced substantial sleep improvement, and these clinical benefits were either maintained or enhanced at follow-up. Stimulus control, directed at regulating the wake-sleep schedule and curtailing sleep-interfering activities, produced higher rates of improvement on the sleep-maintenance parameters than did imagery procedures aimed at reducing cognitive arousal. On the main outcome variable of awakening duration, stimulus control yielded comparable benefits to those previously obtained with middle-aged sleep-maintenance insomniacs (Lacks, Bertelson, Sugerman, & Kunkel, 1983; Morin & Azrin, 1987). Conversely, the magnitude of effect obtained by imagery training was not as substantial as that previously reported with either sleep-maintenance (Morin & Azrin, 1987; Thoresen et al., 1981) or onset insomniacs (Woolfolk & McNulty, 1983). Several patients reported difficulty concentrating and sustaining attention on the images for prolonged periods of time, suggesting that imagery techniques may be more difficult to master for older adults. The smaller improvement rate may also have been mediated by the lower initial credibility of this procedure.

Sleep duration was increased by more than 1 hr in the stimulus control group. Yet, it never exceeded 6 hr per night at any assessment phase. This ceiling effect suggests that it may be unrealistic for older adults to expect more than 6 hr of sleep and that the uninterrupted nature of sleep is clinically more important than its total duration. Sleep-onset latency was lessened in all three conditions. However, these results should be interpreted cautiously because the three groups were homogeneous in maintenance difficulties but heterogeneous in onset difficulties.

Sleep improvement was paralleled by a reduction of medication intake over the course of treatment. Although these results were only partially maintained at follow-up, they point to the initial positive impact that cognitive-behavioral procedures had on medication intake habits. The results also indicated that drug-free patients responded better to treatment. Because the intervention was superimposed on drug intake for some subjects, treatment outcome may have been confounded. In future research, a systematic medication withdrawal component should be integrated with the intervention, and booster sessions should be held periodically (Morin & Kwentus, in press).

Satisfaction with treatment progress was higher for stimulus control than for imagery training patients, and these findings were further corroborated by collateral ratings from significant others showing that stimulus control produced a noticeable change in sleep that was perceived to have a positive impact on daily functioning. Because not all significant others were actually bed partners, these social validation data remain tentative.

The present results are based on subjective and behavioral measures of sleep/wake parameters. The lack of polysomnographic measures precludes the distinction between psychophysiological and subjective insomniacs as well as the definitive ruling out of other sleep disorders and, therefore, limits the current findings to a heterogeneous group of insomniacs. Subjective estimates of sleep latency and awakening duration were highly concordant with those recorded on the mechanical timer. However, because the subjects were responsible for monitoring both data sets, sleep diary data were not truly independent from those recorded on the device. The high correlations between these two assessment modalities may either reflect noncompliance with the instructions to complete the diary independently of timer recordings or, alternatively, may indicate that subjects were using this daily objective feedback to adjust their subjective estimates on subsequent nights. Because this is the first outcome study to use this device for measuring sleep/wake parameters, these data should be treated cautiously and used only as a supplement to daily sleep diaries.

Previous research with older adults (Alperson & Biglan, 1979; Davies et al., 1986; Hoelscher & Edinger, 1988; Puder et al., 1983) has focused on otherwise healthy insomniacs and has excluded those with medical disorders. In the present study, unless their insomnia was considered secondary to a medical condition, subjects with a wide variety of physical illnesses were accepted. Although this more liberal screening procedure may have attenuated the true effect associated with each treatment method, these results appear more generalizable to the older population.

The present findings extend results obtained with younger adults and support the clinical efficacy of nonpharmacological procedures for treating geriatric insomnia. Although improvement rates of 50%–70% remain far from an ideal outcome, short-term cognitive-behavioral therapies appear promising for disorders of initiating and maintaining sleep in the elderly. Further research is needed to design more comprehensive and effective psychological interventions specifically tailored to the elderly's sleep complaints.

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