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Thoughts During Awake Times in Older Good and Poor Sleepers—The Self-Statement Test:60+

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In a previous investigation we showed that thoughts experienced during periods of nocturnal wakefulness contribute to understanding the insomnia complaint. We also demonstrated the problems with open-ended thought listings, such as low thought frequencies, large standard deviations, loss of subjects due to missing data, and difficulties with states-of-mind (SOM) ratios. Because of these difficulties and the expertise and expense involved in coding thoughts, in the current study we developed and evaluated the Self-Statement Test:60+ (SST:60+)—a 34-item inventory measure of thoughts reported by older individuals while trying to fall asleep. Results on 445 individuals showed good reliability and validity for the measure. The findings also demonstrated that negative thoughts and the SOM ratio provide good indices of dysfunctional thinking during periods of nocturnal arousal. Positive thinking, which appears to be a strategy to combat negative thoughts, may serve to buffer the impact of negatives.

KEY WORDS: insomnia; sleep; self-statements; thoughts; assessment; measure.

INTRODUCTION

Sleep researchers and clinicians have increasingly implicated distressing and intrusive thoughts in the etiology and maintenance of insomnia (cf. Morin, 1993). Indeed, some have argued that a common mediating mechanism—interference with intrusive and unpleasant cognitive activity—can best explain the demonstrated effectiveness of a wide variety of cognitive-behavioral interventions in treating sleep problems (cf. Borkovec, 1982; Lacks, 1987; Lichstein & Fischer, 1985). In spite of

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its potentially important role, there has been no systematic investigation of thinking during nocturnal awake times and little is known about the nature or the content of thoughts experienced either by good or by poor sleepers when they are awake during the night.

Assessment of thoughts experienced by older individuals and exploration of the role of cognitions in the experience of insomnia in seniors is particularly important because sleep disruption becomes more prevalent as people age. Psychophysiological changes in sleep and wakefulness associated with normal aging are all in the direction of impaired sleep (Morin, 1993). Thus, it is not surprising that while the occasional experience of insomnia has been estimated at 30%-40% for the general population (American Psychiatric Association, 1994), rates between 50% and 60% for individuals age 60 and over have been reported (Chen & Foley, 1994; Monjan, 1994). Persistent and distressing difficulties in initiating and/or maintaining sleep (DIMS) have been estimated at between 10% and 35% of people over 65, with concomitant increased use of health care facilities and medication (Brabbins et al., 1993; Ford & Kamerow, 1989; Gallup Organization, 1991; Henderson et al., 1995).

Despite developmental psychophysiological changes in sleep patterns, not all older adults complain of impaired sleep (Dement, Miles, & Carskadon, 1982; Monjan, 1990). The general aim of our research program has been to understand sleep dissatisfaction , and to identity those factors which differentiate older individuals who complain of insomnia from those who do not.

In a previous investigation we examined the content and valence of 160 older individuals ' thoughts during nocturnal awake times by means of open-ended thought listings from which we derived 17 discrete thought content areas (Fichten et al., 1996). Findings from this study indicate that good sleepers and poor sleepers who were minimally distressed about their insomnia had more positive than negative thoughts. The opposite was true for highly distressed poor sleepers. The findings also showed that while good sleepers and minimally and highly distressed poor sleepers did not differ on the frequency of positive thoughts, highly distressed poor sleepers reported the most frequent negatives. They also had the most frequent worry thoughts as well as the worst ratings on overall thought pleasantness. Results using the states-of-mined (SOM) ratio proposed by Schwartz and Garamoni (1986, 1989) [positive(positive + negative) thoughts], which reflects the balance between positive and negative thinking, confirmed that highly distressed poor sleepers' thinking is most maladaptive for fostering sleep.

Although the findings of this prior investigation suggested that thoughts experienced during periods of nocturnal wakefulness are important in understanding the insomnia complaint, the results also reflected the well known difficulties of open-ended thought listings (cf. Amsel & Fichten, 1990; Clark, 1988): low thought frequencies, large standard deviations, loss of subjects due to missing data, and difficulties with SOM ratios, such as having to correct for zero frequencies. In addition, both frequency scores and SOMs based on low thought frequencies typically obtained on open-ended measures are generally less informative than those based on inventory measures. For example, SOMs based on thought listings have been shown to have less variability, to be more "central," and to have weaker correlations

with criterion variables than SOMs based on inventory measurement (Amsel & Fichten, 1996). Our results, as well as findings reported in other investigations, suggest that thought listing is useful in providing ideas for inventory construction as well as for exploring specific questions; however, when a valid endorsement measure of a construct exists and investigators simply wish to obtain valenced thought scores, an endorsement measure is generally preferable to a production technique such as thought listing (e.g., Arnkoff & Glass, 1989; Fichten, Amsel, & Robillard, 1988; Glass & Furlong, 1990; Heimberg, Bruch, Hope, & Dombeck, 1990).

Because of difficulties with open-ended thought listings and because of the time expertise, and expense involved in coding thoughts, the goal of the present investigation was to develop and evaluate the Self-Statement Test:60+ (SST:60+)—a closed-ended, inventory measure of thoughts experienced by older individuals while trying to fall asleep.

METHOD

Measures

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

This 34-item inventory measure of valenced thoughts experienced during times of wakefulness was developed for the present investigation. It is based on the 17 different thoughts identified in the thought listings of 160 older individuals which were obtained in a previous investigation (Fichten et al., 1998). Respondents indicate, using a 5-point scale, how often during periods of wakefulness they experience each of 17 positive and 17 negative thoughts (e.g., "enjoyable things I did during the past few days," "poor health of family members or friends"). Scores are summed. The measure yields two thought frequencies—Positive and Negative—as well as a SOM ratio [positive/(positive + negative)]. Higher frequency scores denote more positive and negative thoughts, and higher SOM ratios indicate more adaptive thinking. Because of serious concerns about the validity of SOM ratios which are based on the popular 1 to 5-point rating scale format (Amsel & Fichten, 1996; Schwartz & Garamoni, 1989), a 0 to 4-point response rating scale was used (0 = *never or hardly ever,* 4 = *very often*).

Sleep Questionnaire

This brief objective questionnaire inquires about typical sleep experiences, including hours slept per night, duration of nocturnal arousals, and frequency (0 to 7 days/week) of experienced difficulty falling asleep, getting back to sleep after nocturnal awakenings, and falling asleep after waking up too early. It also inquires how frequently (0 to 7 days/week) each of these three sleep problems is accompanied by feelings of distress. The information provided allows us to (1) compute Sleep Efficiency scores (percentage of bedtime spent asleep), (2) obtain ratings of respondents'

subjective perceptions of the frequency of sleep problems (Sleep Difficulty: Occurrence of Sleep Problems 1 = *very rarely*, 10 = *very often*) and the associated distress (Sleep Distress: Level 1 = *not al all*, 10 = *very much*), and (3) calculate two derived frequency scores—Sleep Difficulty: Frequency of Problem Episodes and Sleep Distress: Frequency of Distress Episodes—which provide single summary frequency scores (0 to 21: higher scores indicate more frequent sleep problem/distress episodes experienced during the week). 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) and, the pattern of correlations among variables shows logical, highly significant relationships (Fichten et al., 1995). Convergent validity data indicate significant and high correlations (r values range from .58 to .85) between corresponding scores on the Sleep Questionnaire and scores based on 7 days of self-monitoring on a daily sleep diary (Fichten et al., 1997).

Sleep Behaviors Scale: 60+

This measure, recently developed by our team, is based on open-ended listings of sleep behaviors. Respondents rate, on a 5-point scale, how often they engage in each of 30 activities when having problems falling asleep or getting back to sleep at night (e.g., toss and turn, eat, read, imagine a scene). Ratings are summed to provide a total score as well as four subscales: Active Behaviors, Relaxation, Cognitive Arousal, and Medication. Good validity and reliability have been demonstrated for this scale (Fichten et al., 1995, 1998; Libman, Creti, Amsel, Brender, & Fichten, 1997). For example, the measure has good temporal stability (r = .85) as well as internal consistency (Cronbach's α = .80). Poor sleepers have been shown to have higher total scores on this measure than good sleepers; this is especially notable on the Cognitive Arousal subscale, where scores are closely related both to daytime and nocturnal measures of poor psychological adaptation, and least evident on the Relaxation subscale.

Tension Thermometer

A single item developed by our team asks, "When you are lying in bed trying to fall asleep, how tense do you generally feel?" Responses are made on an 11-point scale: 0 = *not at all tense,* 100 = *very tense*, with ratings made at 10-point intervals. Our data indicate reasonable temporal stability, $r(35) = .67, p < .001$, and the pattern of correlations between scores on this measure and relevant sleep variables shows logical, highly significant relationships (Fichten et al., 1995; Fichten et al., 1998).

Overall Thought Pleasantness Rating

This single Likert-type rating scale item inquires about the pleasantness of respondents' thoughts while trying to fall asleep; higher scores indicate mostly pleas-

ant thoughts, and lower scores indicate mostly unpleasant thoughts. Reasonable temporal stability, $r(35) = .63$, $p < .001$, and validity data reported elsewhere (Fichten et al., 1995, 1998) suggest acceptable psychometric properties for research.

Pre-Sleep Arousal Scale

Sixteen 5-point rating scale items assess the phenomenology of pre-sleep and nocturnal awake times. Two scores are derived: Somatic (e.g., "a tight tense feeling in your muscles") and Cognitive arousal (e.g., "thoughts keep running through your head"). Nicassio, Mendlowitz, Fussell, and Petras (1985) showed good psychometric properties for this scale. Subscales were shown to be internally consistent and stable over time. Means for insomniacs were significantly higher than for normal sleepers for both subscales, reported Cronbach's alphas for subscales ranged from .67 to .88, and test-retest correlations ranged from .72 to .76. Test-retest correlations obtained in our laboratory on older individuals were more modest: Somatic subscale, $r(56) = .36$, $p < .01$; Cognitive subscale, $r(56) = .52$, $p < .01$.

Anxious Self-Statement Questionnaire (ASSQ)

The frequency of anxious self-talk is evaluated by this 32-item self-report measure. Kendall and Hollon (1989) indicated that reliability for the questionnaire is acceptable (split-half reliability was .92, item-total correlations ranged from .45 to .79) and that it is sensitive to a stressful event. Higher scores indicate more anxious self-talk. In our studies, the measure was modified by asking participants to base their responses on periods of sleeplessness; our data on older individuals indicated acceptable temporal stability in this context, $r(56) = .69$, $p < .001$.

Brief Symptom Inventory (BSI)

A 53-item self-report psychological symptom inventory, the BSI (Derogatis, Rickels, & Rock, 1976) has subscales for nine symptom dimensions (e.g., Depression, Anxiety) and three 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 have been provided by Hale, Cochran, and Hedgepeth (1984). Lower scores indicate better adjustment.

Eysenck Personality Inventory (EPI)

The EPI (Eysenck & Eysenck, 1968) is a reliable and valid empirically based questionnaire that is among the most frequently used measures of personality (Dig-

man, 1990). It evaluates the dimensions of Neuroticism and Extraversion-Introversion, and incorporates a Lie Scale, which evaluates the tendency to respond in a socially desirable direction. Higher scores indicate greater Neuroticism, Extraversion, and Lie scores.

Penn State Worry Questionnaire

On the 16 items of this measure (Mayer, Miller, Metzger, & Borkovec, 1990) respondents indicate, using a 5-point scale, how typical of them each statement is. Internal consistency evaluations obtained in the eight validation studies conducted by the questionnaire's authors ranged from coefficient alpha scores of .91 to .95. Test-retest reliability coefficients ranged from .74 to .92. Data provided concerning concurrent and criterion group validity showed acceptable results. A recent validation study provides support for the use of this measure with older individuals (Beck, Stanley, & Zebb, 1995). Higher scores indicate a more worrying personality style.

Subjects and Procedure

Participants

Subjects were 445 individuals (136 men, 309 women, mean age = 68, range = 55 to 88). They were participating in a larger investigation of sleep, aging, and nondrug treatment of insomnia (Creti, Libman, & Fichten, 1996; Fichten et al., 1995, 1998; Libman et al., 1997a; Libman, Creti, Levy, Brender, & Fichten, 1997b). Both good and poor sleepers were recruited through media publicity consisting of press releases, presentations and mailings to seniors' groups, and notices in community clinics and residences for seniors. The only eligibility requirements were that subjects be over age 55, be community residents, and have sufficient cognitive abilities to complete the measures. Individuals participated on an anonymous, volunteer basis and completed measures either in a seniors' group context or at home. Participants were instructed to provide answers concerning their usual practices and to base their responses on a typical week.

Approximately 75% of subjects belonged to university or college seniors' groups, making this an unusually well-educated sample. Little information was available on the physical health status of most of the participants; a minority had been screened for major health problems as part of the larger on-going investigation.

All participants completed the newly developed Self-Statement Test: 60+ as well as the Sleep Questionnaire, Tension Thermometer, Overall Thought Pleasantness Rating, and Sleep Behaviors Scale: 60+ . Two subsamples completed additional measures; these were determined primarily by the requirements of the larger investigation as well as by subjects' availability. A convenience sample of 39 subjects (13 men and 26 women), including both good and poor sleepers, completed the SST:60+ at a second testing time as well, 4 weeks later. In addition, 139 of the participants came to our laboratory and completed the following measures at a

different testing time: Pre-Sleep Arousal Scale, ASSQ, BSI, EPI, and Penn State Worry Questionnaire.

Grouping Participants: Good Sleepers, High-Distress Poor Sleepers, and Low-Distress Poor Sleepers

Sleep status was based on Sleep Questionnaire scores. Polysommography was not carried out for several reasons, including the expense as well as the burdensome nature of this type of evaluation for seniors. In addition, it has been shown that self-reports and objectively measured sleep parameters are generally highly correlated (e.g., Hoch et al., 1987; Kryger, Steljis, Pouliot, Neufeld, & Odyuski, 1991). Perhaps more important, insomnia is not a hidden disease entity which requires indirect tests for verification. It is the *self-report* of troubled sleep that is of primary interest in evaluating and treating insomnia.

Poor sleepers were those 122 participants who met the criteria for the diagnosis of a disorder of initiating or maintaining sleep (30 min of undesired awake time at least three times per week, problem duration at least 6 months) and whose Sleep Questionnaire responses indicated problematic sleep on two items: both a relatively high Sleep Difficulty: Frequency of Problem Episodes score (4 or greater) as well as a relatively high subjective rating of Sleep Difficulty: Occurrence of Sleep Problems (at least 6).

High-distress poor sleepers were 36 poor sleepers whose subjective Sleep Distress: Level of Distress was 6 or greater (i.e., above the midpoint of the scale) and whose Sleep Distress: Frequency of Distress Episodes score was at least 9 (i.e., a minimum of nine distress episodes per week out of a possible 21, indicating at least three very upsetting nights per week). Low-distress poor sleepers were those 55 poor sleepers whose scores on two items indicated relatively low distress: subjective Sleep Distress: Level score below the midpoint on the scale (5 or less) and Sleep Distress: Frequency score 8 or less (i.e., fewer than three upsetting nights per week). Thirty-one poor sleepers were not classified because they had elements of both high and low distress.

Good sleepers were 189 individuals who (1) failed to meet the criteria for a diagnosis of DIMS, and who met the following requirements: (2) Sleep Difficulty: Frequency score 3 or lower, (3) subjective Sleep Difficulty: Occurrence score below the midpoint of the scale, (4) Sleep Distress: Frequency score below 3, and (5) subjective Sleep Distress: Level score 3 or lower.

One hundred thirty-four individuals were designated "medium-quality" sleepers because they had elements of both good and poor sleep. The sex ratio in all samples was approximately one-third male and two-thirds female.

The sleep characteristics of the sample resemble population parameters of well-functioning older community residents (cf. Prinz, 1994). The elaborate criteria for classifying sleep status resulted in very good and very poor sleepers in our contrast groups. Findings in Table I illustrate the differences on relevant sleep parameters. These show that although high-distress poor sleepers always had the worst scores and good sleepers always had the best, high- and low-distress poor sleepers were

Table I. Sleep Parameters: Mean Scores of Good Sleepers and High- and Low-Distress Poor Sleepers[a]

Variable	Good Sleepers	Poor Sleepers: Low Distress	Poor Sleepers: High Distress	Tukey HSD tests ($p < .05$)
Time[b]				
Total Sleep Time	7.13 h	5.56 h	5.29 h	hi = lo < good
Total Wake Time	.25 h	2.63 h	3.97 h	hi > lo > good
Sleep Efficiency	97 %	70 %	58 %	hi < lo < good
Sleep Behaviors	25.56	36.47	36.96	hi = lo > good
Sleep Difficulty				
Frequency of Problem Episodes (0 to 21)	1.10/week	10.26/week	14.24/week	hi > lo > good
Occurrence of Sleep Problems (1 to 10)	1.74	7.73	8.22	hi = lo > good
Sleep Distress				
Frequency of Distress Episodes (0 to 21)	.60/week	3.98/week	12.97/week	hi > lo > good
Level of Distress (1 to 10)	1.38	2.89	8.00	hi > lo > good

[a]All one-way analyses of variance were significant at the .01 level or beyond. *df*s ranged from (2, 231) to (2, 274).
[b]Total Wake Time is the result of summing three daily wake times (sleep onset latency, waking after sleep onset, early morning wakefulness). Sleep Efficiency was calculated by dividing Total Sleep Time by the sum of Total Sleep Time and Total Wake Time.

reasonably similar on sleep characteristics, except, of course, for the Sleep Distress grouping variables.

The three groups differed slightly, but significantly, on age, $F(2, 267) = 4.67$, $p < .05$. The Tukey HSD test, with α set at .05, indicates that low-distress poor sleepers were significantly older ($M = 70$) than good sleepers ($M = 66$). High-distress poor sleepers ($M = 67$) did not differ significantly from either group. Poor sleepers had experienced insomnia for a mean of 13 years (range = 1 to 63); there was no significant difference between high- and low-distress poor sleepers on this variable.

RESULTS

Reliability of the SST:60+

To determine internal consistency, three kinds of analyses were conducted. First, the relationships among all items on each of the Positive and the Negative subscales were examined; results show that all items on each subscale were positively correlated with each other and that most of the *r*-values were significant. Second, item-total correlations were computed for both subscales (the item under consideration was removed from the total). Results showed that *r*-values ranged

from .22 to .73 for the Positive and from .35 to .67 for the Negative subscale; all coefficients were significant at the .05 level or beyond. Third, Cronbach's α was computed; results again indicated high internal consistency (positive subscale α = .903, Negative subscale α = .898).

Temporal stability data showed that test-retest scores obtained 1 month apart were all highly and significantly ($p < .001$) correlated. Pearson product-moment correlation coefficients were as follows: Positive subscale: $r(37) = .76$, Negative subscale: $r(37) = .89$; SOM ratio $r(37) = .91$. These compared favorably with our findings on the temporal stability of established measures in our sample.

Factor Structure

A three-factor solution showed that principal-components analysis, with varimax rotation, explained a cumulative 48.5% of the variability in scores. Factor 1, which measures generalized positive thinking, explained 25.9% of the variability; Factor 2, which measures generalized negative thinking, explained an additional 16.5%; and Factor 3, which assesses thoughts related to sleep, explained a further 6.1%. Table II presents the rotated factors with the factor loading for each item. Items were assigned to the factor corresponding to the highest factor loading. In spite of the fact that some of the factor loadings were rather low (e.g., Items 2 and 22), alpha coefficients for the three factors were satisfactory (α = .91, .89, and .81 respectively), and the removal of any item would not greatly affect alpha.

Validity

Differences Between Known Groups

Recently, it has been demonstrated, both in our own laboratory (Fichten, et al., 1995, 1998) as well as elsewhere (Lavidor et al., 1996), that (1) where "objective" sleep parameters are concerned, such as total sleep time, total wake time, and sleep efficiency, high- and low-distress poor sleepers are fairly similar to each other, but very different from good sleepers, and (2) on measures of distress related to sleep disruption as well as on measures of affect, personality, and psychological adjustment, there is greater similarity between good sleepers and low-distress poor sleepers than there is between the two poor sleeper groups. In keeping with these results, as part of the construct validation process we expected SST:60+ scores of low-distress poor sleepers to more closely resemble those of good sleepers than those of high-distress poor sleepers.

Results indicated that, as expected, similarities and differences between the three groups on the SST:60+ followed the pattern demonstrated for thought listing in our previous study (Fichten et al., 1998). As the means in Table III indicate, the two-way Analysis of Variance (ANOVA) comparison on valenced frequencies [3 Groups (Good/Low-Distress Poor/High-Distress Poor) × 2 Valence (Positive/Negative)] showed significant main effects for valence, $F(1, 277) = 8.46$, $p < .01$, with

Table II. Factor Structure of the Self-Statement Test:60+

WHEN YOU ARE TRYING TO FALL ASLEEP OR GET BACK TO SLEEP, GENERALLY, HOW OFTEN DO YOU HAVE EACH OF THE FOLLOWING THOUGHTS?
You can have both pleasant and unpleasant thoughts about the same topics.

Answer according to the SCALE below.

0 = never or hardly ever
1 = rarely
2 = sometimes
3 = often
4 = very often

	Factor 1	Factor 2	Factor 3
____ 2. Something I enjoyed reading or watching on TV (+)	.39		
____ 7. Good things happening to my family or friends (+)	.70		
____ 8. How soothing the sounds of my bedroom are (+)	.50		
____ 9. Generally pleasant, positive thoughts (+)	.66		
____ 11. How lucky I am to be in good health (+)	.73		
____ 12. Pleasant thoughts about my future (vacation plans, start of golf season, etc.) (+)	.73		
____ 15. Good things happening in the world (+)	.69		
____ 17. Positive thoughts about myself, in general (+)	.73		
____ 19. Happy times I have had long ago (+)	.67		
____ 20. How relaxed I am feeling (+)	.63		
____ 23. Enjoyable things I did during the past few days (+)	.79		
____ 25. How fortunate my family or friends are to be in good health (+)	.65		
____ 27. How pleasant it feels to be drifting off to sleep (+)	.57		
____ 30. Pleasant thoughts about my activities (housework, projects, job, volunteer work, etc.) (+)	.74		
____ 34. Pleasant thoughts about things I plan to do during the next few days (+)	.77		
____ 3. Bad things happening in the world (−)		.67	
____ 4. Unpleasant thoughts about my activities (housework, projects, job, volunteer work, etc.) (−)		.63	
____ 6. Unhappy times I have had long ago (−)		.65	
____ 10. Unpleasant thoughts about things I need to do during the next few days (−)		.68	
____ 13. Poor health of family members of friends (−)		.59	
____ 18. Unpleasant things I did during the past few days (−)		.71	
____ 21. Generally unpleasant, distressing thoughts (−)		.73	
____ 26. Upset about my own health (−)		.44	

____ 28.	Something unpleasant I read about or saw on TV (−)	.47	
____ 29.	Unpleasant thoughts about my future (how will I manage when I'm older, how long do I have to live, etc.) (−)	.72	
____ 32.	Negative thoughts about myself, in general (−)	.72	
____ 33.	Problems of family members or friends (−)	.71	
____ 1.	How tense I am feeling (−)		.51
____ 5.	How I'm going to get a really good night's sleep and feel refreshed tomorrow (+)		.75
____ 14.	If I don't get to sleep soon, I will feel very tired tomorrow (−)		.78
____ 16.	How quickly time passes when I'm trying to fall asleep (+)		.41
____ 22.	How disturbing the sounds of my bedroom are (−)		.32
____ 24.	When will I fall asleep? (−)		.77
____ 31.	How time drags when I'm trying to fall asleep (−)		.74

Table III. Thoughts While Trying to Fall Asleep: Mean Scores of Good Sleepers and High- and Low-Distress Poor Sleepers

		Poor sleepers	
Variable	Good sleepers	Low distress	High distress
Self-Statement Test: 60+			
Positive Thought Frequency	27.70	28.67	29.53
Negative Thought Frequency	18.02	25.85	33.36
SOM ratio[a]	.61	.53	.46

[a]SOM refers to Schwartz and Garamoni's (1986, 1989) states-of-mind ratios [Positive/(Positive + Negative) thoughts]. Higher scores reflect more adaptive thinking.

positive thoughts outnumbering negative ones, as well as for group, $F(2, 277) = 15.78$, $p < .001$, indicating more total thoughts in high-distress poor sleepers than in good sleepers. The results also show a significant Group × Valence interaction, $F(2, 277) = 18.77$, $p < .001$, indicating that both good sleepers and low-distress poor sleepers had more positive than negative thoughts, while the opposite was true for high-distress poor sleepers, with scores of low-distress poor sleepers being intermediate. Tests of simple main effects and Tukey *post hoc* tests (with α set at .05) on the interaction revealed no significant difference among groups on positive thoughts, $F(2, 277) = .41$ $p > .05$, but did show a highly significant difference on negative thoughts, $F(2, 277) = 39.83$, $p < .001$, indicating more negative thoughts in high-distress poor sleepers than in good sleepers; scores of low-distress poor sleepers were intermediate and significantly different from both groups. In addition, the one-way ANOVA comparison on SOM scores indicated a significant difference, $F(2, 277) = 18.85$, $p < .001$; Tukey HSD test results indicated that SOM scores of good sleepers were significantly higher than scores of high-distress poor sleepers; scores of low-distress poor sleepers were intermediate, but not significantly different from either group.

Relationships Between Sleep Variables and Scores on the SST:60+

Findings on correlations with the eight sleep variables described in Table I also resembled results on thought listings reported in our previous study, although the sizes of the correlations between SST:60+ scores and sleep parameters were considerable greater. For example all correlations between Negative thought frequencies and sleep parameters were highly significant, and, with the single exception of Total Sleep Time, $r(443) = -.24$, $p < .01$, coefficients all exceeded .40 ($p < .001$).

Correlations between sleep variables and the SOM ratio were also significant and in the expected direction, but the relationships were slightly weaker than for Negative thoughts (coefficients ranged from .10 to .35). This was not the case for Positive thoughts, however. As was the case for thought listing, the only notable finding was a *positive* correlation with Sleep Behaviors, $r(443) = .43$, $p < .001$.

Relationship Between SST:60+ and State and Trait Measures of Personality and Adjustment

Results on SST:60+ Negative thoughts, presented in Table IV, show findings similar to those obtained on thought listings, and indicate that negative thoughts were highly and significantly correlated in the expected direction with all eight state and trait measures of problematic thinking, adjustment, and personality evaluated (r values all exceeded .40, with $p < .001$). As expected, Negative thought frequency was also closely and negatively related to a measure which evaluates a desirable attribute: Overall Thought Pleasantness, $r(443) = -.41$, $p < .001$. In fact, all eight correlations between Overall Thought Pleasantness and measures of problematic thinking, personality, and adjustment were significant and negative, although the r values were lower.

The direction of correlations between SST:60+ Positive thought frequencies and scores on the various measures evaluating thinking, personality, and adjustment was *in the same direction* as correlations using Negative thoughts; the correlations with Positive thoughts were, however, all considerably lower, and many were nonsignificant.

Positive Thoughts: A Strategy to Combat Negatives?

The results on Positive thoughts suggested that people consciously think positive thoughts as a way to put themselves to sleep and to combat negative thinking. To verify this proposition, we first had to ascertain whether the significant correlations were an artifact of a heterogeneous sample. Examination of the relationships between Positive and Negative thoughts as well as between valenced thoughts and Sleep Behaviors in Good and in Poor Sleepers, separately, indicated that (1) Positive and Negative thought frequencies were significantly related to each other in both good sleepers, $r(152) = .36$, $p < .001$, and in poor sleepers, $r(122) = .23$, $p < .01$, as well as in the whole sample, $r(443) = .29$, $p < .001$, and (2) correlations between valenced thought frequencies and Sleep Behaviors for both good sleepers and poor sleepers all exceeded .40 ($p < .001$). These results suggest that the findings on Positive thoughts were not merely an artifact of a heterogeneous sample.

To further explore the possibility that positive thinking is a strategy to combat negative thoughts we also examined correlations with Sleep Behaviors Scale: 60+ subscale scores. As can be seen in Table IV, frequency of Positive thoughts was significantly related both to frequency of using an adaptive sleep strategy—engaging in relaxation such as listening to relaxing sounds—as well as to frequency of engaging in the maladaptive behaviors which comprises the Cognitive Arousal subscale (e.g., worrying). Finally, the relationship between Positive thought frequency and Overall Thought Pleasantness was not significant, and correlations between the Sleep Behaviors Scale: 60+ item which measures "Try to change thoughts" was significant both for Positive, $r(371) = .38$, $p < .001$, as well as Negative thoughts, $r(371) = .43$, $p < .001$.

Table IV. Relationships Between SST:60+ Scores and Scores on Measures of Thinking, Personality, Adjustment, and Behavior[a]

	Daytime				Nighttime								
	Personality		Adjustment			Pre-Sleep Arousal				Sleep Behaviors Scale: 60+			
		EPI	BSI										
	Penn. State Worry	Neuroticism	Anxiety	Depression	Tension Thermo-meter	Somatic	Cognitive	Anxious Self-Statements Questionnaire	Overall Thought Pleasantness	Active Behaviors	Medica-tion	Cognitive Arousal[b]	Relaxation[c]
Self-Statement Test: 60+													
SOM ratio	−.08	−.06	−.15	−.19[d]	−.37[e]	−.10	−.09	−.08	.38[e]	−.05	−.17[e]	−.32[e]	.10
Frequencies													
Negative	.49[e]	.46[e]	.41[e]	.40[e]	.54[e]	.41[e]	.49[e]	.49[e]	**−.41**[e]	.29[e]	.30[e]	**.62**[e]	**.20**[e]
Positive	.30[e]	.31[e]	.15	.10	.09	.22[d]	.32[e]	.32[e]	**.07**	.26[e]	.06	**.28**[e]	**.40**[e]
Frequencies—partial correlations													
Negative (controlling for Pos.)	.45[e]	.44[e]	.36[e]	.40[e]	.52[e]	.33[e]	.49[e]	.48[e]	**−.43**[e]	.24[e]	.30[e]	**.60**[e]	**.10**
Positive (controlling for Neg.)	.22[d]	.25[d]	.00	−.07	−.06	.09	.20[d]	.21[d]	**.21**[e]	.20[e]	−.01	**.16**[f]	**.38**[e]

[a]Bold face items highlight notable findings. Sample sizes vary from 98 to 445. SST: 60+ = Self-Statement Test: 60+; SOM ratio = States-of-Mind ratio; EPI = Eysenck Personality Inventory; BSI = Brief Symptom Inventory; Pos. = Positive; Neg. = Negative.
[b]The Cognitive Arousal subscale has been shown to be comprised of maladaptive sleep behaviors.
[c]The Relaxation subscale has been shown to be comprised of adaptive sleep behaviors.
[d]$p < .05$.
[e]$p < .001$.
[f]$p < .01$.

We also computed two series of partial correlations on valenced thoughts. In one series, the effects of Negative thoughts were partialed out, while in the second series the effects of Positive thoughts were partialed out. Results in Table IV indicate (1) only a minimal effect on the correlations with Negative thoughts when Positive thoughts were controlled for, and (2) generally similar but substantially lower correlations between Positive thoughts and scores on various measures of maladaptive thinking, personality, adjustment, and behavior. Moreover, the positive correlation between Positive thought frequency and Overall Thought Pleasantness became significant.

It was also possible that correlations between SST:60+ Positive and Negative thought frequencies and scores on the other measures were in the same direction because of social desirability response set or demand characteristics inherent in the assessment process. While data bearing directly on this issue were not obtained in the present study, two lines of evidence suggest that social desirability and demand characteristics were not responsible for the obtained results. First, we correlated scores on a crude measure of social desirability—the EPI Lie Scale—with SST:60+ scores. Results indicated that neither the correlation with Positive thoughts, $r(120) = -.09$, nor the correlation with Negative thoughts, $r(120) = .01$, was significant. Second, we administered a well-known social desirability scale (Crowne & Marlow, 1964), along with the Sleep Questionnaire, to a convenience sample of college students. Unpublished results indicated significant negative correlations between socially desirable responding and both Sleep Difficulty, $r(42) = -.38$, $p < .01$, as well as Sleep Distress, $r(42) = -.46$, $p < .01$. In addition, a nonsignificant one-way ANOVA indicated that good sleepers gave more socially desirable responses ($M = 13.0$) than either low-distress poor sleepers ($M = 9.0$) or high-distress poor sleepers ($M = 8.5$). While these results could be interpreted to mean that poor sleepers responded in a less socially desirable way than good sleepers, it should be noted that good sleepers differed from poor sleepers on only one kind of valenced thought—negative. On Positive thoughts, no significant difference was found. Had social desirability effects been operative, significant differences should have been evident on Positive thoughts as well. Thus, this line of investigation, too, suggests, that the correlational findings on Positive and Negative thoughts are not merely an artifact of response sets or demand characteristics.

Discriminant Validity

The Extraversion-Introversion scale of the EPI is included in this presentation solely for the purpose of providing discriminant validity data for the SST:60+. Unlike all other measures of personality and adjustment described in the present investigation, this personality characteristic does not measure poor adjustment and it does not discriminate older good and poor sleepers (Morgan, Healey, & Healey, 1989). Consistent with Morgan et al.'s findings, the three groups of participants in the present investigation also did not differ significantly on this personality measure, $F(2,99) = 1.57$, $p > .05$. Correlations in the present investigation showed little relationship (r values below .20) between Extraversion-Introversion and (1) sleep pa-

rameters, (2) all measures of personality, thinking, and adjustment evaluated, as well as (3) SST:60+ Positive thoughts, Negative thoughts, and SOM ratios. This was also the case for thought listing results in our previous investigation, and provided evidence of discriminant validity for the SST:60+ .

DISCUSSION

The data indicate good psychometric properties for the SST:60+ according to many of the criteria specified by Glass and Arnkoff (1994), indicating that this is a successful inventory measure of thinking during periods of nocturnal wakefulness in older adults.

The measure incorporates three factors: generalized positive thinking, generalized negative thinking, and sleep thoughts. The two valenced factors were the strongest, and corresponded to the two valenced subscales proposed for the scale. Internal consistency and temporal stability were high for both negative and positive scales as well as for SOM ratios. Since the content was derived from open-ended thought listings provided by a fairly large sample of older individuals, the test items were, presumably, representative of the domain of behavior to be assessed (content validity). Subscales also manifested good criterion-related, convergent, and discriminant validity, and scores showed significant differences between good sleepers and high- and low-distress poor sleepers (contrasted groups). Similarity of the results obtained using thought listings and the newly developed measure provided additional validation for the SST:60+ .

Negative Thoughts and the SOM Ratio Are Related to Poor Sleep and High Distress

The data indicated substantial and significant relationships between negative thought frequencies and *all* sleep variables evaluated. Correlations between sleep variables and the SOM ratio were also significant and in the expected direction, but the relationships were slightly weaker than for negative thoughts. These findings on negative thoughts and SOMs were stronger than those we reported for thought listings, where only some of the relationships were significant (Fichten et al., 1998). We attribute the present results to the superior properties of endorsement measures, in comparison with production measures such as thought listing.

Positive Thoughts Are Used to Combat Negatives

Findings on positive thoughts were not as clear-cut as on negatives. For example, the three groups of participants failed to differ on positive thoughts, and, with the single notable exception of Sleep Behaviors, correlations between positive thoughts and sleep parameters were uniformly low; this was consistent with results on thought listings in our previous investigation. In addition, positive and negative

frequencies on the SST:60+ were significantly and positively correlated; this is not typical for valenced self-statement measures (Fichten et al., 1988; Ingram & Wisnicki, 1988).

We believe that these curious results reflected the use of positive thoughts as a strategy to induce sleep and to combat troublesome negative thoughts. Several lines of evidence support this contention. First, participants who indicated that they tried to change their thoughts when having difficulty getting to sleep had many negative as well as positive thoughts. Second, correlations between total Sleep Behaviors, which provided an index of poor sleep, and *both* SST:60+ positive and negative thought frequencies were large and highly significant; this is similar to findings on thought listings. Consistent with this argument, correlations with state and trait measures of adjustment showed that positive and negative thoughts on the SST:60+ functioned in similar, rather than opposite ways. The frequency of positive thoughts was significantly related to both an adaptive sleep strategy—engaging in relaxing activities—as well as to maladaptive sleep behaviors such as worrying and working on personal problems during nocturnal awake times. Perhaps more important, the results showed that, while the frequency of negative thoughts was significantly related to overall thought *un*pleasantness, the frequency of positive thoughts was not related significantly to overall pleasantness.

Findings on partial correlations also supported the view that thinking positive thoughts is a strategy used to fight negative thinking. The results showed that when the effects of negative thoughts were partialed out, (1) correlations between positive thoughts and measures of poor a strategy used to fight negative thinking. The results showed that when the effects of negative thoughts were partialed out, (1) correlations between positive thoughts and measures of poor psychological adjustment became substantially lower, (2) the correlation with overall thought pleasantness became positive and significant, and (3) the correlations between valenced thoughts and adaptive and maladaptive sleep behaviors were rationalized, so that negative thought frequency was primarily related to maladaptive cognitive arousal, while positive thoughts were closely related to adaptive relaxation behaviors.

Use of the SST:60+ in Research and Practice

The ambiguous performance of positive thoughts on the SST:60+ was also consistent with the relatively weak performance and poor temporal stability of positive thoughts in the thought listing study, and provided further support for the notion that both negative thought frequencies and SOM ratios provide better indices of dysfunctional thinking during periods of nocturnal arousal than do positive thought frequencies. In this regard, the present results underscore the need to report both valenced thought frequencies as well as SOM ratios in investigations of sleep and cognition (cf. Amsel & Fichten, 1990, 1996).

While it appears that positive thinking may serve to buffer the impact of negatives, further research where positive and negative thoughts are manipulated rather than merely assessed should be conducted. In such research, it would be advisable to administer the SST:60+ first thing in the morning, when thoughts experienced

during the night may be more easily recalled. Moreover, additional data on the psychometric properties of the SST:60+ based on other, less well-educated samples is needed.

Nevertheless, the newly developed SST:60+ is likely to be helpful in evaluations of thinking during nocturnal awake times in older individuals. It is easy to use, reliable, and valid. It can both assess modifiable dysfunctional cognitions and monitor and evaluate the effects of various intervention efforts in research and treatment programs. For example, the measure could be administered at various times in the context of therapy in order to evaluate the effectiveness of the intervention and to explore the mediational links between cognitive, affective, physiological, perceptual, and behavioral events in the sleep/insomnia experience.

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