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The role of beliefs and attitudes about sleep in seasonal and nonseasonal mood disorder, and nondepressed controls

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Abstract

Background—Unhelpful sleep-related cognitions play an important role in insomnia and major depressive disorder, but their role in seasonal affective disorder has not yet been explored. Therefore, the purpose of this study was to determine if individuals with seasonal affective disorder (SAD) have sleep-related cognitions similar to those with primary insomnia, and those with insomnia related to comorbid nonseasonal depression.

Methods—Participants ($n=147$) completed the Dysfunctional Beliefs and Attitudes about Sleep 16-item scale (DBAS-16) and the Structured Interview Guide for the Hamilton Depression Rating Scale, Seasonal Affective Disorder Version (SIGH-SAD), which assesses self reported sleep problems including early, middle, or late insomnia, and hypersomnia in the previous week. All participants were assessed in winter, and during an episode for those with a depressive disorder.

Results—Individuals with SAD were more likely to report hypersomnia on the SIGH-SAD, as well as a combined presentation of hypersomnia and insomnia on the Pittsburgh Sleep Quality Index (PSQI). The SAD group reported DBAS-16 scores in the range associated with clinical sleep disturbance, and DBAS-16 scores were most strongly associated with reports of early insomnia, suggesting circadian misalignment.

Limitations—Limitations include the self-report nature of the SIGH-SAD instrument on which insomnia and hypersomnia reports were based.

Conclusions—Future work could employ sleep- or chronobiological-focused interventions to improve clinical response in SAD.

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Keywords

Seasonal affective disorder; hypersomnia; fatigue; sleep; depression

Introduction

Unhelpful beliefs and attitudes about sleep include rigidly-held beliefs and unrealistic expectations about sleep (Carney, et al., 2010). Such beliefs and attitudes are associated with disturbed sleep and insomnia (Morin et al., 1993; Carney and Edinger, 2006). Fortunately, cognitive behavioral therapy for insomnia (CBT-I) modifies the rigidity of sleep-related beliefs, while increasing sleep efficiency and reducing insomnia symptoms (Carney and Edinger, 2006). Individuals with mood disorders may have even higher rates of sleep-related beliefs than those with primary insomnia (i.e., not due to an underlying medical or psychiatric disorder; Carney et al., 2007), but it is not known whether individuals with seasonal affective disorder (SAD) endorse these beliefs as well. If individuals with SAD endorse unhelpful beliefs about sleep, this may have significant treatment implications. SAD involves a seasonally recurring pattern of major depressive episodes, usually in the fall or winter, followed by remission or change to mania or hypomania in spring or summer (Rosenthal et al., 1994). SAD is characterized by sleep disturbances, particularly a relatively high frequency of self-reported hypersomnia (Kaplan and Harvey, 2009; Harvey, 2011). It is unknown whether the sleep-related beliefs endorsed in nonseasonal depression, characterized by insomnia, and primary insomnia are also present in SAD.

The cognitive model of insomnia posits that certain beliefs about sleep cause increased arousal and cognitive attention to “sleep-related threats,” leading to or exacerbating sleep disruption (Harvey, 2002). If individuals with SAD reporting hypersomnia are spending more time asleep, then they may be less likely to share beliefs about sleep with individuals experiencing insomnia. However, reviews suggest that individuals reporting hypersomnia spend more time in bed, but not necessarily more time asleep (Kaplan and Harvey, 2009; Harvey, 2011). Also, others suggest that individuals with mood disorders may report hypersomnia as a reflection of fatigue, rather than actual increased total sleep time (Nofzinger et al., 1991). Hypersomnia may be a function of this same cognitive mechanism. Both those reporting insomnia and those reporting hypersomnia may wish for more sleep, may be vigilant for factors that could interfere with sleep, and may worry about the consequences of not getting enough sleep – all of which reflect unhelpful beliefs and attitudes about sleep. This study will examine the extent to which individuals with SAD endorse unhelpful beliefs and attitudes about sleep, and whether or not the endorsement of these beliefs is associated with insomnia or hypersomnia.

Sleep-related beliefs could be considered a vulnerability factor that persists after treatment for depression and could therefore increase risk for relapse in mood disorders (Carney et al., 2011). One study of individuals with co-occurring insomnia and depression found that levels of depression did not account for the high levels of unhelpful beliefs about sleep (Carney and Edinger, 2006). A follow-up study treating those with depression and insomnia found that a solely depression-focused cognitive-behavioral treatment did not change endorsement of maladaptive sleep-related beliefs (Carney et al., 2011). Therefore, unhelpful beliefs about sleep are thought to be unique, and not simply a subset of more general negative beliefs (Carney et al., 2011). If such beliefs are found in SAD, adjunctive treatment with CBT-I may be useful. However, given that individuals with SAD report both hypersomnia and insomnia, it must first be determined if unhelpful beliefs about sleep are unique to those reporting insomnia, or if they are also observed with hypersomnia.

We administered the 16-item Dysfunctional Beliefs and Attitudes about Sleep scale (DBAS-16; Morin et al., 2007), which consists of items from the original 30-item scale that have moderate means, sufficient variance to avoid a floor effect, good internal consistency, low missing-data rates, and are non-redundant (Morin et al., 2007). The DBAS-16 has been associated with clinically significant insomnia in multiple insomnia groups, and can distinguish these groups from good sleepers (Carney et al., 2010). Although some beliefs about sleep are specific to insomnia (i.e., “I am concerned that chronic insomnia may have serious consequences on my physical health.”), many items are compatible with hypersomnia (i.e., “Without an adequate night’s sleep, I can hardly function the next day.”).

Our first prediction is that individuals with SAD will have elevated DBAS-16 scores compared to controls, and similar levels compared to individuals with nonseasonal unipolar depression (MDD). Second, we predict that individuals reporting both insomnia and hypersomnia will have increased rates of unhelpful beliefs about sleep compared to those reporting neither hypersomnia nor insomnia. Third, we predict that self-reported hypersomnia will be associated with fatigue, as reports of hypersomnia may reflect a desire or wish for more sleep due to fatigue.

Methods

Participants

Participants were adults age 18-65 recruited through local media in Pittsburgh, Pennsylvania for a study on SAD. Individuals were encouraged to volunteer if they had a history of depression, either with or without a seasonal pattern, or in the case of controls, no history of depression. Participants completed their assessments during the fall or winter months. All study procedures were explained to participants prior to obtaining informed consent, and given an opportunity to ask questions. Individuals were adults with the capacity to consent, and were not members of special populations (i.e., prisoners). The University of Pittsburgh Institutional Review Board approved all study procedures prior to participant recruitment, and the research was conducted in accordance with the Helsinki Declaration as revised in 1989. As this was not a treatment study, the participants were informed that the benefits to participation did not include treatment. The following assessments were used to assess inclusion and exclusion criteria for the three diagnostic groups: SAD, MDD, and control.

SCID—The Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Patient Edition With Psychotic Screen was used to assess for a lifetime mood disorder diagnoses and to screen for comorbid Axis I disorders (SCID-I/P; First et al., 2002). Individuals in the MDD group were diagnosed with Major Depressive Disorder, whereas individuals in the SAD group were diagnosed with Major Depressive Disorder With Seasonal Pattern. Individuals in the control group were required to have no history of Major Depressive Episodes. Individuals with a substance induced mood disorder, psychotic disorders, or bipolar disorder were excluded.

SIGH-SAD—The Structured Interview Guide for the Hamilton Rating Scale for Depression—Seasonal Affective Disorder Version (SIGH-SAD) is the most commonly used clinical assessment for measuring changes in SAD symptoms in SAD research (Williams et al., 1992). The SIGH-SAD was used to determine whether or not individuals met criteria for a SAD episode during their winter assessment, and was administered by trained raters. Raters were blind to diagnostic group and included a Licensed Clinical Psychologist (KR), clinical psychology graduate students and undergraduate students who had undergone training to administer the SIGH-SAD in a standard and reliable manner. A second rater, also blind to diagnostic group, reviewed video of the SIGH-SAD interviews to determine inter-rater

reliability. For inclusion in the SAD group, individuals were required to meet previously established SIGH-SAD-based SAD episode criteria (Terman et al., 1990). Individuals in the control group were required to not meet the criteria for a current episode in the week prior to assessment, as well as having no history of depression on the SCID. Reports from specific items on the SIGH-SAD (Appendix A) were used to characterize type of sleep problem as only insomnia, only hypersomnia, insomnia and hypersomnia both, or neither insomnia nor hypersomnia. Total SIGH-SAD score was calculated excluding items for sleep, fatigue, and energy (see Appendix A. for specific item wording). Hamilton insomnia items (i.e., early, middle, and late insomnia) are reasonably well correlated with sleep diary data (Manber et al., 2005), although the hypersomnia item has not been tested in this manner. In addition, we used the SIGH-SAD because patients with SAD tend to report fatigue and atypical symptoms (Tam et al., 1997), so it is important to use a rating scale with the atypical symptom subscale such as the SIGH-SAD.

M-SPAQ—The Modified Seasonal Pattern Assessment Questionnaire (M-SPAQ) was used to measure the degree of individual variation in mood and behavior across the seasons (insert refs).¹⁶⁻¹⁷ Previously established criteria were used as inclusion criteria (Kasper et al., 1989). The global seasonality scale (GSS), an M-SPAQ subscale, is calculated by summing 6 self-reported items (i.e., sleep, appetite, mood, energy level, weight and social behavior), rated on a 5-point Likert scale ranging from 0-“no change”, to 4-“extremely marked change.” Inclusion criteria for the SAD Group were: (a) a GSS ≥ 11 , (b) reporting that seasonal changes pose at least a moderate problem, AND (c) reporting the SPAQ-defined winter mood pattern (i.e., report “feeling worst” during January and/or February, with or without other affected months, excluding July and August; Kasper et al., 1989). The control and MDD groups met the following criteria: (a) a GSS of 8 or 9, and reported no problems across the seasons OR (b) GSS ≥ 7 .

DBAS-16—The Dysfunctional Beliefs and Attitudes about Sleep scale (DBAS-16) is a sixteen-item scale of sleep-related beliefs and attitudes such as “One poor night's sleep will ruin the rest of the week” and “When I don't get proper amount of sleep on a given night, I need to catch up on the next day by napping or on the next night by sleeping longer (Morin et al., 2007).” Items are rated on a 10-point Likert scale from 0, (strongly disagree) to 10 (strongly agree). The total score is an average of ratings on each of the 16 items (Morin et al., 2007). The DBAS-16 has convergent validity with similar measures, and adequate construct validity (Morin et al., 2007).

PSQI—The Pittsburgh Sleep Quality Index (PSQI) is a self-report measure of sleep characteristics and quality (Buysse et al., 1989). It is a reliable and valid means to distinguish “good sleepers” from “poor sleepers” with high specificity (Buysse et al., 1989). The PSQI has been tested in a separate study for construct validity with a known groups analysis including individuals with a clinical diagnosis of primary hypersomnia, narcolepsy, or other hypersomnia ($N = 105$). The mean PSQI total in that hypersomnia group was 7.37 ($SD = 3.93$; Buysse, D.J., personal communication). PSQI scores in the hypersomnia group of that unpublished study were found to be significantly higher than those found in good sleepers and community residents ($p's < .05$), and significantly lower than the mean for individuals with depression and primary insomnia ($p's < .05$; Buysse, D.J., personal communication), indicating that the PSQI can distinguish individuals with hypersomnia from other groups.

Fatigue—The Chalder Fatigue Measure (CFM) was administered to a subset of 55 participants in the study (Chalder et al., 1993) after the present hypotheses about the role of fatigue and SAD were developed. The CFM measures the severity of physical and mental

fatigue (Chalder et al., 1993). Participants rate 11-items such as “Do you have problems with tiredness?” and “Are you lacking in energy?” as being better than usual = 0, no more than usual = 1, worse than usual = 2, or much worse than usual = 3 (Chalder et al., 1993). All items are summed for a total CFM score. Chalder et al. (1993) determined that the 11-item scale was both reliable and valid. Internal consistency measures were high, internal reliability was good, and ROC analysis determined that the CFM has high specificity as well as sensitivity for identifying cases with chronic fatigue (Chalder et al., 1993). In addition, good face validity and discriminant validity were found for the CFM (Chalder et al., 1993).

Statistical analysis—In this study, participants were grouped one of two ways, depending on the type of analysis. First, participants were grouped based on diagnosis (i.e., SAD, MDD, or controls with no history of depression). Second, the same participants were grouped based on their self-reported sleep problems on the SIGH-SAD (i.e., insomnia, hypersomnia, both, or neither). Individuals were able to report both hypersomnia and insomnia within the past week on the SIGH-SAD interview (See Appendix A for specific SIGH-SAD item wording). To test whether beliefs reflected in the DBAS-16 vary across diagnostic groups or groups defined by type of sleep problem we used a multivariate analysis of covariance, with age and gender included as covariates. To determine which self-reported symptoms-hypersomnia or insomnia- accounted for more variance in DBAS-16 scores, hierarchical regression was performed, and simple contrasts were calculated to compare the groups based on type of sleep problem reported. Scores on the three insomnia items and one hypersomnia item from the SIGH-SAD were entered after age, gender, and total SIGH-SAD score (although total SIGH-SAD score did not include the insomnia and hypersomnia items from the SIGH-SAD). The analysis was conducted once with all 147 participants, and once with 51 SAD participants. To test whether hypersomnia is a reflection of fatigue (CFM) in SAD, we performed a linear regression predicting self-reports of hypersomnia based on the SIGH-SAD interview.

Results

The total frequency of self-reported hypersomnia in our SAD group was 64.7% (including both individuals reporting hypersomnia only and those reporting both hypersomnia and insomnia) (Table 1). A total of 147 individuals completed the DBAS-16, and groups did not differ by age ($F(3,146) = 2.35, p = .08$) or gender ($X^2 = 4.04, p = .26$) (Table 2). Groups did differ significantly by average DBAS-16 score ($F(2,146) = 31.87, p < .001$, partial eta squared (η^2) = .31). Specific contrasts show that DBAS-16 scores in the SAD and MDD (p 's $< .001$) groups were significantly higher than in the nondepressed control group. Inter-rater reliability on the SIGH-SAD interviews was calculated and determined to be high ($r = .99$). The frequency of sleep problems reported on the SIGH-SAD (i.e., hypersomnia or insomnia) was significantly different across diagnostic groups, $X^2(6,146) = 60.33, p < .001$. Although individuals in the control group had no history of mood disorders as per inclusion criteria, only 55% reported neither hypersomnia nor insomnia on the SIGH-SAD. All individuals in the control group had a PSQI global score of 8 or below, indicating that the sleep problems in the control group were minimal. Although this value of 8 on the PSQI was not used in inclusion/exclusion criteria to define groups, it is mentioned here to characterize the sleep quality of the control group.

Self-Reported Insomnia vs. Hypersomnia

Groups based on type of sleep problem were significantly different on DBAS-16 scores ($F(3,146) = 11.15, p < .001, \eta^2 = .192$), and DBAS-16 scores were significantly higher in each of the three symptomatic groups when compared to the group reporting no sleep problems (Table 1). Specifically, groups reporting insomnia, hypersomnia, or both on the

SIGH-SAD had higher DBAS-16 scores when compared to the group reporting neither insomnia nor hypersomnia. Notably, 45% of the control group reported either insomnia or hypersomnia. This is expected due to the fact that our control group was not considered a “good sleeper” group, but rather a group of individuals with no history of depression.

Self-reported insomnia accounted for the most variance in DBAS-16 total scores after accounting for age, gender, and total SIGH-SAD score (Tables 3 & 4). Additionally, hypersomnia did not account for additional variance in DBAS-16 scores beyond the variance accounted for by insomnia. The magnitude of variance in DBAS-16 scores accounted for by early insomnia is large considering that the coefficients (β) ranged from .6 to .9 (Tables 3 & 4).

Sleep Quality

Diagnostic groups were significantly different on the PSQI global score ($F(5,146) = 21.04, p < .001, \eta^2 = .420$; see Table 5). We also found PSQI global scores differed by type of self-reported sleep problem ($F(5,146) = 14.25, p < .001, \eta^2 = .330$; Table 5). Sleep duration was significantly different by type of self-reported sleep problem ($F(146,5) = 4.69, p = .004, \eta^2 = .087$), but not significantly different by diagnostic group ($F(146,5) = .596, p = .619, \eta^2 = .012$). Time in Bed (TIB) was significantly different across diagnostic groups, $F(146,5) = 6.61, p < .001, \eta^2 = .119$, and significantly different based on type of sleep problem, $F(146,5) = 3.297, p = .022, \eta^2 = .063$. Sleep efficiency was significantly different between sleep-problem groups ($F(146,5) = 6.34, p < .001, \eta^2 = .115$) and diagnostic groups ($F(146,5) = 4.16, p = .007, \eta^2 = .078$). Individuals with insomnia reported significantly shorter total sleep time and lower sleep efficiency, and had lower PSQI global scores compared to individuals reporting only hypersomnia (p 's $< .001$), but reported similar time in bed. The group reporting both insomnia and hypersomnia had sleep duration, time in bed, and efficiency scores similar to the insomnia and hypersomnia groups, but had the highest PSQI global score, indicating that this group may experience the poorest sleep quality.

Hypersomnia and Fatigue

The 55 total individuals in our study who completed the CFM were in the SAD group ($n = 18, M = 4.94, SD = 3.00$), the MDD group ($n = 12, M = 2.92, SD = 3.23$) and never-depressed control group ($n = 25, M = 1.28, SD = 2.32$). There was a significant difference in CFM scores by diagnostic group ($F(54,2) = 9.58, p < .001, \eta^2 = .277$), and simple contrasts indicated that the SAD group had significantly higher CFM scores compared to controls ($p < .001$), but the nonseasonal MDD group was not significantly different from controls. After accounting for depression severity, the Chalder Fatigue Measure (CFM) accounted for significant variance in self-reported hypersomnia (Table 7). However, only 55 individuals in the sample completed the CFM, so this was only a preliminary test on a subsample of participants.

Discussion

Regarding our first hypothesis, we found that individuals with SAD are likely to report elevated rates of unhelpful beliefs about sleep compared to those with no history of depression. This indicates that individuals with SAD may benefit from interventions focused on altering such beliefs about sleep. In addition, individuals with insomnia, hypersomnia, and both insomnia and hypersomnia all have elevated unhelpful beliefs and attitudes about sleep compared to never-depressed controls, supporting our second hypothesis. Individuals with SAD, and those with both hypersomnia and insomnia, reported unhelpful beliefs about sleep at levels associated with clinically significant sleep disturbances (i.e., DBAS-16 $M > 3.8$; Carney et al., 2010). The fact that individuals reporting insomnia alone or hypersomnia

alone did not meet the 3.8 threshold on the DBAS reflects the fact that the insomnia and hypersomnia groups were defined by their self-reported sleep problems on the SIGH-SAD, rather than diagnosis of a sleep problem.

Regarding our third hypothesis, it appears that reports of early insomnia were most strongly associated with unhelpful beliefs about sleep in the total sample, as well as within the SAD group alone. Despite the fact that individuals reporting hypersomnia had significantly higher DBAS-16 scores compared to non-depressed controls, reports of hypersomnia were not associated with unhelpful beliefs about sleep once insomnia and depression severity were accounted for. One possible reason that hypersomnia might not have been strongly associated with DBAS-16 scores after accounting for insomnia could be that our SAD sample reported slightly lower rates of hypersomnia (64.7%) than reported in other studies on SAD (68-80%; Anderson et al., 1994; Tam et al., 1997), although these rates are not very different. Another reason that hypersomnia may not have been associated with DBAS-16 scores after accounting for insomnia is that initial insomnia and morning hypersomnia may be related in SAD (Lewy et al., 1986).

The combined insomnia and hypersomnia presentation was common in the SAD sample (47%), and was associated with a particularly high mean DBAS-16 score of 4.3, suggesting that this hypersomnia-and-insomnia group deserves further investigation. Although early insomnia is associated with arousal, it can also be consistent with a phase delay, which is thought to be common and perhaps etiologically significant in SAD (Lewy et al., 2006). Phase-delayed individuals may try to retire too early, thus leading to difficulty with sleep initiation. In response to a night of early insomnia, individuals may compensate by trying to sleep in, taking daytime naps, or retiring to bed early on subsequent nights (Wooten and Buysse, 1999; Bond and Wooten, 1996). Phase-delayed individuals may also want to sleep longer in the morning, leading to reports of morning hypersomnia. Morning hypersomnia might then precipitate early insomnia in following nights by reducing homeostatic sleep drive and further delaying circadian phase. An oscillation between nights of insomnia and nights of hypersomnia may then be established, and could explain the combined insomnia and hypersomnia presentation. Over time, this circadian rhythm sleep problem can lead to more “classic” psychophysiological insomnia, as conditioned arousal develops. Given that early insomnia was found to be the most common type of insomnia, as well as the greatest predictor of variance in DBAS-16 scores (β s = .6 - .9), this theory could explain why reports of hypersomnia were not associated with DBAS-16 scores after accounting for early insomnia. Objective monitoring or actigraphy could be used to verify this hypothesis of the effects of phase delay on sleep patterns.

We found that self-reported hypersomnia was associated with reports of fatigue. This, plus the elevated DBAS-16 scores, suggests that these individuals have unhelpful beliefs about how much sleep they need, and may equate fatigue with a desire for more sleep than they are getting. These factors lead to the hypothesis that reported hypersomnia is actually due to a cognitive misperception of spending more time in bed to combat feelings of fatigue, or anhedonia, or as avoidance behavior (Kaplan and Harvey, 2009). Our data support this, as the hypersomnia and combined insomnia and hypersomnia groups reported greater time in bed compared to the insomnia group and the group reporting no sleep problems. Objective recordings of total sleep time and time in bed could be used to confirm that hypothesis.

Limitations

In our sample only 64.7% of SAD group members reported hypersomnia, with or without insomnia, which is at the low end of hypersomnia rates in SAD reported by others (68-80%; Kaplan and Harvey, 2009), but still high compared to the nonseasonal MDD group and the control group. This could be due to limitations of the measure of hypersomnia used in the

present study, which included only one item from the SIGH-SAD. In addition, our measurement of hypersomnia and insomnia was limited to self-report, so the construct measured here is an individuals' retrospective perception of their sleep duration, rather than prospectively or objectively-assessed longer sleep duration. Third, the measure of hypersomnia used in the present study included one item from the SIGH-SAD, which is likely to be less valid than the entire measure as a whole. It would be interesting to test the hypothesis that hypersomnia in SAD is a disorder of time in bed, rather than total sleep time (Kaplan and Harvey, 2009; Harvey, 2011), but with only self-reported total sleep time on the PSQI in this study, we were unable to do so. Future studies utilizing objective measures of sleep, such as sleep diaries and/or actigraphy, could be used to assess the hypothesis that hypersomnia in SAD is a disorder of time in bed, rather than total sleep time (Kaplan and Harvey, 2009; Harvey, 2011).

Conclusions and Future Directions

An index score of 3.8 on the DBAS-16 scale has been identified as a cut-off for clinically significant level of endorsement of unhelpful beliefs and attitudes about sleep (Carney et al., 2010). Because our SAD group had an average index score of 4.6 ($SD = 2.0$), treatments designed to target dysfunctional beliefs and attitudes about sleep may be beneficial as adjunctive treatment for those diagnosed with SAD. A 4-session CBT designed to address sleep disruptive beliefs and habits protocol versus a sleep hygiene education control therapy in patients with primary or comorbid insomnia was associated with significantly greater improvements in self-reported insomnia symptoms, sleep quality, and reduced maladaptive sleep beliefs as measured by the DBAS (Edinger et al., 2009). These findings suggest that CBT is an effective treatment for individuals with primary insomnia as well as those who have comorbid insomnia with non-psychotic psychiatric illnesses, a group similar to our SAD group. In a study of individuals with depression, adding CBT for insomnia to depression treatment improved both sleep and mood outcomes (Manber et al., 2008). Given the rates of unhelpful beliefs about sleep in this SAD population, perhaps adjunctive CBT focused on sleep would improve treatment in SAD.

It is not yet known, however, if CBT focused on sleep problems would help individuals reporting hypersomnia (but not also insomnia). Reports of hypersomnia in SAD may reflect one of two experiences, (1) individuals may have an increased total sleep time (TST), or (2) individuals may spend an increased amount of time in bed (TIB), but may not actually get more hours of sleep each day (Kaplan and Harvey, 2009). Individuals in the second case might report sleeping longer even if this is not the case due to impaired memory for brief awakenings (Wyatt et al., 1994). The motivation to spend more TIB could be to combat feelings of fatigue often seen in mood disorders (Kaplan and Harvey, 2009), which our data support. If individuals with SAD reporting hypersomnia are actually in the TIB category, then they may be more likely to benefit from increased sleep efficiency resulting from CBT for insomnia (Carney and Edinger, 2006). The SIGH-SAD hypersomnia item assesses increased sleep in the past month, so could hypothetically reflect changes within an episode with a greater than 1 month duration, or changes in sleep duration from baseline (see Appendix A for SIGH-SAD item wording). However, because individuals reporting hypersomnia on the SIGH-SAD also reported an average of 8 hours 48 minutes of sleep on the PSQI (Table 5), it appears that our SIGH-SAD-based reports of hypersomnia are consistent with self-reported sleep duration on the PSQI, although both are vulnerable to the limitations inherent to self-report measures of sleep. In fact, current depression level may have lead some in the sample to report hypersomnia when the actual experience is fatigue and increased TIB, but objective sleep data are necessary to answer that question.

Individuals with SAD have some of the same cognitive risk factors associated with nonseasonal depression such as dysfunctional attitudes, automatic negative thoughts, and rumination (Rohan et al., 2011). It is possible that sleep-related beliefs and other typical depressogenic beliefs have similar origins, although a recent study with individuals with depression and insomnia found that unhelpful beliefs about sleep did not improve with CBT for depression (Carney et al., 2011). If DBAS-16 scores are elevated during summer remission, it may be appropriate to interweave a targeted CBT for sleep to an existing CBT that has been specifically designed for SAD (Rohan et al., 2009). Similar interwoven treatments combining CBT for depression and insomnia are being tested (Harvey, 2011), and psychological treatments for hypersomnia are in development (Kaplan and Harvey, 2009).

Hypersomnia reports in SAD are higher in winter (Anderson et al., 1994), so it will be critical to determine whether DBAS-16 scores are also higher in winter, or rather if these beliefs are a trait-like variable that persists in the absence of SAD episodes during spring and summer. Given that hypersomnia is associated with the onset and recurrence of mood disorders (Kaplan and Harvey, 2009), understanding the causes behind hypersomnia may become useful in preventing depression. The seasonal recurrence of SAD allows for frequent and predictable measurement of during- and between-episode states that could help determine if unhelpful sleep-related cognitions contribute to reports of sleep disturbance, and if so, may identify sleep disrupting beliefs as an important treatment target in SAD.

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Appendix

Appendix A

Wording of the SIGH-SAD items assessing early, middle, and late insomnia, as well as hypersomnia, fatigue, and energy.

Item	Wording	Scoring
H6. Insomnia Early (Initial Insomnia).	I'd like to ask you now about your sleeping during the past week. Have you had any trouble falling asleep at the beginning of the night? Right after you go to bed, how long has it been taking you to fall asleep? How many nights this week have you had trouble falling asleep?	0 = no difficulty falling asleep 1 = complains of occasional difficulty (i.e., more than ½ hour) falling asleep 2 = complains of nightly difficulty falling asleep.
H7. Insomnia Middle.	During the past week, have you been waking up in the middle of the night? IF YES: Do you get out of bed? What do you do? (Only go to the bathroom?) When you get back in bed, are you able to fall right back asleep? Have you felt your sleeping has been restless or disturbed some nights?	0 = no difficulty 1 = complains of being restless and disturbed during the night 2 = waking during the night – any getting out of bed (except to void)
H8. Insomnia Late (Terminal Insomnia).	What time have you been waking up in the morning for the last time, this past week? IF EARLY: Is that with an alarm clock or do you just wake yourself up? What time do you usually wake up (that is, when you feel well)?	0 = no difficulty 1 = waking in the early hours of morning but goes back to sleep 2 = unable to fall asleep again if gets out of bed
A6. Hypersomnia. Note: Compare sleep length to	Have you been sleeping more than usual this past month? IF YES: How much more? IF NO: What about weekends? (What time have	0 = no increase in sleep length 1 = at least 1 hour increase in sleep length

Item	Wording	Scoring
euthymic, and NOT to hypomanic sleep length.	you been falling asleep? Have you been taking naps? That means you've been sleeping about _____ hours a day all together? How much do you usually sleep when you feel well?)	2 = 2-hour increase 3 = 3-hour increase 4 = 4-hour increase
H9. Somatic Symptoms General.	How has your energy been this past week? IF LOW: Have you felt tired? (How much of the time? How bad has it been?) This week, have you had any aches or pains? (What about backaches, headaches, or muscle aches?) Have you felt any heaviness in your limbs, back, or head?	0 = none 1 = heaviness in limbs, back, or head. Backaches, headaches, muscle aches. Loss of energy and fatigability. 2 = any clear-cut symptom
A7. Fatigability (or low energy, or feelings of being heavy, leaden, weighed down).	How much of the time have you felt tired? (Every day? How much of each day?) Very tired, or just a little?	0 = does not feel more fatigued than usual 1 = feels more fatigued than usual but this has not impaired function significantly; less frequent than in (2) 2 = more fatigued than usual; at least one hour a day; at least three days a week 3 = fatigued much of the time most days 4 = fatigued almost all the time

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Table 1

Rates of sleep problems reported on the SIGH-SAD by diagnostic group (*n*, %).

Group	Insomnia Only	Hypersomnia Only	Both	Neither ^a	Total
SAD	17(33.3%)	9(17.6%)	24(47.1%)	1(2.0%)	51
MDD	7(43.8%)	2(12.5%)	7(43.8%)	0(0%)	16
Control	25(31.3%)	5(6.3%)	6(7.5%)	44(55.0%)	80
Total	49(33.3%)	16(10.9%)	37(25.2%)	45(30.6%)	147

^a Individuals in the Neither column reported neither insomnia nor hypersomnia during the SIGH-SAD interview.

Table 2

Demographic variables and DBAS-16 means and SD followed by comparisons between the SAD, S-SAD, and nonseasonal MDD groups with the control group (top). In the bottom half of the table, groups experiencing insomnia only, hypersomnia only, both, or neither are compared on DBAS-16 means.

				DBAS-16		^a Group contrasts	^b Mean Difference	^c 95% CI Mean Difference
Diagnostic Group	N	Age	% Female	M	SD	p	M	(lower – upper)
SAD	51	38.61	78.4	4.43	1.79	<.001 ***	1.91	(1.37-2.38)
MDD	16	35.56	56.2	4.46	1.46	<.001 ***	1.94	(1.15-2.68)
Control	80	32.80	72.5	2.52	1.05			
Total	147	35.50	73.9	3.38	1.63			

				DBAS-16		^a Group contrasts	Mean Difference	95% CI Mean Difference
Sleep Group	N	Age	% Female	M	SD	p	M	(lower – upper)
Insomnia	49	33.69	85.7	3.65	1.67	<.001 ***	1.35	(0.71-1.99)
Hypersomnia	16	31.56	62.5	3.30	1.34	.035 *	0.94	(0.07-1.82)
Both	37	39.89	75.7	4.32	1.83	<.001 ***	1.91	(1.23-2.60)
Neither	45	34.00	60.0	2.40	1.08			

^aSpecific group contrasts reflect the group in a given row compared to the control group in the top half of the table, and compared to the group reporting neither hypersomnia nor insomnia in the bottom half of the table.

^bMean Difference – Average difference between the group in a given row and the group reporting neither hypersomnia nor insomnia.

^c95% CI Mean Difference – 95% Confidence Interval for the Mean Difference between groups based on type of sleep problem reported.

^dSpecific group contrasts reflect the symptomatic groups (e.g., Insomnia Only) compared to the group reporting neither insomnia nor hypersomnia.

*
p < .05

p < .001

Table 3

Regression using scores on the SIGH-SAD hypersomnia and insomnia items to predict DBAS-16 scores, adjusted for age and gender and depression severity in the total sample ($N = 147$).

Total Sample ($N = 147$)				
Predictors	ΔR^2	β^a	95%CI(β)	p^c
Step 1	.023			.182
Age		.004	-.012-.021	.601
Gender		-.186	-.672-.300	.451
Step 2	.338			.000 ***
SIGH-SAD total ^b		.080	.043-.117	.000 ***
Step 3	.074			.001 **
Early insomnia		.608	.294-.922	.000 ***
Middle insomnia		.256	-.087-.600	.142
Late insomnia		.044	-.336-.423	.820
Step 4	.003			.410
Hypersomnia		.092	-.128-.312	.410

^a β is the unstandardized coefficient.

^b The SIGH-SAD total does not include the sleep, fatigue, and energy items, included to control for severity of depression symptoms.

^c The p value reported is the significance related to β , the unstandardized coefficient for a given value within a step, or the significance of the F Change for the entire step as one block.

**
 $p < .01$.

 $p < .001$.

Regression using scores on the SIGH-SAD hypersomnia and insomnia items to predict DBAS-16 scores, adjusted for age and gender and depression severity in the SAD group only ($n = 51$).

Table 4

SAD group only ($n = 51$)				
Predictors	ΔR^2	β^a	95%CI(β)	p^c
Step 1	.028			.507
Age		-.010	-.046-.028	.590
Gender		.327	-.897-1.551	.593
Step 2	.034			.200
SIGH-SAD total ^b		.047	-.050-.138	.394
Step 3	.171			.030 [*]
Early insomnia		.903	.260-1.545	.007 ^{**}
Middle insomnia		.132	-.505-.768	.679
Late insomnia		-.207	-.835-.421	.509
Step 4	.002			.744
Hypersomnia		.068	-.350-.487	.744

^a β is the unstandardized coefficient.

^b The SIGH-SAD total does not include the sleep, fatigue, and energy items, included to control for severity of depression symptoms.

^c The p value reported is the significance related to β , the unstandardized coefficient for a given value within a step, or the significance of the F Change for the entire step as one block.

^{*} $p < .05$.

^{**} $p < .01$.

Table 5

Sleep Quality by group and type of self-reported sleep problem based on the PSQI responses. Values expressed as *h:mm* or percent (%).

Diagnostic Group	PSQI Global			Sleep Duration ^a			TIB ^b			Sleep Efficiency (%) ^c		
	N	M	SD	M	SD	M	M	SD	M	M	SD	SD
SAD	51	7.63	3.36	7:41	2:02	8:45	1:34	87.8%	16.7%			
MDD	16	7.13	3.30	7:34	1:55	8:42	1:22	86.9%	16.6%			
Control	80	2.93	1.83	7:28	0:56	7:52	0:59	95.6%	9.5%			
Total	147	5.14	3.34	7:31	1:33	8:14	1:22	91.7%	13.4%			

Sleep Group	PSQI Total			Sleep Duration			TIB			Sleep Efficiency (%)		
	N	M	SD	M	SD	M	M	SD	M	M	SD	SD
Insomnia Only	49	6.28	3.81	7:08	1:14	8:20	1:04	86.1%	13.6%			
Hypersomnia Only	16	3.47	1.36	8:48	1:43	8:55	1:42	98.9%	8.9%			
Both	37	7.11	3.03	7:49	1:59	8:32	2:02	92.0%	18.4%			
Neither	45	2.38	1.44	7:23	0:55	7:43	0:58	95.9%	6.9%			

^aSleep Duration - self-reported estimate of actual sleep duration over the past month.

^bTIB - Time in Bed - Duration between bed time and getting out of bed time.

^cSleep Efficiency - Number of hours slept divided by time in bed.

Table 6

Regression using depression severity, DBAS-16, and fatigue measures to predict hypersomnia reported during the SIGH-SAD, adjusted for age and gender in a subsample that completed the Chalder Fatigue Measure (CFM; $n = 55$).

Block	Predictor	ΔR^2	β^a	95%CI(β)	p^c
Step 1		.015			.633
	Age		.009	-.010-.029	.346
	Gender		-.092	-.716-.533	.770
Step 2		.082			.039*
	SIGH-SAD total ^b		-.010	-.059-.040	.698
Step 3		.095			.361
	DBAS-16		.125	-.083-.333	.234
Step 4		.211			.005**
	CFM ^d		.154	.049-.258	.005**

^a β is the unstandardized coefficient.

^b The SIGH-SAD total includes all items except the four sleep items and two questions about fatigue and energy.

^c The p value reported is the significance related to β , the unstandardized coefficient for a given value within a step, or the significance of the F Change for the entire step as one block.

^d CFM – Chalder Fatigue Measure.

* $p < .05$.

** $p < .01$.