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Preliminary communication

Cognitive-behavioral therapy, light therapy, and their combination in treating seasonal affective disorder

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Abstract

Background: The need to develop supplementary or alternative treatments for seasonal affective disorder (SAD) is underscored by the significant minority (47%) of SAD patients that is refractory to light therapy, the persistence of residual symptoms despite light treatment, and poor long-term compliance with light use. Because preliminary studies suggest that cognitive and behavioral factors are involved in SAD, cognitive-behavioral therapy (CBT) warrants investigation as a possible treatment option. *Methods:* We piloted a 6-week randomized clinical trial to compare a standard light therapy protocol; a novel, SAD-tailored, group CBT intervention; and their combination in ameliorating and remitting a current SAD episode and as prophylaxis against episode recurrence. Depressive symptom severity and remission rates were assessed at post-treatment and at a 1-year follow-up visit to examine long-term treatment durability. *Results:* CBT, light therapy, and their combination all demonstrated significant reductions in depressive symptoms on two different outcome measures. Remission rates varied by measure, but did not reach statistical significance. During the subsequent winter, CBT, particularly in combination with light therapy, appeared to improve long-term outcome regarding symptom severity, remission rates, and relapse rates. No CBT-treated participant, with or without light, experienced a full SAD relapse compared to over 60% of those treated with light alone. *Limitations:* These results should be viewed as preliminary and are limited by the small sample size (n=23) and lack of a control group. *Conclusions:* The nearly half of SAD patients who do not remit with light alone may benefit from CBT as an adjunct or alternative treatment, especially as a prophylaxis against episode recurrence.
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Keywords: Seasonal affective disorder; Cognitive-behavioral therapy; Light therapy; Treatment durability

1. Introduction

Seasonal affective disorder (SAD) is a recurrent fall–winter depression with periods of remission in spring and summer (Rosenthal et al., 1984). Light therapy, involving daily exposure to bright light during the symptomatic months, is the current 'gold standard' for SAD treatment. A pooled analysis concluded that 53.3% of individuals with SAD overall, and only 43% of those with moderate to severe SAD demonstrated clinically significant improvement in depressive symptoms with light treat-

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ment (Terman et al., 1989). Therefore, a significant minority of SAD individuals does not remit with light therapy, especially those with more severe symptoms and those who experience more typical depressive features (Terman et al., 1996). Moreover, a recent study contrasting the degree of improvement with light therapy with spontaneous remission status in the summer revealed residual symptoms with light treatment (Postolache et al., 1998). Light therapy requires a considerable daily time commitment from the patient during the symptomatic months, contributing to a 59% discontinuation rate after the research protocol (Schwartz et al., 1996). For all of these reasons, the development of supplementary and/or alternative treatments is warranted.

Extensive literature documents the efficacy of cognitive-behavioral therapy (CBT; Beck et al., 1979) for nonseasonal major depression (e.g. DeRubeis et al., 1999; Dobson, 1989; Gloaguen et al., 1998; USDHHS, 1993). Although SAD, like major depressive disorder, has important biological underpinnings (e.g. Wehr et al., 2001), preliminary studies suggest that cognitive and behavioral factors may be involved in SAD, including automatic thoughts, dysfunctional attitudes, behavioral withdrawal, low rates of positive reinforcement, and rumination (Azam and Young, 1998; Hodges and Marks, 1998; Rohan et al., 2003). Therefore, CBT, which effectively targets these cognitions and behaviors, may be an appropriate additional treatment option for SAD. One small study found that group cognitive or group behavioral therapy significantly improved SAD symptoms relative to a wait list-control (Sigmon et al., 2000). However, the efficacy of a full CBT package (i.e. restructuring cognitions and behavioral activation), the comparative efficacy of CBT and light therapy, and the potentially additive benefits of combining CBT and light remain unknown.

Importantly, the benefits of CBT appear to extend beyond the point of termination. Patients treated with CBT demonstrate a reduced risk for major depressive episode relapse relative to pharmacotherapy or clinical management (Blackburn et al., 1986; Fava et al., 1998; Paykel et al., 1999). This treatment 'durability' has been attributed to active use of skills learned in CBT to alleviate residual and subsequent depressive symptoms, although studies have not directly tested this assumption. Given that SAD has a predictable winter depressive episode recurrence and spring remission (Graw et al., 1997; Leonhardt et al., 1994; Sakamoto et al., 1995), treatments that function as prophylaxis against subsequent episodes would be highly beneficial. To date, the only preventive research for SAD has implemented light therapy in the autumn prior to relapse (e.g. Meesters et al., 1994; Partonen and Lönnqvist, 1996).

The purpose of this study was to provide preliminary data on a novel, SAD-tailored cognitive-behavioral approach to treating SAD. To this end, we conducted a 6-week randomized pilot study comparing two single treatment modalities (i.e. light therapy and CBT) and their combined 'synergistic' effects in ameliorating and remitting a current SAD episode. We also examined the comparative durability of these treatments at a 1-year follow-up (i.e. during the subsequent winter). We hypothesized that CBT would be comparable in efficacy to light therapy and that their combination would confer additive benefits in both the short- and long-term.

Because the application of CBT to SAD has not been previously tested, we consider this line of study to be in the early pilot/feasibility testing stage necessary for developing new treatments (see Rounsaville and Carroll, 2001). To minimize risks to participants and to alleviate ethical problems inherent to this preliminary phase of investigation, standard of care or best available treatment controls are often selected over wait-list or no-treatment control groups (Kendall et al., 1999). Thus, we elected to use the best available treatment (i.e. light therapy) as the basis for comparing our new CBT intervention to determine whether more sophisticated, controlled comparisons with larger samples are warranted in future studies.

2. Methods

2.1. Participant recruitment

Adult community residents in the greater Washington, DC, metropolitan area (39° North) were recruited for this study via advertisements during fall 2000. Inclusion criteria for the study were: (a) DSM-IV criteria for major depression, recurrent,

with seasonal pattern on the Structured Clinical Interview for DSM-IV Axis I Disorders–Clinician Version (SCID-CV; First et al., 1995), and (b) a current winter SAD episode as assessed by the Structured Interview Guide for the Hamilton Rating Scale for Depression–Seasonal Affective Disorder Version (SIGH-SAD; Williams et al., 1992; see description of SIGH-SAD scoring criteria below). Exclusion criteria included: (a) current psychological or psychiatric treatment (i.e. psychotropic medications, psychotherapy, light therapy) or immediate plans to initiate such treatment, (b) presence of any other current Axis I disorder, (c) plans for major vacations or absences through March, and (d) bipolar-type SAD. Acknowledging the pilot nature of this study, we loosened our exclusionary criteria following initial recruitment efforts in order to increase sample size. We included a small sample that otherwise satisfied all study criteria, but was taking stable doses of antidepressant medications.

2.2. Measures

2.2.1. Structured Interview Guide for the Hamilton Rating Scale for Depression–Seasonal Affective Disorder version (SIGH-SAD)

The SIGH-SAD (Williams et al., 1992) is the most commonly used clinical assessment device for detecting changes in SAD symptom severity. It includes the 21-item Structured Interview Guide for the Hamilton Rating Scale for Depression (HAM-D) and a supplementary SAD subscale comprised of eight questions that assess atypical depressive features common in SAD such as hypersomnia and carbohydrate craving. Two trained raters, blind to treatment group assignment, administered the SIGH-SAD and obtained high inter-rater reliability (rs=0.93 at pre-treatment; 0.99 at post-treatment, and 0.99 at 1-year).

Based on accepted guidelines (Terman et al., 1990), the following criteria were used to define SAD episode onset and relapse: total SIGH-SAD score ≥ 20 + HAM-D score ≥ 10 + atypical score ≥ 5. The two possible ways to classify remission are (Terman et al., 1990): (1) pre- to post-treatment reduction in total SIGH-SAD score $\geq 50\%$ + HAM-D score ≤ 7 + atypical score ≤ 7, or (2) HAM-D score ≤ 2 + atypical score ≤ 10.

2.2.2. Beck Depression Inventory–Second Edition (BDI-II)

The BDI-II (Beck et al., 1996) is a widely used 21-item self-report measure of depressive symptom severity with high test–retest reliability and convergent validity (Beck et al., 1996). The BDI has been used to estimate remission rates subsequent to treatment (e.g. Gortner et al., 1998). Consistent with this approach, remission was defined as a BDI-II score ≤ 8.

2.2.3. Pre-treatment survey

At pre-treatment, participants were given a brief survey to assess their expectations for the study. Specifically, participants were asked (1) to rank-order the three treatments under study in expected efficacy from 1 (‘most effective’) to 3 (‘least effective’), (2) to rate the expected efficacy of the treatments on a 1 (‘not at all effective’) to 10 (‘very effective’) scale, and (3) to rank-order the treatments in order of personal preference from 1 (‘most preferred’) to 3 (‘least preferred’) treatment option.

2.2.4. 1-Year follow-up survey

At the 1-year follow-up visit, participants were surveyed about their SAD-management behaviors over the past year. Items assessing cognitive and behavioral strategies included: ‘thinking positively’, ‘increasing my activity level (doing things I enjoy)’, ‘socializing with other people’, ‘being more aware of my SAD symptoms’, and ‘exercising’. Strategies consistent with a light therapy approach included: ‘using a light box’, ‘going outside’, ‘making my home brighter’, ‘going South on a trip/vacation’, and ‘keeping a regular sleep schedule’. Participants rated items on frequency (0 ‘almost never’, 1 ‘sometimes’, 2 ‘often’, 3 ‘almost always’) and helpfulness (0 ‘completely unhelpful’, 1 ‘slightly helpful’, 2 ‘moderately helpful’, 3 ‘very helpful’). The survey also asked yes/no questions about ongoing use of light therapy, participation in psychotherapy, and use of antidepressant medications.

2.3. Treatment protocols

2.3.1. Cognitive-behavioral therapy (CBT)

CBT was conducted in group format for 1.5-h sessions twice a week over 6 weeks (total of 12 sessions)

with four to six participants per group. Although CBT is typically administered for 12–20 sessions (Ilardi and Craighead, 1994), SAD necessitates an intensified version because SAD patients may spontaneously remit with the arrival of spring if CBT were conducted weekly over 20 weeks.

We tailored traditional CBT to address the special needs of the SAD population in developing and manualizing our 'Coping with the Seasons' protocol. The protocol addressed the role of environmental changes as well as cognitions and behavior in symptom onset and maintenance. Through the traditional CBT elements of behavioral activation and cognitive restructuring, our CBT focused on improved coping with the winter season. Some cognitive restructuring focused on challenging negative thoughts related to the winter season, weather conditions, and lack of light. A relapse-prevention component addressed early identification of negative anticipatory thoughts about winter and SAD-related behavior changes, how to use the skills learned to cope with subsequent winter seasons, and development of a personalized relapse-prevention plan. The first author, a licensed psychologist, served as the primary therapist with a clinical psychology practicum student as co-therapist.

2.3.2. Light therapy (LT)

LT was administered according to the NIMH Biological Rhythms Section's standard treatment protocol (Holly Low, personal communication). Specifically, LT participants used the 10,000 lux standard light box in their homes in 45-min doses, twice daily: once between 06:00 and 09:00 h and again between 18:00 and 21:00 h. Participants recorded their light use with diary forms. Although therapeutic response typically occurs within 2 weeks of initiating light therapy (Labbate et al., 1995), the LT protocol in this study was maintained and monitored for 6 weeks to match the duration of the CBT.

2.3.3. Cognitive behavioral therapy and light therapy (CBT+ LT)

CBT + LT participants received all elements of both the LT and CBT protocols (i.e. daily light exposure and twice-weekly group CBT simultaneously for 6 weeks).

2.4. Screening procedures

We reviewed 265 phone responses to media advertisements. Of these, 164 were contacted and agreed to undergo a phone screen to assess the exclusion criteria and history of SAD. Those who did not meet the study criteria and/or did not want to volunteer received a mental health referral list. The 43 individuals who satisfied phone screening criteria and expressed interest in volunteering were invited to the laboratory to review the informed consent document. All but one individual consented to the study procedures and was subsequently interviewed using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-CV; First et al., 1995). Individuals who met DSM-IV criteria for major depression, recurrent, with seasonal pattern (n=28) were interviewed with bi-weekly SIGH-SADs to monitor for onset of a current SAD episode. This strategy was necessary because individuals differ in the timing of episode onset. Individuals who went on to meet SIGH-SAD criteria for a current SAD episode (n=26) were then actively enrolled in the study.

2.5. Study procedures

After meeting SIGH-SAD criteria for a current SAD episode, participants completed the BDI-II and pre-treatment expectations survey and were subsequently randomized to a treatment group. Treatment protocols were initiated between the first week of December 2000 and the fourth week of January 2001 and completed between the second week of January and the first week of March 2001. Following the 6-week treatment phase, the SIGH-SAD and BDI-II were re-administered.

Participants who completed the trial were invited to attend a follow-up visit during the winter subsequent to treatment completion. Those who agreed to return reviewed and signed an informed consent document and completed the SIGH-SAD, BDI-II, and 1-year follow-up survey. The follow-ups occurred between the second week of January and the fourth week of March 2002. Participants were paid $20 for attending the pre-treatment visit, $40 for the post-treatment assessment, and $50 for the 1-year follow-up. The Institutional Review Board at the Uniformed Services University approved this study.

2.6. Data analytic strategy

Consistent with prior SAD treatment research (Terman et al., 1990), two analytic approaches were used. The first (i.e. low threshold) approach involves examining statistically significant differences in pre- to post-treatment symptom severity scores. To this end, a 3 (treatment group: CBT, LT, CBT + LT) × 2 (measurement occasion: pre-treatment, post-treatment) repeated measures analysis of variance (ANOVA) was conducted on SIGH-SAD and BDI-II scores. The second (i.e. high threshold) method uses a chi-square analysis to compare the proportion of participants achieving complete symptom remission on the SIGH-SAD and BDI-II. Similar analyses were conducted on the 1-year follow-up data.

3. Results

3.1. Post-treatment results

3.1.1. Participant characteristics and attrition

Two participants, both randomized to the CBT group, dropped out of the study immediately upon group assignment. One other participant in the CBT + LT group was lost to follow-up during treatment. The final sample of 23 completers (seven CBT, nine LT, seven CBT + LT) was predominantly female (91.3%), Caucasian (87.0%), middle-aged (mean=50.5 years; S.D.=12.6), married (66.7%), college-educated (72.2%), and currently employed (69.6%). Three were taking stable doses of antidepressant medication, assigned one to each treatment group. The three treatment groups did not significantly differ on depression severity before treatment initiation on either the SIGH-SAD or BDI-II (see Figs. 1 and 2).

3.1.2. Participant expectancies and preferences

On the pre-treatment survey, participant expectations regarding treatment effectiveness and preferences were revealed. The majority of participants (69.6%) expected CBT + LT to be the most effective treatment option followed by LT (26.1%) and CBT (4.3%). A greater proportion of participants rated CBT + LT as the most effective treatment than as second or third in effectiveness, $\chi^2(2, N=23)=13.65$, $P=0.001$. Similarly, on Likert ratings of effectiveness, participants anticipated CBT + LT (mean=8.86, S.D.=0.77) to be more effective than LT (mean=7.18, S.D.=1.30), $t(21)=5.53$, or CBT (mean=5.57,

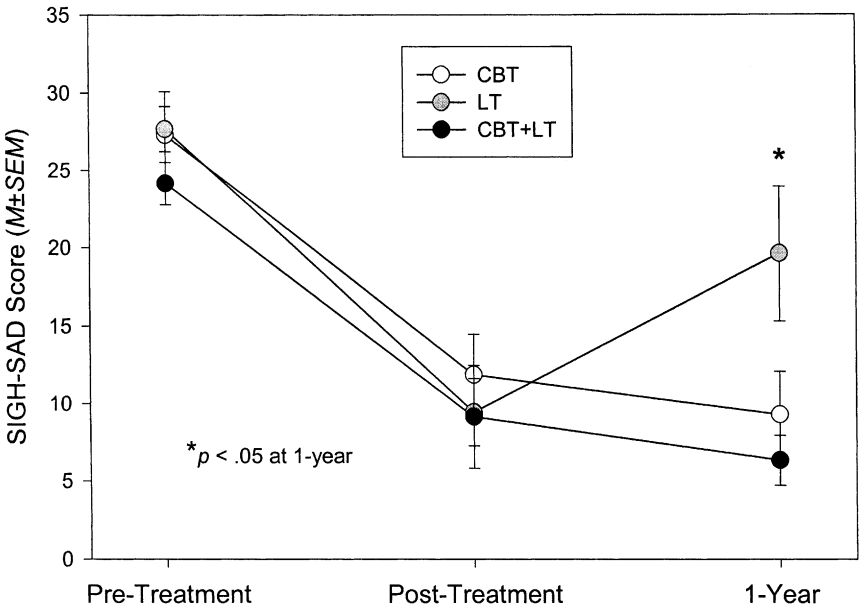

Fig. 1. SIGH-SAD scores across occasions.

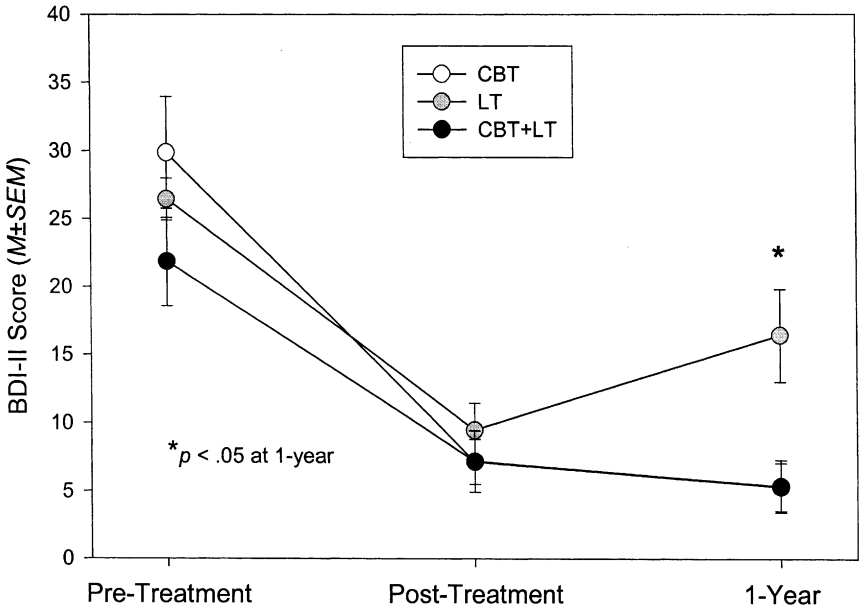

Fig. 2. BDI-II scores across occasions.

S.D.=1.59), $t(22)=9.64$, both Ps<0.001. In addition, LT was rated as more effective than CBT, $t(22)=3.81$, $P<0.001$. The majority of participants ranked CBT + LT (56.5%) as their most preferred treatment option followed by LT (43.5%) and CBT (4.3%). Again, CBT + LT was ranked more frequently as the most desirable intervention than as second or third in preference, $\chi^2(2, N=23)=9.74$, $P=0.008$.

3.1.3. Symptom improvement and remission rates

An ANOVA on SIGH-SAD scores revealed a significant occasion main effect, $F(1,20)=74.13$, $P<0.001$, $\eta^2=0.788$ (see Fig. 1). Similarly, with BDI-II scores as the dependent measure, an ANOVA revealed a significant occasion main effect, $F(1,19)$[1]$=82.72$, $P<0.001$, $\eta^2=0.813$ (see Fig. 2). On both measures, participants, in general, improved over the course of all three treatments, group-×occasion, ns. The same pattern of results was obtained when the HAM-D and atypical subscale scores were analyzed separately.

Based on SIGH-SAD criteria, the CBT + LT demonstrated the highest remission rate. Using BDI-II criteria, a greater percentage of CBT-treated participants were classified as remitted than those treated with CBT + LT or LT. However, remission results did not reach significance (see Table 1).

3.2. 1-Year follow-up results

3.2.1. Attrition

Of this sample, 21 (seven CBT, eight LT, six CBT + LT) attended the 1-year follow-up evaluation during January or February 2002. The remaining two participants (one LT, one CBT + LT, both female) were contacted, but declined to participate.

3.2.2. Symptom severity, relapse rates, and remission rates

Follow-up SIGH-SAD scores differed across the treatment groups, $F(2,18)=4.39$, $P=0.028$, $\eta^2=0.328$, indicating that CBT + LT had lower SIGH-SAD scores than LT, $P<0.05$. CBT demonstrated a trend towards lower SIGH-SAD scores than LT, $P<0.08$ (see Fig. 1). HAM-D and atypical subscale score results demonstrated the same pattern. Follow-up BDI-II scores also differed by group, $F(2,18)=6.10$, $P=0.009$, $\eta^2=0.404$,

[1] Note: one CBT+LT participant failed to complete the BDI-II at post-treatment.

Table 1
Remission rates at post-treatment and at 1-year follow-up

	SIGH-SAD	
Occasion	No. remitted/*n*	Remission rate (%)
Post-treatment[a]		
CBT	3/7	42.86
LT	5/9	55.55
CBT+LT	5/7	71.43
1-year[b]		
CBT	3/7	42.86
LT	3/8	37.50
CBT+LT	5/6	83.33
	BDI-II	
Occasion	No. remitted/*n*	Remission rate (%)
Post-treatment[c]		
CBT	5/7	71.43
LT	3/9	33.33
CBT+LT	3/6	50.00
1-year[d]		
CBT	4/7	57.14
LT	2/8	25.00
CBT+LT	4/6	66.67

[a] $\chi^2(2, N=23)=1.17$, ns.
[b] $\chi^2(2, N=21)=3.27$, ns.
[c] $\chi^2(2, N=22)=2.29$, ns.
[d] $\chi^2(2, N=21)=2.77$, ns.

whereby CBT- and CBT + LT-treated participants had lower BDI-II scores than those treated with LT, *P*s<0.05 (see Fig. 2).

In terms of relapse prevention, no CBT-treated participant, with or without light, met SIGH-SAD criteria for a relapse at the follow-up visit relative to 62.5% of light-treated participants who relapsed. These proportions were significantly different (see Table 2). At follow-up, CBT + LT had the highest remission rate using both SIGH-SAD and BDI-II criteria, but the difference was ns (see Table 1).

3.2.3. SAD-management behaviors

Because significant differences between treatments were revealed at the follow-up, between-group differences in SAD-management behaviors were examined to explore potential reasons behind these discrepancies (see Table 3). Given the small sample, group main effects with medium effect sizes (≥0.25; Cohen, 1988) were considered meaningful. Group main effects were revealed for frequency of positive thinking, socializing frequency, perceived helpfulness of socializing, and frequency of going South. These group main effects were followed with Tukey's pairwise comparisons with *P* set at 0.05. CBT + LT participants scored higher on all these factors relative to LT participants, and the CBT group reported more frequent socializing than the LT group. Two participants (both treated with CBT + LT) reported continued use of light at follow-up, but only one reported an adequate dose. Five participants (two CBT, two LT, one CBT + LT) reported some involvement in psychotherapy, and six (three LT, two CBT + LT, one CBT) reported use of antidepressant medications, primarily selective serotonin reuptake inhibitors (SSRIs).

4. Discussion

To our knowledge, this is the first published study to apply a cognitive-behavioral intervention to SAD. These preliminary findings suggest promise for the utility of cognitive-behavioral therapy (CBT) in the treatment of SAD, particularly as an adjunct to light therapy. CBT alone, light therapy alone, and the combination of CBT and light all significantly improved symptoms across the 6-week trial. This pattern of results was obtained across two different measures of depressive symptoms—the Beck Depression Inventory–Second Edition (BDI-II) and Structured Interview Guide for the Hamilton Depression Rating Scale–SAD Version (SIGH-SAD), thereby increasing the likelihood these results are not specific to a particular measure.

At post-treatment, remission rates varied depending on outcome measure, although results did not reach statistical significance. When SIGH-SAD remission criteria were used, the role of CBT as an adjunct to light therapy appeared especially encouraging. In a possible synergistic effect, these two treatments together demonstrated the highest remission rate following treatment. In contrast, when remission was defined using BDI-II scores, CBT alone

Table 2
Relapse rates at 1-year follow-up

Treatment group	No. relapsed/*n*	Relapse rate (%)
CBT	0/7	0%
LT	5/8	62.50%
CBT+LT	0/6	0%

$\chi^2(2, N=21)=10.66$, $P=0.005$.

Table 3
SAD-management behaviors at 1-year follow-up

Specific strategies	CBT	LT	CBT+LT	$F(2,18)$	P	η^2	Post hocs
Consistent with CBT approach							
Thinking positively							
Frequency, mean (S.E.M.)	1.71 (0.29)	1.38 (0.18)	2.17 (0.14)	3.15	0.067	0.259	CBT+LT > LT
Helpfulness, mean (S.E.M.)	2.71 (0.18)	2.25 (0.31)	2.67 (0.33)	0.86	0.441	0.087	–
Increasing my activity level							
Frequency	1.86 (0.26)	1.50 (0.38)	2.17 (0.31)	1.02	0.381	0.102	–
Helpfulness	2.43 (0.37)	2.50 (0.19)	2.83 (0.17)	0.63	0.546	0.065	–
Socializing with other people							
Frequency	1.57 (0.53)	0.88 (0.23)	2.00 (0.43)	3.87	0.040	0.301	CBT, CBT+LT > LT
Helpfulness	2.14 (0.34)	1.63 (0.26)	2.83 (0.41)	4.71	0.023	0.344	CBT+LT > LT
Being more aware of my SAD symptoms							
Frequency	2.00 (0.31)	2.00 (0.33)	2.50 (0.34)	0.71	0.503	0.074	–
Helpfulness	2.00 (0.49)	1.75 (0.41)	2.67 (0.21)	1.29	0.301	0.125	–
Exercising							
Frequency	1.43 (0.37)	1.50 (0.33)	1.67 (0.49)	0.09	0.914	0.010	–
Helpfulness	2.25 (0.26)	2.63 (0.18)	2.50 (0.22)	1.32	0.293	0.127	–
Consistent with LT approach:							
Using a light box							
Frequency	–	–	0.83 (0.48)	2.11	0.150	0.190	–
Helpfulness	1.43 (0.53)	1.75 (0.25)	1.83 (0.22)	0.28	0.761	0.030	–
Going outside							
Frequency	2.00 (0.31)	1.88 (0.30)	2.33 (0.33)	0.55	0.587	0.057	–
Helpfulness	2.57 (0.20)	2.75 (0.16)	3.00 (0.00)	1.67	0.217	0.156	–
Making my home brighter							
Frequency	1.14 (0.40)	1.25 (0.31)	2.17 (0.31)	2.40	0.119	0.210	–
Helpfulness	2.14 (0.34)	1.75 (0.49)	2.83 (0.17)	1.90	0.179	0.174	–
Going South on a trip/vacation							
Frequency	0.71 (0.42)	0.38 (0.52)	1.67 (0.42)	3.65	0.047	0.288	CBT+LT > LT
Helpfulness	1.86 (0.51)	2.38 (0.74)	3.00 (0.00)	2.58	0.104	0.223	–
Keeping a regular sleep schedule							
Frequency	2.33 (0.33)	1.50 (0.33)	2.00 (0.37)	1.53	0.236	0.156	–
Helpfulness	2.86 (0.14)	2.13 (0.40)	2.67 (0.21)	1.77	0.199	0.164	–

Frequency of items was rated on a Likert scale: 0=almost never, 1=sometimes, 2=often, 3=almost always. Helpfulness was rated on a Likert scale: 0=completely unhelpful, 1=slightly helpful, 2=moderately helpful, 3=very helpful.

actually had a higher remission rate than the combined treatment or light therapy. This discrepancy in results was largely unexpected, but may be explained by differences between these measures. The SIGH-SAD places greater emphasis on the somatic symptoms of depression, especially the reverse vegetative symptoms, whereas the BDI-II encompasses the cognitive, behavioral, and affective features of depression.

Importantly, these preliminary findings suggest that CBT, alone or in combination with light therapy, may improve long-term outcome regarding symptom severity, relapse, and remission rates. In general, CBT-treated participants appeared to maintain or improve upon their initial treatment gains into the subsequent winter season. Most impressively, no CBT-treated participant, with or without adjunct light treatment, experienced a full relapse to a SAD episode at the 1-year follow-up compared to over 60% of participants treated with light alone. Despite the small sample, other significant differences between treatments emerged 1 year after treatment termination. Both the CBT + LT and CBT groups had significantly lower BDI-II scores than the LT group; and CBT + LT participants had significantly lower SIGH-SAD scores than LT participants. In addition, CBT + LT had the highest remission rate on both outcome measures, although this difference did not reach significance.

A few potential explanatory factors emerged behind these differences. The superiority of CBT + LT over LT 1-year later may be attributed to their more frequent

social activities, positive thinking, and trips South. CBT participants also reported more frequent socialization than LT participants at follow-up. These findings are consistent with studies in the nonseasonal depression literature documenting the long-term durability of cognitive-behavioral therapy (Blackburn et al., 1986; Fava et al., 1998; Paykel et al., 1999). Because light therapy requires a considerable time commitment from the patient and is associated with long-term noncompliance (Schwartz et al., 1996), CBT may be a more cost-effective way to treat SAD in the long run.

Our findings are consistent with recent models that attempt to integrate physiological and psychological vulnerability factors in explaining SAD onset and maintenance (Young, 1999). These results should not be interpreted as inconsistent with biological conceptualizations of SAD because, in prior studies, cognitive-behavioral approaches have been applicable to disorders with known biological underpinnings. For example, these results parallel the nonseasonal depression literature where CBT has demonstrated efficacy for even endogenous major depressive disorder (e.g. Thase et al., 1991).

Although promising, our results should be viewed as preliminary and are limited by the small sample size and lack of a control group. We cannot rule out the possibility that apparent treatment effects in all groups were due to the passage of time or regression to the mean. However, we doubt that to be the case because post-treatment remission rates for our best available treatment 'control' group (i.e. light therapy) match those from a large-scale meta-analysis, and the superiority of light therapy over no- or delayed-treatment and placebo light controls has been established (Terman et al., 1989).

With the optimal time of day for bright light administration remaining controversial in the field, our dual morning–evening administration of light therapy represents another possible weakness in our design. Terman et al.'s (1989) meta-analysis concluded that morning light therapy was superior to evening or mid-day light and that the dual exposure of morning plus evening light did not confer any significant benefits over morning alone. Two recent trials suggest that morning light may be more effective than evening light, but did not include a morning plus evening light therapy condition (Terman et al., 2001, 1998). One recent study that included a split-dose condition found that timing light administration in morning only, evening only, or split between morning and evening produced similar antidepressant effects at the end of the 5-week trial (Ruhrmann et al., 1998). Future comparisons of CBT and light therapy for SAD should consider using a morning only dose of light therapy.

In conclusion, the nearly half of SAD sufferers who do not remit with light alone may possibly benefit from CBT as a supplementary or alternative treatment, particularly for maximizing long-term outcome and preventing relapse. Because these early results warrant further exploration, we currently have a larger, sufficiently powered study underway. Our new trial will seek to replicate this method with the addition of a minimal-contact/delayed light therapy control group (i.e. light treatment following a 6-week waiting period) to help in ruling out alternate explanations for any observed treatment effects. In making this shift from pilot study to full clinical trial, we will determine with greater certainty whether CBT has a role in the treatment of SAD.

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