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When Counting Sheep Becomes Counting Worries: Insomina, Rumination and Depression

Previous studies have examined how both external and internal factors are related to sleep disorders. Internal factors such as depression have been linked to insomnia and other sleep disorders. The current study examines the relationship between rumination, insomnia, and depression. The study also examines how sleep rumination, the act of persistently worrying about how much sleep one is getting, might affect the relationship between insomnia and depression. In the results, depression was strongly correlated with rumination ($r = .635, p < .001$). Though there was no correlation between sleep rumination and depression, there was a significant correlation between depression and sleep discrepancy, the difference between the amount of sleep and the amount of sleep desired ($r = .51, p < .001$). This finding suggests that more research should be conducted on sleep discrepancy to see how it may relate to other disorders and psychological concepts.

Throughout the world, people often complain of being unable to get a good night's sleep. There are many causes of this common problem, and insomnia is one of the most prevalent. Insomnia is defined as a general difficulty initiating or maintaining sleep that lasts for weeks at a time and is usually marked by significant distress or impairment in normal functioning (Jansson & Linton, 2006; Mayers & Baldwin, 2006). Studies have looked at how external factors, such as workload and stress, can cause insomnia to develop, and, in individuals already diagnosed with insomnia, maintain the presence of this sleep disorder (Jansson & Linton, 2006). Studies have also examined how internal factors, such as depression, are related to sleep disorders. Mayers and Baldwin (2006) note that of

all the sleep disorders, insomnia and hypersomnia have been closely investigated in relation to depression and that there is a relationship between the two.

In addition, many studies have analyzed the relationship between rumination, the focus on the causes of low mood and related symptoms, and depression. However, only a few studies have explored rumination and sleep quality (Carney, Edinger, Meyer, Lindman, & Istre, 2006). As mentioned earlier, sleep quality is generally related to depression. As such, it would seem that there would be some interaction between sleep quality, depression, and rumination. However, few studies have examined the relationship between insomnia, general rumination and depression. Also assumed is

the act of persistently worrying about how much sleep one is getting, which we call sleep rumination, might affect the level of depression in individual experiences. Although related to rumination, sleep rumination is a unique concept in the current literature in that it only concerns thoughts related to sleep. No published research has looked into the correlation between sleep rumination and depression. The current study aimed to examine the relationship between insomnia, rumination and depression in college students. It also considered the effect of sleep rumination, as opposed to general rumination, on insomnia and depression.

Adolescents and young adults experience more sleep disturbances at this point in their lives than at any previous developmental stage. This population tends to experience sleep phase syndrome (staying up late and sleeping late), irregular sleep patterns and an increased risk of insomnia and other sleep disturbances (Goldstein, Bridge & Brent, 2008). In a college setting, members of this age group may be more at risk for sleep disturbances due to lifestyle choices, increased academic workload and busy schedules. While many college students have adapted to be able to function on less sleep, the amount of sleep required for physiological needs has not changed (Dahl & Lewin, 2002 as cited in Goldstein et al., 2008). At the same time, this age group is also more prone to depression and suicide due to biological and social factors (Cukrowicz, Otamendi, Pinto, Bernert, Krakow, & Joiner, 2006; Goldstein et al., 2008). Studies have shown that insomnia in college students affects their physical well-being, psychological state and inter-personal relationships (Pires de Souza, 2006).

The uniqueness of this study came from the fact that it measured the effect of insomnia on factors such as depression and other dependent variables highly relevant to college students. The present study also examined a unique independent variable of depression. While many studies look at amount of sleep as an indicator for depression, few studies examine individual perceptions of insomnia and its subsequent effects (Carney et al., 2006; Cukrowicz et al., 2006; Freedman & Sattler, 1982; Vincent, Penner, Lewycky, 2006). The current study extended the idea of perceptions of sleep to examine

individuals' discrepancies between how much sleep they obtained and how much sleep they expected they should be getting, which we call sleep discrepancy. The study also examines how the size of this sleep discrepancy correlated with depression, workload, and other factors, since there did not appear to be studies examining this more general relationship. This study was also unique because it researched both rumination and sleep rumination's role as a mediator between sleep quality and depression. It was expected that an increased amount of sleep discrepancy will increase the level of depression, that a higher workload will correlate with an increased amount of sleep discrepancy, and that rumination and sleep rumination will act as mediators in the relationship between insomnia and depression.

Methods

Participants

The participants were 37 undergraduate Grinnell College students (21 females, 15 males and one unknown) between the ages of 18 and 22 years. Grinnell College is a small liberal arts school in central Iowa. One individual's data was dropped due to the fact that this individual failed to fill out one of our questionnaires. This left us with 36 participants (21 females and 15 males). At the beginning of the study, participants filled out a six-question demographics sheet that surveyed gender, age, perceived amount of sleep needed, workload, and caffeine and drug intake. On average, participants perceive an ideal night's sleep to range from 6.5 to 9 hours. Workload ranged from half an hour to 10 hours daily and 7-80 hours per week. Caffeinated drinks consumed ranged from zero to 5 per day. Of 36 participants, 53% self-reported as substance free, 19% reported recreational drug use, 17% reported prescription drug use, and 11% reported use of both. In exchange for participating in our study, half a participation credit was rewarded to subjects taking courses that required participation credits; participants were also offered a choice from a selection of cookies. Those participants who were not taking classes that required participation credits were simply offered cookies.

Materials

Materials included were a 145-item questionnaire that contained both original questions and items from multiple diagnostic tools. Original questions included 6 demographic questions, 20 items that surveyed participants' feelings over the past week, 14 items that surveyed participants' experiences over the past week, and 14 questions that surveyed how participants had dealt with life over the past week. The survey included 11 original questions assessing sleep rumination, and also a Response Style Questionnaire (Nolen-Hoeksema, 1991), which addressed individual responses, such as rumination, to negative mood.

The survey also included 19 items from the Pittsburgh Sleep Quality Index to survey sleep habits (see appendix A) (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). These questions measure sleep amount, quality, conditions, and habits for the majority of days and nights in the past month. Some questions ask for a time input, such as "During the past month, when have you usually gone to bed at night?" Other questions are scored on a 5-point likert scale with "not during the past month," "less than once a week," "once or twice a week," and "three or more times a week." A sample question would be "(During the past month, how often would you) Wake up in the middle of the night or early morning?"

The last instrument included was the Self-Rating Depression Scale (Zung, 1965), a 20-item questionnaire that evaluated feelings and behaviors to indicate levels of depression. The questions were scored on 4 possible responses: "none or a little of the time" (1), "some of the time" (2), "a good part of the time" (3), and "most or all of the time" (4). These responses were anchored on a likert scale of 1 through 4, with a sample question being "I get tired for no reason." Respondents would choose from 1 of the 4 possibilities, whereas "none or a little of the time" is anchored to 1 to denote normal range of depression and "most of all of the time" (4) would indicate severe depression. Some of the items were reversely scored, such as "I find it easy to do the things I used to," in which the anchoring was reversed. Also included were rumination items that asked how often participants thought about

depressive events and sleep. Possible responses were "almost never," "sometimes," "often," and "almost always." These responses were anchored on a 4-point likert scale and some questions had reverse anchoring and scoring. As an example, "How often do you think about all your shortcomings, failing, faults, and mistakes?" This question covered regular rumination and was anchored reversely.

Procedures

Participants had the option of signing up for different time slots at times ranging from 4:30PM to 9PM. These sessions were held in a quiet classroom and the experimenters sat in the front of the room throughout the study. During these sessions, participants were first given a consent form that outlined the purpose of the study, its procedure and its anonymity, then informed of their rights to leave and not complete every task, and lastly given the contact information of the experimenters. After consent signatures were collected, the experimenters proceeded to distribute the survey containing all of the questionnaires. Participants were given 25 minutes to fill out the survey. After completing this survey, participants were debriefed and offered some form of snack as compensation for their help. The students in qualifying courses were given PSELL credit based on the length of their participation.

Results

A significant correlation was found between sleep discrepancy and depression ($r = .51, p < .001$). Sleep rumination was tested as a mediator between sleep discrepancy and depression. A correlation test between sleep discrepancy and sleep rumination yielded no significant results ($r = .267, p = .116$). There was no need to run a subsequent regression between sleep rumination and depression as sleep rumination did not correlate with sleep discrepancy and thus does not mediate the correlation between sleep discrepancy and depression.

Also tested was the validity of the sleep rumination measures, which were modified from rumination measures; they were found to be high in

validity (Cronbach's $\alpha = 0.82$). While rumination correlated strongly with depression ($r = .635, p < .001$), there was no significant correlation between sleep rumination and depression ($r = .27, p = .106$). Partial correlations were conducted to control for possible confounds. Variables such as drug intake, caffeine consumed, and workload were tested as mediators in the relationship between sleep rumination and depression. The data yielded no difference when controlling for these external factors ($p = .43 - .92$). This data suggests that sleep rumination does not predict depression as we hypothesized.

The validity of the sleep discrepancy measures was also tested by separating sleep discrepancy into average hours of sleep received and hours of sleep needed and correlating each individual variable with depression. Average hours of sleep received correlated negatively with depression ($r = -.31, p = .068$) but this result was not significant. Hours of sleep needed correlated positively with depression ($r = .23, p = .203$) but again this result was not significant. The correlation between sleep discrepancy and depression increased when controlling for average hours of sleep received ($r = .78, p = .004$).

Discussion

The goal of this study was to examine whether or not sleep discrepancy correlates with depression, workload, and other factors. In addition, also in question were the factors that are involved in this relationship, if it exists. One hypothesis was that, as sleep discrepancy increased, greater levels of depression would arise, and any increase in sleep discrepancy might be related to a heavy workload. Another prediction was that sleep rumination, the amount that an individual spends worrying about the discrepancy in their amount of sleep, would be a main factor responsible for this relationship.

The results showed a significant positive correlation between sleep discrepancy and depression level. In other words, participants with a larger difference between the amount of sleep they got and the amount of sleep they believed they needed were more likely to have a higher level of

depression than those who had smaller differences. This finding supports the hypothesis that increased sleep discrepancy is paired with a general increase in depression level. This finding is a strong one because of its sufficient sample size and strong significance value.

The study also found that controlling for workload had no effect on the initial finding, indicating that the relationship between sleep discrepancy and depression was not simply related to large workload. Similarly, there was no effect of other possible confounding factors, such as caffeine intake or drug or alcohol usage. This finding does not support the hypothesis that workload, or some other confounding variable, would be closely related to sleep discrepancy. Additionally, sleep rumination did not appear to play any significant role in the relationship between sleep discrepancy and depression. This finding was also contrary to the hypothesis and is a reliable finding because of the sample size and the strong Cronbach's α for the sleep rumination scale. Lastly, while the study corroborates current literature that rumination strongly correlates with depression, sleep rumination itself did not significantly correlate with depression.

There are many important implications simply from the finding that sleep discrepancy and depression are related. First, the present study challenges previous theories about the relationship between insomnia or hypersomnia and depression. In most cases, insomnia and hypersomnia are considered symptoms of depression; however, these findings suggest that the relationship between sleep disorders and depression is more complicated than simple cause and effect. Due to the nature of the correlation study, sleep discrepancy cannot be proposed as a cause of depression. While it's possible that the relationship between depression and sleep discrepancy is not simply a one-way relationship, future research on depression should focus on general sleep issues such as sleep discrepancy, rather than specifically insomnia or hypersomnia.

One of the original hypotheses proposes that a large sleep discrepancy would be correlated with sleep rumination, and that sleep rumination would act as a mediator in the correlation between sleep

discrepancy and depression. The data did not support this hypothesis. The idea was that sleep discrepancies would cause an individual to ruminate more on sleep, which in turn increases depression level and sleep discrepancy. Instead, the findings indicate that sleep rumination does not play a significant role in the relationship between sleep discrepancy and depression.

This data also provides evidence that some external factors do not appear to be responsible for the relationship between sleep discrepancy and depression level. In their paper, Jansson and Linton (2006) provide evidence that insomnia can be caused or maintained by large amounts of workload and stress, which implies that depression might be at least somewhat related to workload. This idea might also suggest that the correlation between sleep discrepancy and depression might be at least somewhat related to workload. However, this study found that workload did not appear to play any role in this relationship. In fact, there was no support for any potential confounding factors. There were no significant results to indicate that workload, caffeine intake, drug usage (prescription or recreational), or alcohol consumption has any role in the relationship between sleep discrepancy and depression. These results lead to the belief that perhaps there is no mediating factor in the relationship between sleep discrepancy and depression.

Despite the fact that this study was taking a step into somewhat uncharted territory, no significant difficulties or problems arose during the course of the study. Only a few problems appeared during the course of the study. First, a rumination question was accidentally removed when editing the questionnaire. However, this did not prove to be a serious issue, since the particular question concerned regular rumination, which was still found to correlate strongly with depression. The only other two issues related to sections of the questionnaire not ultimately used in this study. The first issue was simply a question that confused multiple participants enough that they specifically wrote down that the question was confusing. The other issue was related to a set of questions asking the participants' significant other/partner to answer, but since the participants took this test in sessions with the experimenters, these

questions could not reasonably be answered.

There are many future directions for research to take. For instance, it seems important to examine possible causes for the relationship between sleep discrepancy and depression. Since this study was designed simply to see if there is a relationship, causation was not a factor examined. However, there appear to be numerous possible causes, such as sleep discrepancy being caused by depression, the depression being influenced by sleep discrepancy, or a third, related variable, interrelated to both. One possible third variable not addressed in this study would be stress levels. It is possible that an individual's stress level affects sleep discrepancies, which means that stress level may, in turn, be a factor in the correlation with depression.

Another possible third variable would be the more general version of sleep rumination, symptom-focused rumination. It is possible that sleep rumination was simply too specific, and that the symptom-focused rumination for depression in general might be a mediator between sleep discrepancy and depression. However, one would think that, were this the case, at least some correlation between sleep discrepancy and sleep rumination would have appeared. This still seems like an advantageous variable to examine before trying to examine any causal relationship between depression and sleep discrepancy, simply to ensure that all possibilities are considered.

Overall, this study provides interesting new evidence into research on depression and sleep disorders. Our data indicate that losing sleep is not necessarily a self-perpetuating process, at least in the sense that, as evidence shows, worrying about lost sleep does not appear to make depression any worse. This study was limited to a sample from a small and selective population. Future studies should expand the participant pool and examine further the relationship between sleep discrepancy and depression, as these results signify an exciting new direction in sleep and depression research.

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