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Assessing Pre-sleep Experiences in a Population of Depressed and Non-depressed College Students

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Abstract

A common symptom of depression is insomnia – yet it remains unclear why those with depression report difficulty sleeping and little is known about the pre-sleep experiences of those who are depressed. The aim of this paper is to compare pre-sleep experiences in people with and without depression on eight different types of sleep-disturbing experiences that people often have when they lie awake during the night. Eighty-seven undergraduate college participants including 34 with depression and 53 without depression completed daily surveys for 14 days on these pre-sleep experiences. Results indicated that those with depression reported significantly higher scores on thinking too much ($t(78) = -1.91$, $p < .05$), worrying and dwelling on concerns ($t(78) = -2.28$, $p < .05$), unpleasant emotions/not comfortable emotionally ($t(78) = -2.37$, $p < .05$), visual imagery ("pictures in your mind") interfered with sleep ($t(78) = -1.40$, $p < .05$), wakening from a dream led to losing sleep ($t(78) = -1.53$, $p < .05$), and feeling at least partly awake (and partly asleep) during parts of the night ($t(780 = -1.51$, $p < .05$). These findings suggest that insomnia/sleep difficulty in those with depression is associated with emotional and cognitive disturbances prior to the onset of sleep.

Executive Summary

Major depressive disorder (MDD) is a psychiatric disorder characterized by the occurrence of a major depressive episode at least twice in a lifetime. Major depressive episodes present themselves with symptoms such as irritability, inability to feel pleasure, and inability to concentrate. Major depressive disorder also frequently coexists with insomnia, a disorder characterized by the inability to maintain and/or initiate sleep. The coexistence of insomnia and depression is problematic because insomnia may be a precursor for depression, the presence of insomnia symptoms predict depression relapse, and symptoms of insomnia frequently remain after successful treatment of depression. Thus, it is important to understand why people with MDD have symptoms of insomnia.

There are several theories about why depressed people experience poor sleep. One of these theories is that depressed people have high levels of the stress hormone, cortisol, and high levels of cortisol lead to alertness, which may impair sleep. Another theory is that depressed people often experience negative thinking such as worrying and dwelling on concerns and studies have found that people who worry and dwell on their concerns right before falling asleep exhibit behaviors of sleep instability. A third theory about why depressed people are often poor sleepers is because these people have negative thoughts before sleep, tend to wake up from sleep more often and consequently have trouble falling back asleep. Finally, it has been proposed that depressed people experience more negative emotions and in the evening and these emotions delay sleep.

This study investigated the pre-sleep experiences that undergraduate depressed and non-depressed college students have when they were trying to sleep. The threshold for determining

which participants were depressed was evaluated by The Patient Health Questionnaire-8, a questionnaire designed to access depression. The participants were sent an email every morning for 14 days which included a link to a survey where they reported details about their previous night's sleep. Participants were required to report their pre-sleep experiences by using the Sleep Interference Rating Scale (SIRS), a questionnaire designed to evaluate the pre-sleep experiences that interfere with a person's sleep while they lie awake at night. The SIRS consists of eight descriptors; SIRS 1 is *thinking too much, worrying and dwelling on concerns* (SIRS 2), *body at times was not physically ready for sleep* (SIRS 3), *unpleasant emotions/not comfortable emotionally* (SIRS 4), *environmental factors interfered with sleep* (SIRS 5), *visual imagery ("pictures in your mind")* (SIRS 6*), awakening from a dream led to losing sleep* (SIRS 7), *feeling at least partly awake (and partly asleep) during parts of the night* (SIRS 8). The participants rated their experiences with each factor on a scale from 0 to 10 where "0" meant that the experience did not occur at all, "1" meant that the experience occurred but did not affect sleep and "10" meant that the experience interfered with sleep very much. We conducted independent samples T-test to compare each SIRS variable in those with and without depression.

As anticipated, our results showed that depressed people were more likely to report thinking too much (SIRS 1), worrying and dwelling on concerns (SIRS 2), unpleasant emotions/not comfortable emotionally (SIRS 4), visual imagery ("pictures in your mind") interfered with sleep, wakening from a dream led to losing sleep (SIRS 7), and feeling partly awake (and partly asleep) during parts of the night than non-depressed participants. These results are consistent with theories about why depressed people have difficulty sleeping – they have high negative cognitive activity (dwelling on concerns and thinking too much) and high negative emotional activity (unpleasant emotions/not comfortable emotionally). This high negative mental

activity prior to sleep may have resulted in participants wakening from a dream and losing sleep (SIRS 7) as well as feeling partly awake (and partly asleep) during parts of the night.

The findings of this study may have implications for future health research on comorbid insomnia and depression. Our finding that people who are depressed are more likely to experience negative emotions or being emotionally uncomfortable has implications that in order to combat insomnia, depressed people must be taught techniques on how to balance their emotional state so that they do not have negative emotions prior to sleep. These techniques may also be useful because as we found in our study, depressed people tend to have more negative thoughts and dwell on their concerns before they attempt to initiate sleep. This high negative mental activity may be inducing stress and causing wakefulness which consequently leads to more frequent unintentional awakenings before a final wake time.

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Introduction

Major depressive disorder (MDD) is a mood disorder characterized by the recurrence of major depressive episodes at least twice in a lifetime (American Psychiatric Association, 2013). Symptoms of MDD include depressed mood or irritability which persists for most of the day, anhedonia, inability to concentrate, fatigue/loss of energy and sleep disturbances (American Psychiatric Association, 2013). Major depressive episode is a common mood disturbance in the U.S. population with a lifetime prevalence of 16% (Tsuno, Besset, & Ritchie, 2005), and is associated with numerous problematic outcomes such as low quality of life, which may impact careers as well as personal and social life (Skundberg-Kletthagen, Wangensteen. Hall-Lord, & Hedelin, 2014)

One of the well-known symptoms of depression is insomnia, which is characterized by difficulty initiating and/or maintaining sleep (American Psychiatric Association, 2013). Insomnia is a common sleep disorder, with a prevalence of 6.7% in the general United States population (National Institute of Mental Health, 2016). It is normal for those who suffer from MDD to have comorbid insomnia as 90% of patients with MDD complain about sleep difficulties (Tsuno, Besset & Ritchie, 2005).

It is crucial to understand why those with MDD report symptoms of insomnia. First, not only is insomnia a symptom of depression, but there is evidence to suggest that insomnia is also a potential cause of depression. Breslau, Roth, Rosenthal and Andreski (1996) found that the risk for major depressive disorder was more likely to increase in young adults with sleep disturbances in comparison to young adults without prior history of sleep disturbances. Anotherstudy that analyzed the comorbidity of insomnia and depression in over 1000 male medical students over the period of 34 years showed that the risk for developing clinical depression was doubled for

those who experienced insomnia during medical school than those who did not (Chang, Ford, Mead, Cooper-Patrick, & Klag, 1997). Second, other studies have shown that symptoms of depression are more likely to persist if the disorders are coexisting (Dombrovski , Cryanowski, Mulsant, Houck Buysse, Andreescu, Thase, Mallinger, & Frank, 2008. A study conducted by Pigeon, Hegel, Fan, Sateia, Lyness, Phillips and Perlis (2008) indicated that insomnia in a population of elderly adults with major depression was more likely to persists even after the successful treatment of depression. Results of this study found that untreated insomnia was also more likely to prolong depression (Pigeon et al., 2008). In a similar publication, Buysse, Angst, Gamma, Ajdacic, Eich, & Rössler (2008) conducted a clinical study with 156 young adults in Switzerland and found that 17-50% of the participants with insomnia lasting for two weeks or longer developed a major depressive episode in a follow-up interview.

There are different theories as to why depressed patients experience poor sleep. One theory is that depressed patients have increased levels of cortisol and adrenocorticotropic hormones (ACTH) throughout the night (Tsuno, Besset &, Ritchie, 2005), which has been shown to increase alertness. This theory is notable because increased cortisol due to stress caused by worrying and dwelling on concerns or experiencing negative emotions may lead to sleep instability (Tsuno, Besset &, Ritchie, 2005). Another hypothesis about the link of insomnia to depression is the monoamine hypothesis (Tsuno, Besset &, Ritchie, 2005). This theory explains that antidepressants such as Selective Serotonin Reuptake Inhibitors (SSRIs) are linked to increased insomnia because SSRIs increase serotonin, which causes wakefulness and therefore disrupts sleep (Tsuno, Besset &, Ritchie, 2005). Not only has it been found that stressful life events are linked to poor sleep (Healey, Kales, Monroe, Bixler, Chamberlin, & Soldatos, 1981), but it has also been found that negative thoughts also induce wakefulness and sleep difficulty

thus leading to increased likelihood that individuals with insomnia and individuals with depression have negative emotions and negative thoughts. Studies have found that those with insomnia usually experience negative thought content before they attempt to sleep and this consequently leads to sleep instability (Vandekerckhove, Weiss, Schotte, Exadaktylos, Haex, Verbraecken, &, Cluydts, 2011). Despite the specificity of these theories, they all indicate that both depression and insomnia are associated with pre-existing conditions such as negative affect and negative thought content.

Though multiple theories exist regarding the comorbidity of insomnia and depression, very few researchers have attempted to compare factors in people with and without depression that may cause insomnia. Vandekerckhove et al. (2011) measured the pre-sleep emotional state of participants and found that participants were more likely to have sleep difficulty if negative emotions were experienced right before sleep onset. Another study conducted by Takano, Sakamoto, and Tanno (2014) analyzed the effect of repeated thoughts that undergraduate students had throughout the day on sleep onset latency. This study indicated that repeated thoughts in the evening right before sleep, was more likely to produce a long sleep onset time (Takano, Sakamoto, & Tanno, 2014). Though studies like this have analyzed the pre-sleep cognitive thought processes of people, they do not assess a wide range of pre-sleep factors in groups with and without depression and results were either based on retrospective surveys or taken for minimal days and may lack reliability. Further, these studies have been conducted in a laboratory setting which may have altered the sleep patterns of the participants (Vandekerckhove et al., 2011). Participants tend to act unnaturally when placed into stimulated sleep environments as opposed to a real-world scenario. Results from studies where participants were evaluated in a lab setting may yield compelling findings, but they lack external validity and vary when people

with insomnia are placed in their natural sleep habitats. Our study allows participants to record their pre-sleep experiences in their normal sleep environment to avoid any deviation from the results.

The aim of this paper is to evaluate factors that affect sleep among a population of depressed and non-depressed college students. The present study will provide a list of descriptors other than negative emotions and negative cognition that may occur while people are trying to sleep in their natural environments for two weeks. We will use the Sleep Inference Rating Scale (SIRS) to examine factors that may influence sleep. The SIRS is comprised of a list of 8 different pre-sleep experiences that a person may have when attempting to fall asleep. By using the Sleep Interference Rating Scale (SIRS) over several nights, we will be able to analyze a complete list of sleep factors depressed patients have when initiating sleep. We hypothesize that depressed participants will experience more negative emotional and negative cognitive pre-sleep experiences than non-depressed participants.

Methods

Participants

Participants in this study were students at a private medium sized university. Participants were enrolled in an introductory psychology course. There were initially 89 participants in this study and two participants were dropped from the study due to missing data in the primary variables. This left a remainder of 87 total participants. Participants in this study were 38% male (*n*= 34) and 62% female (*n*= 55). Participants were 16% Asian (n= 14), 3% Black (n= 3), 69% White (n= 69), 8% Multi-racial (n= 7) and 3% unknown (n= 3). Forty-six percent of participants were 18 years old (n= 41), 28% were 19 years old (n= 25), 15% were 20 years old (n= 13), 6% were 21 years old (n= 5), 1% was 22 years old (n= 1) and 1% was 33 years old (n= 1). The

student status of participants were 70% (*n*= 62) freshmen, 21% (*n*= 19) sophomore, 7% (*n* = 6) juniors and 2% (*n*= 2) seniors. Forty-nine percent (*n*= 44) of participants had no insomnia and 42% (*n*= 37) had subclinical insomnia and the remaining 9% (*n*= 8) had clinical insomnia.

Procedures

In the first meeting, participants completed baseline questionnaires to access their health and sleep habits, including measures of depression and insomnia severity. After the first visit, participants were instructed to complete daily surveys to document factors influencing their sleep using the Sleep Interference Scale (SIRS) for the following 14 days. An email was sent every morning with a link containing the survey which was to be completed in the 24 hours after it was sent.

Measures

Sleep Interference Rating Scale (SIRS).

The Sleep Interference Rating Scale (SIRS) is a questionnaire created by the investigator for the purposes of this study, which is designed to assess the pre-sleep experiences that interfere with a person's sleep while they lie awake at night. The SIRS consists of eight possible experiences. SIRS 1 was *thinking too much, worrying and dwelling on concerns* (SIRS 2), *body at times was not physically ready for sleep* (SIRS 3), *unpleasant emotions/not comfortable emotionally* (SIRS 4), *environmental factors interfered with sleep* (SIRS 5), *visual imagery ("pictures in your mind")* (SIRS 6*), awakening from a dream led to losing sleep* (SIRS 7), *feeling at least partly awake (and partly asleep) during parts of the night* (SIRS 8). Participants were instructed to rate each experience on a scale from 0 to 10 where 0 indicates that the experience "did not happen last night", 1 is the experience happened but it "did not interfere with sleep" and 10 is the experience happened and it "interfered with sleep very much".

The Patient Health Questionnaire (PHQ-8)

The PHQ-8 is a questionnaire, which consists of eight questions to assess depression severity. Patients are asked to rank how often they have been bothered by the eight listed problems in the past two weeks. These factors are as follows; *little interest or pleasure in doing things*; *feeling down, depressed or hopeless*; *trouble falling asleep, staying asleep, or sleeping too much*; *feeling tired or having little energy*; *poor appetite or overeating*; *feeling bad about yourself - or that you're a failure or have let yourself or your family down*; *trouble concentrating on things, such as reading the newspaper or watching television and moving or speaking so slowly that other people could have notice. Or, the opposite- being so fidgety or restless that you have been moving around a lot more than usual*. Participants are asked to rank factors with a choice of four different options; 0= *not at all*, *1= several days*, 2= *more than half the days* and *3= nearly every day*. The resulting score for this scale is the sum of all eight items. A score of 10 or greater has been shown to identify individuals with major depression (Kroenke, Strine, Spitzer, Williams, Berry &, Mokdad, 2009). Seventy-nine percent (*n*= 71) of participants were categorized having no depression and 18% (*n*= 16) of participants met criteria for depression.

Results

Independent-samples *t*-tests were conducted to compare sleep interference (SIRS) experiences in participants without and without depression. As shown in figure 1, results indicated that sleep interference in the depressed population was more likely to happen due to SIRS 1 *thinking too much* ($t(78) = -1.91$, $p < .05$), SIRS 2 *worrying and dwelling on concerns* ($t(78) = -2.28$, $p < .05$), SIRS 4 *unpleasant emotions/not comfortable emotionally* ($t(78) = -2.37$, $p < .05$), SIRS 6 *visual imagery ("pictures in your mind") interfered with sleep* ($t(78) = -1.40$, *p*

< .05), SIRS 7 *wakening from a dream led to losing sleep* ($t(78) = -1.53$, $p < .05$), and SIRS 8 *feeling at least partly awake (and partly asleep) during parts of the night* ($t(780 = -1.51$, $p < .05$).

Discussion

The aim of this paper was to evaluate factors that affect sleep among a population of depressed and non-depressed college students. This study was the first to study multiple factors related to sleep that occurred in depressed and non-depressed people for an extended period of time. Participants were instructed to rate their experience with each factor every day for 14 days. Depressed participants were more likely to experience symptoms of insomnia due to thinking too much, worrying and dwelling on concerns, unpleasant emotions/not comfortable emotionally, visual imagery, awakening from a dream that led to losing sleep, and feeling at least partly awake (and partly asleep) during parts of the night.

Our study finds that depressed participants are significantly more likely to experience negative emotions and cognitions that interfere with sleep than non-depressed participants. These findings are consistent with previous studies, which have consistently shown that depression is associated with negative strong emotions and a tendency to view the world in a negative way. People with comorbid depression and insomnia often worry that their current cognitive state will negatively affect their sleep (Bagby, Rector, Bacchiochi, & McBride, 2004). Consequently, Negative cognition prior to sleep induces wakefulness in people with insomnia (Vandekerckhove et al., 2011). Further, these findings also suggest that underlying conditions that promote both negative emotions and negative cognitions are factors determining both insomnia and depression.

Our findings that depressed participants are more likely to experience feeling at least partly awake (and partly asleep) during parts of the night is consistent with previous findings that depressed people are more likely to wake up more often and experience feeling partly awake.

One theory about why depressed people are more likely to be partly awake and party asleep is that their REM sleep, sleep characterized by rapid eye movement and dreaming, occurs earlier than it is supposed to and disrupts the deep sleep phase that occurs later (Cartwright, 2010). The deep sleep phase is then unable to occur again (Cartwright, 2010). Therefore, depressed people have interrupted REM sleep which leads to sleep instability.

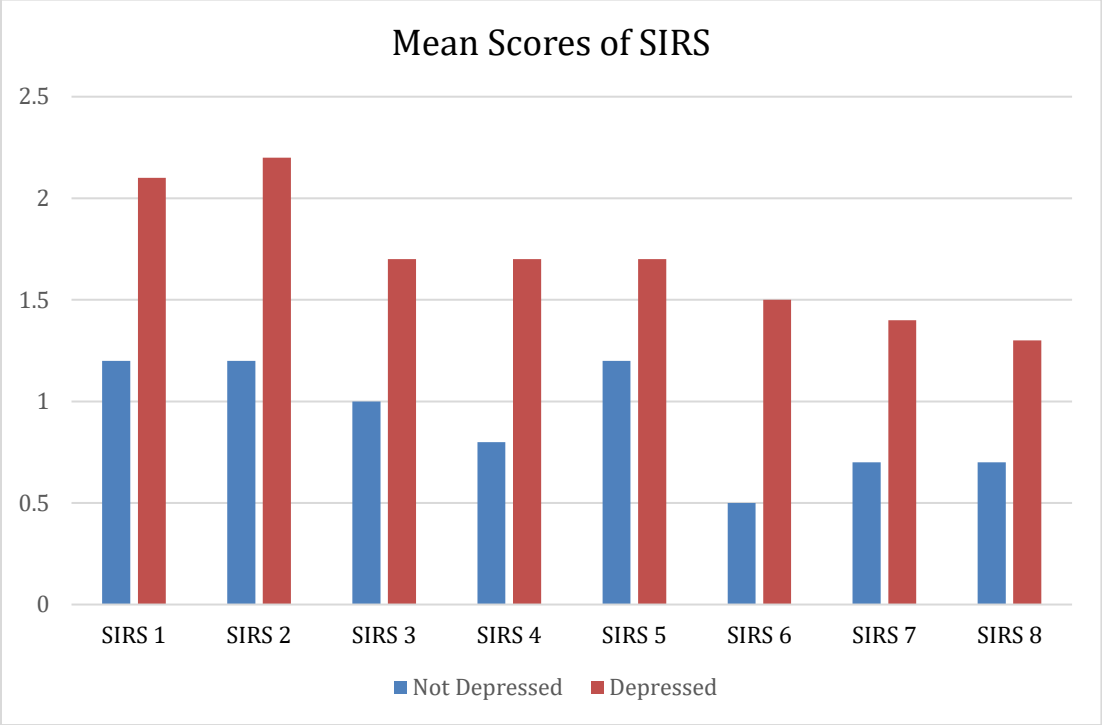
The physiological factor of SIRS 3, *the body was not physically ready for sleep*, was not significant between groups. While some participants may experience increased alertness at night and are more awake during the evening others are more alert during the evening (Mozafari, Mohamadi, Tabaraie, & Arsang, 2015). These results show that non-depressed participants did not differ from depressed participants in influencing sleep and shows suggest that morning/evening preference is not a significant reason as to why depressed individuals have disrupted sleep.

Those who are depressed and non-depressed did not differ in environmental factors influencing sleep. College students are more likely to experience uncomfortable environments due to the naturally loud and busy nature of the environment. Due to the large group of freshmen (70%) in our study, they were potentially subjected to dormitories and roommates which have a tendency to be noisy especially on the weekend. Though these may be factors that influence sleep, the influence of these factors does not seem to differentially impact those with and without depression

This study highlights potential reason why those who are depressed have trouble with sleep and these factors should be considered in the evaluation of treatment of those with comorbid insomnia and depression. Our study found that depressed people are more likely to experience several types of disruptive pre-sleep experiences. Depressed participants reported

experiencing unpleasant emotions or were not comfortable emotionally, which is consistent with previous findings that negative affect is a consistent symptom in people with comorbid depression and insomnia. Depressed participants also reported negative cognitive pre-sleep experiences such as thinking too much and worrying and dwelling on concerns, which is consistent with previous findings that the comorbid depression and insomnia population tends to ruminate prior to sleep. Physiological experiences such as wakening from a dream led to losing sleep and feeling at least partly awake (and partly asleep) during parts of the night were also reported, and these experiences are also associated with strong negative emotions. These findings suggest that reducing negative pre-sleep emotions and cognitions will be important to evaluate and potentially treat to reduce insomnia symptoms in this population.

There are several limitations that should be considered when interpreting the results of this study. Limitations for this study include a small sample size (n <100) and the gender ratio. Of the 89 participants, 62% were female (n= 55). Studies have shown that depression is more prevalent in women than men (Albert, 2015) and the disproportion in participants may have skewed the results and may not be generalizable to the population of college students. Seventy percent of the participants (n= 62) were college freshmen and results may only be generalizable to younger university students. Other limitations include that none of the participants had an official diagnosis for major depression. Aside from the limitations, this study also provided positive points including two weeks' worth of data which is helpful to provide reliable indicators of pre-sleep experiences. Our findings that high negative emotion and high negative cognitive activity contributes to the present literature and provides new evidence to be used in future treatment.



Note. Those who were depressed had significantly higher scores on SIRS 1 *thinking too much*, SIRS 2 *worrying and dwelling on concerns*, SIRS 4 *unpleasant emotions/not comfortable emotionally*, SIRS 6 *visual imagery ("pictures in your mind") interfered with sleep*, SIRS 7 *wakening from a dream led to losing sleep*, and SIRS 8 *feeling at least partly awake (and partly asleep) during parts of the night*.

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