

# **I**NSOMNIA AND AGING: PROCEDURAL ASPECTS / L'INSOMNIE ET LE VIEILLISSEMENT: LES ASPECTS DE PROCEDURE

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## **SUMMARY**

Disrupted sleep and complaints of insomnia are prevalent in older adults. While the common complaint in younger insomniacs is difficulty falling asleep, older poor sleepers usually have difficulty getting back to sleep after waking in the middle of the night or waking too early in the morning. Effectiveness of existing pharmacological and psychological treatments is limited for long-standing aging related sleep problems and there are serious social, human, and financial costs related to medical treatment for older insomniacs. Moreover, little is known about older individuals who do not complain of insomnia in spite of fragmented sleep and lengthy nocturnal awake times. For these reasons, we have been investigating sleep, insomnia, and the aging process since 1990. The scope of our research is delineated and the evolution of our research program is described.

## **SLEEP AND AGING: THE SCOPE OF THE PROBLEM**

A substantial literature exists on changes in the amount and pattern of sleep and wakefulness in relation to aging. Older people generally spend more time in bed but less time asleep than younger individuals. They also characteristically experience a reduction in deep sleep, increased nighttime wakefulness, and increased fragmentation of sleep by periods of wakefulness. Some reduction in rapid-eye movement (REM) sleep and total nighttime sleep also occur with aging (Dement et al., 1985; Miles & Dement, 1980; Prinz et al., 1990). These changes with age are in the direction of impaired sleep maintenance (Morin, 1993).

Psychophysiological factors associated with aging resemble the pattern seen in non-elderly insomniacs (e.g., Engle-Friedman & Bootzin, 1981). Experimental observations indicate that older individuals are more easily aroused from nighttime sleep by auditory stimuli than are their younger counterparts (Zepelin et al., 1984), suggesting that older people are more sensitive to environmental stimuli which may disturb sleep. Sleep patterns accompanying advancing age

suggest age-related deregulation of the circadian sleep-wake rhythm, with increased nighttime wakefulness accompanied by increases in the likelihood of falling asleep during the day (Carskadon et al., 1982a; Hauri, 1982; Miles & Dement, 1980).

Thus, it seems clear that the physiological changes accompanying normal aging are likely to predispose older individuals to perceive themselves as suffering from a sleep disorder; 25% to 50% of aging individuals do, in fact, complain of difficulties in initiating and/or maintaining sleep (DIMS) (Dement et al., 1982; Mellinger et al., 1985). A recent survey of experienced geriatricians indicates that an average of 32% of their elderly patients had a sleep related problem (Haponik, 1992). These physicians reported major pressures from patients and caregivers to prescribe sedative-hypnotic medications.

## **Insomnia: Medical Treatment**

Faced with a distraught patient complaining of insomnia, physicians are often tempted to prescribe a hypnotic agent. Indeed, older individuals receive a disproportionate share of prescribed sedative-hypnotic medications. Patients over age 60 received 66% more prescriptions for such medication than did those 40 to 59 years of age (Baum et al., 1986; Institute of Medicine, 1979). In addition, a large number of older individuals consume alcohol or over-the-counter sleeping aids (Kales & Kales, 1984). Elderly insomniacs rely heavily on sleep-promoting agents; over age 65, it is estimated that up to 50% of the population report frequent or regular sleep medication use (Kripke, 1983; Kripke et al., 1983).

Effects achieved by hypnotics are generally temporary; most lose their effectiveness after 2-4 weeks of continuous utilization. Rebound insomnia is to be expected upon hypnotic drug withdrawal (Kales et al., 1985). Tolerance with hypnotics develops rapidly, so that larger doses are required to achieve any effects. Increased dosage promotes drug-dependent insom-

nia. Moreover, rebound REM effect, in the form of nightmares, is frequently reported after discontinuing a hypnotic drug. Withdrawal effects often develop within a few days after sleep medication is discontinued, reinforcing the insomniac's belief that sleep is not possible without medication. Daytime sedation, cognitive and psychomotor impairment, and drug "hangover" are all adverse longer term side effects. Moreover, as noted by Morin and Kwentus (1988), there is little empirical evidence to suggest that performance decrements due to hypnotic use are compensated by improved sleep.

Drugs are metabolized more slowly in older than in younger people. Because of reduced hepatic and renal functions, clearance of most benzodiazepines marketed as hypnotics is decreased in older individuals. Elderly patients are particularly at risk for toxic effects of drugs and longer absorption periods. Long acting drugs create nocturnal confusion, impair an already diminished level of cognitive functioning (Scharf & Brown, 1986), and increase muscle weakness, thereby increasing the likelihood of falling (Kramer & Schoen, 1984). Daytime carryover effects such as sleepiness and reduced alertness are also more pronounced in the elderly (Carskadon et al., 1982b). Noncompliance with drug regimes and overmedication pose additional potential problems in the elderly (Morin & Kwentus, 1988). A National Institutes of Health consensus paper on drugs and insomnia urged great restraint in the use of hypnotic agents for anything other than temporary, situational or intermittent conditions (Freedman et al., 1984).

#### **Insomnia: Psychological (Cognitive-Behavioral) Treatments**

Several nonpharmacological interventions for insomnia have been developed. These have demonstrated moderate effectiveness in young and middle aged adults. Evaluation of effectiveness of such treatments with older individuals has received far less attention (Fichten & Libman, 1991). Although biofeedback, sleep hygiene, and sleep restriction therapy have also demonstrated efficacy, the most popular approaches are muscle relaxation, cognitive strategies, and stimulus control.

**Muscle relaxation.** The rationale for this type of treatment, which includes a variety of training procedures (e.g., progressive relaxation, passive relaxation) is based on the premise that if people can learn to relax their bodies at bedtime, they will fall asleep faster. Relaxation training has not only been the most frequently prescribed behavioral intervention in the nonpharmacological treatment of insomnia, but it has also been shown to be effective relative to placebo conditions (e.g., Borkovec, 1982; Lichstein & Fischer, 1985).

Studies on the use of relaxation techniques in older adults have typically addressed sleep onset insomnia in spite of evidence showing that problems of sleep maintenance are most prevalent in the older population (Bootzin et al., 1983; Morin & Gramling, 1989). Many studies systematically exclude subjects over age 55 because of the known changes in sleep patterns. Also, the tension phase of the tension and release of muscle groups prescribed in progressive relaxation may be problematic for elderly individuals with arthritis or other painful joint conditions.

**Cognitive strategies.** The premise for these methods, which include autogenic training, meditation, and imagery training is that cognitive rather than muscular hyperactivity causes insomnia. The evidence suggests that intrusive cognitions are far more prevalent than somatic factors in the experience of insomnia (Lichstein & Rosenthal, 1980; Nicassio et al., 1985) and data indicate that cognitive arousal plays a key role in insomnia (Kuisk, Bertleson, & Walsh, 1989; Lichstein & Fanning, 1990; Morin, Stone, Trinkle, Mercer, & Remsberg, 1993; Nicassio, Mendlowitz, Fussel, & Petras, 1985). Cognitive techniques typically involve dealing with uncontrollable and intrusive cognitive activity by learning to focus on relatively pleasant, somewhat monotonous but attention-getting thoughts, images and internal stimuli which are incompatible with worrisome thoughts and images preventing sleep onset.

The efficacy of cognitive strategies for alleviating sleep onset insomnia has been demonstrated (cf. Lacks, 1987). Evaluations of cognitive interventions in the treatment of sleep maintenance insomnia (Coates et al., 1982; Morin & Azrin, 1987; Morin, Kowatch, Barry, & Watson, 1993; Sanavio, 1988; Schoichet et al., 1985; Thoresen et al., 1981) show that multicomponent cognitive interventions resulted in substantial improvement in latency of sleep initiation, with smaller benefits on maintenance parameters. Patients with mixed onset and maintenance problems were generally less responsive than those presenting either difficulty alone.

**Stimulus control.** This technique is based on the premise that sleep-incompatible behaviors, both overt and covert, have been conditioned to bed-related stimuli. It has been shown effective in a large variety of studies (cf. Morin & Kwentus, 1988). Treatment involves eliminating the association between sleep-incompatible behaviors (e.g., eating, worrying, watching TV) and the bedroom. The technique involves curtailing sleep-incompatible behaviors and strengthening associations between bed/bedroom and sleep behavior (e.g., when unable to fall asleep or return to sleep within 10-20 minutes, people are instructed to get out of bed and go to another room, returning to bed only when sleepy again). It also in-

volves regulating the wake-sleep schedule (arising at the same time every morning, avoiding daytime napping).

These procedures seem particularly relevant for elderly individuals, where retirement is accompanied by changes in daily routines and sleep schedules. Studies using stimulus control treatment for geriatric insomnia indicate that it is effective for both sleep onset (Puder et al., 1983) as well as for sleep maintenance problems (Engle-Friedman et al., 1992, Hoelscher & Edinger, 1988; Morin & Azrin, 1988). Nevertheless, 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 period of sleeplessness during the night (Davies et al., 1986). Such factors lead to noncompliance with the behavioral protocol and undermine the potential clinical benefits. Moreover, the effectiveness of the various components of the technique is not known, and it is possible that some of the more onerous requirements of the program may be unnecessary.

Examination of the stimulus control procedure has prompted several researchers to suggest that the effective ingredient in this technique may be the disruption of sleep incompatible behaviors such as intrusive thoughts or restless tossing. If this is the case, rather than the postulated reestablishing of the bed as a discriminative stimulus for sleep, then the onerous requirement of having to leave the bed and bedroom would be unnecessary. Removing the out-of-bed requirement might improve treatment effectiveness for the more difficult sleep maintenance problem as well as be more feasible for the less ambulatory older adult.

**Countercontrol.** 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 non-arousing 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 sleep onset insomniacs. In a more recent study it was found that this technique reduced awake time in sleep-maintenance insomnia by about 30% and that older participants profited as much from the treatment as younger subjects (Davies et al., 1986).

**Limitations of non-pharmacological interventions for older individuals.** It has been demonstrated that cognitive/behavioral treatments work for older people (Engle-Friedman et al., 1992; Friedman et al., 1991)

and that these may be perceived as more acceptable and effective than pharmacotherapy (Morin et al., 1991). Nevertheless, as noted earlier, these procedures are generally more effective for sleep onset insomnia than for sleep maintenance insomnia - the difficulty encountered by people as they age. In addition, the tension phase of the tension and release of muscle groups prescribed in progressive relaxation may be problematic for elderly individuals with arthritis or other painful neuromuscular conditions. For stimulus control, the instructions are fairly complex and the behavioral prescriptions are aversive. Elderly people complain about the requirement of getting out of bed after every 10-20 minute period of sleeplessness during the night (Davies et al., 1986) and the out of bed requirement is impractical for older people with mobility impairments. Such factors lead to noncompliance with the behavioral protocol and undermine the potential clinical benefits.

The countercontrol procedure appears to be the most suited to the needs of elderly insomniacs. However, even though this technique eliminates the necessity of leaving the bed, an arduous requirement for most older adults, Davies et al. (1986) indicated that in their study of countercontrol they encountered resistance on the part of participants to turning on the lights in the middle of the night and engaging in some activity. They suggested that an insomnia treatment which addresses the disruption of cognitive arousal more directly might have greater therapeutic success and fewer compliance problems.

Failure to carry out treatment recommendations may be the single greatest impediment to a cognitive-behavioral insomnia treatment program (Chambers, 1992). Therefore, there continues to be a need to develop an effective treatment which is uniquely suited to aging persons. Such an intervention should use the mediating mechanism common to cognitive-behavioral treatments, the procedures must not be burdensome, expectations of potential effectiveness must be maintained, and the individual must subjectively perceive improvement in his or her sleep problem - a perception demonstrated to be somewhat independent of behavioral change (Espie et al., 1989).

## THE RESEARCH PROGRAM

### Why study sleep problems in older individuals?

It has been estimated that between 12% and 25% of people aged 65 and older complain of persistent and distressing insomnia; this is associated with increased use of health-related facilities (Ford & Kamerow, 1989; Mellinger, Balter, & Uhlenhuth, 1985). Moreover, there is some indication that chronic insomnia may enhance vulnerability for major depression (Ford & Kamerow, 1989). In older people, insomnia is also a

risk factor for nursing home placement (Pollak, Perlick, Linsner, Wenston, & Hsieh, 1990).

Because older individuals are more vulnerable to sleep disorders and because there are physical and psychosocial consequences, both of the sleep disturbances itself as well as of the usual pharmacological treatment, the research which we begun in 1990 has focused on evaluating various aspects of good and poor sleep in older individuals.

#### Four Fundamental Questions

Not all older adults complain of impaired sleep, although it may be assumed that developmental psychophysiological sleep deficits are present in them as well. At least one study has demonstrated that a sample of carefully screened elderly adults with no discernible disease reported no sleep-related symptoms, but still displayed the age-related changes in their sleep-wake pattern, reflecting poorer quality sleep as compared with younger persons (Prinz et al., 1984). The question arises, **Why do not all older individuals complain of insomnia?** Why does the magnitude of the sleep complaint not match the severity of the psychophysiological deficit in older individuals, as it usually does in middle aged adults (Bootzin & Engle-Friedman, 1987)?

One goal of our research was to address this issue. To accomplish this, we investigated a variety of sleep and nonsleep factors which differentiate older poor sleepers who complain of insomnia from those who do not. This examination involved two aspects. One compared two groups of poor sleepers: those who complained about their sleep problem and those who did not (people in this latter group readily acknowledged that they slept poorly - it just did not bother them). The second compared older individuals who described themselves as either good sleepers or poor sleepers.

Clearly, the best solution to the problem of geriatric insomnia is to prevent its occurrence (primary prevention). If this is not possible, the next preferred solution is to prevent deterioration (secondary prevention) and to minimize the impact of the sleep problem on other aspects of daily living. Should the first two options not be feasible, effective techniques must be available for treating sleep problems once they have developed. To shed light on these issues, we asked three additional fundamental questions, **Who is actually vulnerable to developing insomnia? How can insomnia problems and deterioration of existing difficulties be prevented? What is the best way to treat insomnia once it has developed?**

#### Answering the Questions

Given the extensive literature, it was easy to ask the big questions. As is typical of so much research, in order to answer the big questions, a whole series of

smaller, component questions had to be answered first.

First, our evaluation of the literature suggested that some heretofore unexplored variables which dealt with the nature of the nocturnal awake experience were crucial to understanding the insomnia complaint. We developed the Cognitive Model of Insomnia (Fichten & Libman, 1991) which incorporated these factors and subsequently evaluated predictions made by the model in our research. This model gave a theoretical base to the empirical work and guided much of our thinking about the nature of the insomnia complaint.

Briefly, our model proposes that while nocturnal arousals may be inevitable, especially in older persons, the complaint of insomnia is likely to be related to the quality of nocturnal awake times. There are two key aspects of this formulation. One concerns the aversiveness of the awake time experience during the night; this is typically occupied by extraneous and intrusive cognitive activity such as concerns about the day's events and worry about miscellaneous matters, including the consequences of not getting enough sleep (which exacerbates the problem of actually falling asleep). The second aspect concerns common errors in information processing which can result in overestimation of the time spent awake; this, we believe, both magnifies the sleep complaint as well as contributes to the negative cognitive experiences which interfere with falling asleep.

**Question 1: Why do not all older individuals complain of insomnia?** To answer this question, we needed to compare self reported good sleepers with complaining and non-complaining poor sleepers on: thoughts, time estimation, sleep parameters, personality, and lifestyle factors. However, there were no available measures to evaluate thoughts and self statements in older individuals during middle of the night awakenings.

Before we could answer the larger question, we had to conduct two smaller studies; one to explore the nature of thoughts during nocturnal awake times in an open ended manner and another to use this information to construct and validate an inventory measure of thoughts and self-statements. In the process, we also explored a methodological issue dealing with the best way to measure positive and negative thoughts and self-statements. This led us to examine the impact of scale values on Schwartz and Garamoni's (1986, 1989) States-of-Mind (SOM) thought ratios. This methodological issue has been of considerable interest to two of the team members for several years, and is a prominent feature of Fichten and Amsel's research on physical disabilities (Fichten, Amsel, Robillard, & Tagalakis, 1991; Amsel & Fichten, 1990; Fichten, Amsel, & Robillard, 1988). We also conducted a

statistical evaluation of predictions made by the SOM formulation.

Our Cognitive Model of Insomnia predicted differences in the estimation of time. Therefore, we tested time estimation in two studies. In one, we evaluated time estimation in the daytime under various conditions in the psychology laboratory. In the second investigation, we compared time estimation in the sleep laboratory by comparing self reports and polysomnographic evaluations.

When we attempted to compare good and poor sleepers on various sleep parameters, we discovered that the evaluation of sleep parameters needed further study. Was a questionnaire concerning typical sleep experiences sufficient, or was it necessary to obtain daily self monitoring data by asking individuals to complete sleep diaries on a nightly basis? To answer this question, we conducted an investigation which compared data obtained from a retrospective measure, such as a questionnaire, with data obtained from ongoing evaluation via self monitoring using a daily sleep diary. While evaluating the data for this investigation, we were confronted with another empirical question: what is the "best" way to measure various aspects of sleep parameters such as total wake time (e.g., summing direct estimations of sleep onset latency and nocturnal awake times or subtraction of sleep times from bed times), sleep efficiency, and overall sleep quality. Again, a small methodological investigation was required.

A related line of inquiry compared lifestyle and personality factors in good and poor sleepers. Here, the literature suggested that a variety of factors distinguished younger and middle aged good and poor sleepers; these include life stressors, traits and personality factors, state factors such as worrying when awake at night and "clock watching," and behavioral sleep related lifestyle factors such as "sleep hygiene" practices (e.g., caffeine or strenuous exercise in the evening, naps during the day) (Coyle & Watts, 1991; Edinger, Stout, & Hoelscher, 1988; Hauri & Fisher, 1986; Paulsen & Shaver, 1991). We were also interested in other, potentially modifiable lifestyle variables such as daytime activities, regularity of sleep and non sleep routines, and variety and pleasantness of daytime activities; these factors have recently been receiving increasing attention (Rubman, Brantley, Waters, Jones, Constans, & Findley, 1990; Waters, Adams, Binks, & Varnado, 1993; White & Nicassio, 1990).

When comparing older good and poor sleepers we evaluated the variables suggested as important in the literature (of course, we also evaluated time estimation, cognitive factors, and sleep parameters). In carrying out these comparisons we were confronted with the dilemma that while there were many available definitions of what constitutes poor sleep, the litera-

ture provided no accepted way to define good sleep. Because good sleep is not merely the absence of pathology, we had to conduct a methodological investigation in order to determine who were the good sleepers. We also wanted to compare the two groups on the nature of sleep strategies used. However, because there were no available measures to evaluate sleep strategies, we were forced to carry out an additional methodological study to develop and validate a questionnaire dealing with this construct.

**Questions 2 and 3: Who is actually vulnerable to developing insomnia? How can insomnia problems and deterioration of existing difficulties be prevented?** Because of the nature of age-related psychophysiological changes, all aging individuals must be considered at risk for developing insomnia. Nevertheless, some older adults do not develop problems. For those who do, there are differing levels of severity. To best target prevention and intervention efforts, it is important to identify which aging individuals are at high risk for developing problems.

In order to answer the two larger questions, we first needed to explore the natural course of sleep complaints in an older population in a longitudinal study. By evaluating demographic, physical, personality, lifestyle and sleep characteristics in older individuals of various ages over a four year period we investigated the following specific questions: what is the natural course of sleep complaints, who will develop a significant sleep problem, and who will be invulnerable to developing sleep problems. We also explored the predictors of improvement in people who are currently experiencing difficulties. Needless to say, conducting a long term follow-up of vast numbers of individuals has posed its own special challenges in subject retention, record keeping, and data analysis.

**Question 4: What is the best way to treat insomnia once it has developed?** A key aspect of our research program was the compilation and evaluation of new treatments suggested by the Cognitive Model of Insomnia. Thus, we are currently completing a comparative study of two new brief psychological interventions in a sample of older individuals.

The goals of our investigation were (1) to develop a treatment technique which would be particularly well suited to older adults in terms of ease of compliance as well as effectiveness, (2) to conduct a controlled evaluation of the newly developed interventions for the management of insomnia, and (3) examine its comparative effectiveness in helping older insomniacs see themselves as people who can cope with their sleep disturbances rather than be the victims of it.

We tested two novel treatments based on our model: the treatments were expected to exert beneficial effects on sleep and on distress by interfering with negative

cognitions and altering time estimation for nocturnal awake times. Poor sleeper volunteers were randomly assigned to one of four experimental conditions and administered: daily self monitoring (sleep diary) plus listening to audiotaped novels during nocturnal awake times, daily monitoring plus listening to audiotaped passive relaxation exercises, daily monitoring alone, or no treatment intervention (test only control condition). Of course, this study built on findings from our other investigations and incorporated elements which dealt with the evaluation of sleep parameters (questionnaire, sleep diary, polysomnogram), time estimation, thoughts and self-statements, affect, and the use of various sleep strategies.

The experimental interventions required that we select appropriate audiotaped materials for nocturnal use. To help in the selection of this material we turned to a population which has extensive experience with such materials: people who have visual disabilities. To obtain information on the use of various available audiotaped materials we conducted a structured interview study with older good and poor sleepers with visual impairments. Because examination of physical disabilities is a second major area of funded research for two team members (Fichten and Amsel), we had ready access to this population.

In the context of the insomnia treatment outcome study we also conducted a series of statistical analyses to evaluate what treatment works best for whom. In addition, because we were already geared up for conducting a long term follow-up to answer questions 2 and 3, we are also currently conducting an evaluation of the long term effects of our treatment interventions.

### Conclusions

Our data describing aspects of sleep and insomnia as well as the psychological and lifestyle characteristics of a large community sample of older individuals, both good and poor sleepers, contribute to the understanding of the complaint of insomnia as distinct from the phenomenon of sleep disruption. Our studies also address the following critical questions. What are the parameters of nonmedically based insomnia in older individuals? At which stage should an intervention be implemented? For whom will a particular intervention strategy be effective? The results of our investigation are expected to contribute to the overriding goal in all public health efforts, namely maintenance and improvement in quality of life by promoting the use of coping activities which prevent or alleviate disability - in this case, the debilitating experience of insomnia.

## PROCEDURAL ASPECTS OF THE RESEARCH PROGRAM

### Current Status

Our research on sleep, insomnia and the aging process, which started in 1990, is still in progress and our funding is assured into 1995. Substantial portions of the research program described above are now complete and we have already tested over 700 participants. However, answers to the questions posed inevitably lead to further questions and to additional methodological lacunas which must be filled. By allowing ourselves to address each ancillary question as it arose we permitted the research to grow from a series of discrete studies to a viable, multifaceted research program with many elements and with diverse funding sources. Because of team members' differing interests and complementary areas of expertise, the overall research program permits the active involvement of various team members in different phases.

### Research Team Composition and Project Location

Since the inception of the program, the research team has had four active senior members. In alphabetical order, these are: Rhonda Amsel, M.Sc. (McGill statistics professor), Laura Creti, M.A. (former Dawson College student and professor, currently a Ph.D. student at Concordia University - thesis supervisor is Eva Libman), Catherine S. Fichten, Ph.D. (Dawson College psychology professor), Eva Libman, Ph.D. (Concordia University psychology professor). Three of us (Creti, Fichten, Libman) are also associated with the Behaviour and Sex Therapy Service, Department of Psychiatry of the SMBD Jewish General Hospital in Montreal, where the research is actually being carried out (although research participants were recruited from the community, the psychological laboratory where participants are tested is located at the Jewish General Hospital - the collaborating sleep laboratory which conducts the polysomnographic evaluations is at the Royal Victoria Hospital).

The research team also includes a number of more peripheral members who either contribute specific expertise or support the team as high level research assistants. In alphabetical order, these are: Sally Bailes, M.A., William Brender, Ph.D., Ann Gay, B.A., Darlene Judd, Harriet Lennox, B.Sc., Robert Levy, M.D., Kathleen McAdams, Vicki Tagalakakis, M.Ed., and Nettie Weinstein, B.A.

### Funding

Three granting organizations are currently providing funding for various aspects of the research program. The Conseil Québécois de la recherche sociale (CQRS) has provided funding since 1990 (grants from 1990 to 1995 awarded to Libman and Fichten). The NHRDP program of Health and Welfare Canada has provided funding since 1993 (grant from 1993 to 1995 awarded

to Fichten and Libman). In addition, in 1993 DGEC's Programme de soutien aux chercheurs de collèges (PSCC) awarded Catherine Fichten a travel grant as well as released time to work on the research.

### Publication and Dissemination Strategy

Because of the theoretical and applied aspects of the research and because of the priorities of the various funding agencies supporting this research program, we have been disseminating our findings in a variety of ways: presentations at scholarly conferences, talks and workshops at hospital rounds, and seminars at seniors' groups and residences. Because of a concern with popularizing the findings of the applied aspects, we have also tried to inform the larger public about our work.

Specifically, we have presented at scholarly conferences in the following areas: psychology, sleep society, gerontology (over 30 presentations). We have given talks and workshops at: hospital and chronic care facility rounds, seniors' residences, seniors' groups (over 20 presentations). In the effort to popularize our work we have appeared on radio and TV talk shows (5 appearances), and have encouraged newspaper articles about our work.

We have only recently started publishing our findings: one article has already appeared, two have been submitted to scholarly journals, and one is in the final stages of preparation. There will be many more; we intend to publish findings on various aspects of the research program as the data become available.

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