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Sleep Quality, Stress, and Eating Disorders: A Correlational Study

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Running Head: SLEEP QUALITY, STRESS, AND EATING DISORDERS 18

Restrictive eating disorders and obesity, both extremes in the imbalanced eating behaviors spectra, are two major concerns in society. These behaviors affect the physical and psychological health of those who suffer from them. There are several factors related to these imbalanced eating patterns; sleep and stress are two major topics that have caught the attention of researchers.

Sleep affects eating. Gonnissen et al. (2000) explained that “effects of sleep fragmentation, independent of sleep duration, on appetite profiles and 24 [hour] profiles of hormones are involved in energy balance regulation” (p. 113). On the other hand, quantity of sleep also correlates with eating disturbances. In their research, Killgore et al. (2013) found that general daytime sleepiness produced low activation of the ventromedial frontal cortex. This activation, in turn, correlated directly with self-reported difficulty decreasing food intake. These findings, however, only applied to women participants. Additionally, sleep deprivation (defined as 4 hours or less of sleep per night) produces imbalances in ghrelin and leptin, which imbalance hunger and inhibit satiety, respectively. These changes lead to further imbalances in mood, anxiety, and weight management (Jean-Philippe, 2014). Amount of sleep

SLEEP QUALITY, STRESS, AND EATING DISORDERS 19

can affect eating, and eating disorders can affect sleep quality (Carvalho Bos et al., 2013).

When accounting for stress, research findings show that stress correlates with poor sleeping patterns, which in turn relates to obesity and binge eating disorder (BED). In fact, Vgontzas et al. (2008) concluded that 47% of people with obesity reported higher levels of subjective sleep disturbances when observed in a sleep laboratory and higher levels of stress based on Minnesota Multiphasic Personality Inventory-2. Several other articles support this finding by presenting psychological distress as a mediating model between daytime sleepiness and increased consumption of sweetened products. Jean-Philippe (2014) explained that “individuals who experience daytime sleepiness may consume energy-dense foods to upgrade their energy level or to alleviate their negative mood or psychological distress” (p. 88). Other studies claimed that short sleepers consume the same amount of food under stress or normal situations, whereas, the eating patterns of normal sleepers resemble those of sleep-deprived people under stress. Namely, “short sleep may produce an effect on eating that is equivalent to the ego-threat produced by the stress condition” (Dweck, Jenkins & Nolan, 2014, p.111).

SLEEP QUALITY, STRESS, AND EATING DISORDERS 20

All research studies mentioned above agree that there is a correlation between sleep patterns, eating tendencies, and levels of stress. However, it is still unclear if sleep mediates stress and eating behaviors or if stress mediates sleep and eating behaviors. Understanding this relationship will be helpful for further treatment of eating disorders because more specific treatments can be developed. Moreover, knowing if sleep or stress is a mediator will allow therapists and people in general to recognize and more effectively treat their eating behaviors and thus have a healthier lifestyle.

The present study hypothesized that stress mediates sleep quality and eating behaviors.

Methods

Participants

Because women have higher rates of eating disorders than men, a sample of 60 women was recruited through Facebook (facebook.com) and byu.edu email. They were required to be between the ages of 18 and 40 years old. Anthropometric and additional information were collected during the surveys, including age, ethnicity, education level, marital status, family history of eating disorders, weight, and height.

Materials

The surveys used were the Short Form Perceived Stress Scale (PSS-4) (Warttig, Forshaw, South & White, 2013), the Pittsburgh Sleep Quality Index (PSQI) (Buysse, Reynolds, Monk, Berman & Kupfer, 1988), and the Disordered Eating Attitude Scale (DEAS) (Dos Santos Alvarenga, Baeza Scagliusi & Tucunduva Philippi, 2010) to measure stress, sleep quality, and eating behaviors, respectively.

The PSS-4 consists of a 14-item Likert scale with five subcategories: “never,” “almost never,” “sometimes,” “fairly often,” and “very often.” Seven items were reverse scored. An example of a positive-worded question is “In the last month how often have you felt nervous and ‘stressed?’” and an example of a negative-worded question is “In the last month how often have you been able to control irritations in your life?”

For the sleep section, participants completed the PSQI online. This test measured their sleep quality for the last month. The format of the survey consisted of 22 fill-in-the-blank, forced-choice, and Likert scale questions.

The DEAS is a 25 item scale divided into two parts. Part one consisted of a selected-response and forced-choice questions, whereas part two was based on five-level Likert

SLEEP QUALITY, STRESS, AND EATING DISORDERS 22

scales. Moreover, this test evaluated five subareas that constituted disordered eating. These areas were relationship with food, concerns about food and weight gain, restrictive and compensatory eating practices, feelings towards eating, and idea of normal eating.

Design

Because the aim of the study was to understand the relationship of stress and sleep quality over disordered eating behaviors, the design used was a multiple regression study with one dependent variable and two independent variables. The dependent variable was eating behaviors, and the independent variables were stress and sleep quality. Based on the data collected, the predicted results were that stress would mediate the relation between sleep quality and eating behaviors.

Procedure

The participants were asked to complete three different surveys on Qualtrics, provided through the internet. They did not have a time limit or a specific schedule to take the tests. Additionally, participants were asked to complete the tests honestly and had the right to not answer a question if they were not comfortable responding to it. They were encouraged to answer all questions and to withdraw from taking the

surveys if they desired. The order of survey presentation was counterbalanced using a Latin Square Design.

Results

The criteria used for exclusion were being male, not finishing the survey, and being older than 40 years old. Based on the criteria, five male subjects, three participants who did not finish the survey, and three participants who were older than 40 years were excluded from the analysis. For descriptive statistics, refer to Table 1. Statistical analyses performed were multiple regression, because the final purpose was to find correlations between the variables of sleep quality, stress, and eating behaviors. For this analysis, eating disorder was the dependent variable, and sleep quality in addition to stress levels were the independent variables or predictors. All variables were measured simultaneously in the survey. The relationship between stress and eating disorder was significant, meaning that an increase in stress was significantly correlated with an increase in eating disorders ($\beta=0.308$, $t=2.529$, $p=0.014$; See Figure 1). However, higher levels of sleep quality were not significantly correlated with high levels of eating disorders ($\beta=0.099$, $t=0.653$, $p=0.516$; See Figure 2). Based on these results, the previous hypothesis that stress mediated the

SLEEP QUALITY, STRESS, AND EATING DISORDERS 24

correlation between sleep quality and eating disorders was rejected; therefore, it can be concluded that levels of stress independently affect eating disorders and that no mediator was found between sleep quality, stress, and eating disorders.

Discussion

Previous studies have found a relationship between poor sleep quality or quantity and eating disorders (Gonnissen et al., 2000; Killgore et al., 2013; Carvalho Bos et al., 2013). Moreover, other studies have found a positive relationship between stress and eating disorders (Vgontzas et al., 2008; Jean-Philippe, 2014; Dweck, Jenkins & Nolan, 2014). Based on these findings, the objective of the study was to discover if the present research replicates the results found in previous studies. The initial hypothesis was that stress mediated the relationship between eating disorders and quality of sleep. The results revealed that eating disorders presented a significant relationship with stress levels, meaning that higher levels of eating disorders correlated significantly with higher levels of stress. However, sleep quality and eating disorders did not correlate with each other. These findings do not support the hypothesis because no mediator among stress, eating disorders, and quality of sleep was found.

However, as it was mentioned before, literature related to these three variables showed that there are correlations between sleep quality, sleep quantity and eating disorders. Studies demonstrated that short sleepers presented imbalances in hormones related to hunger and satiety signals (Jean-Philippe, 2014) similar to people with poor sleep quality (Gonnissen et al., 2000). Other studies showed that higher stress levels were linked to obese populations and people with eating disorders (Vgontzas et al., 2008). Nonetheless, current reviews contradict the last statement by indicating that only people who restrict their diets eat more foods higher in fats and sugars under periods of greater workload (Gibson, 2006).

The present study resembles previous studies by looking for relationships among stress, sleep, and eating disorders. However, the present study is more specific than past research because it only targets populations with eating concerns, such as bulimia or anorexia, because the test focuses on this side of the eating disorder spectra. Furthermore, this study only measured quality of sleep instead of sleep quantity; whereas, studies that found relationships among the three variables accounted only for sleep quantity (Vgontzas et al., 2008; Carvalho Bos et al., 2013). The present study is unique because

SLEEP QUALITY, STRESS, AND EATING DISORDERS 26

no other studies have correlated three tests to measure sleep quality, stress levels, and eating disorders. In this sense, the study narrowed the research by looking specifically at these three variables.

Strengths related to this study include that it had good construct validity. The three tests used successfully measured each construct. The Perceived Stress Scale (PSS-4) and the Pittsburgh Sleep Quality Index (PSQI) have good validity and reliability. Therefore, they have shown to obtain similar results among populations and also to measure the expected construct. Moreover, the p value of the correlation between stress levels and eating disorders was significant; indeed, it was close to the 0.01 level, which suggests a high correlation. The study used a Latin Square Design in order to randomize the different tests and account for an order effect. This design increases the internal validity of the test.

The study has limitations that should be considered. It did not account for sleep duration, which may explain the lack of significance between sleep and eating disorders. Moreover, the sample used was a convenience sample; hence, it does not successfully represent the entire population of women. In other words, it does not have good external validity. Despite the fact

that the use of Latin Square Design may increase the internal validity of the test, internal validity may be decreased because this study does not account for other possible confounds that may affect the results. For example, higher levels of stress may be related to anxiety disorders—stress being a result of the latter instead of the actual variable being measured. Furthermore, the test was self-reported, which suggests that participants took the test under unstandardized environments, which may lead to incorrect results.

Future studies can improve the research by using a randomized sample instead of a convenience sample. A greater variability in demographics will permit researchers to generalize the results to a greater number of women. Another important factor to consider for future research is to measure sleep duration in order to look for other moderators that may explain a possible significance between sleep and eating disorders. Further research should also focus on the weight of participants in addition to age range. It was previously discussed that stress is more present among people with eating disorders, but sleep disturbances are more common among people with obesity. Therefore, it can be assumed that weight acts as a mediator between sleep and eating disorders, or weight

SLEEP QUALITY, STRESS, AND EATING DISORDERS 28

acts as a mediator between stress and eating disorders; this idea does not support the hypothesis, which is that stress mediates the relationship between sleep quality and eating behaviors. Moreover, finding correlations among these three variables will help to develop intervention studies that may indicate causation, bringing to light new scientific knowledge. Hence, understanding these concepts is relevant for the development of specific therapy and treatment for eating disorders at any point of the spectra.

Conclusion

Eating disorders, sleep disturbances, and levels of stress appeared to be highly correlated based on past studies. Due to this correlation, the objective of the present study was to restate the findings by hypothesizing that stress levels mediated the relationship between sleep quality and eating disorders. Results showed that sleep quality did not correlate with eating disorders. However, stress levels highly correlated with eating disorders. These findings in addition to further studies will be useful for more accurate treatment of eating disorders, basing their procedures on solid scientific knowledge.

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SLEEP QUALITY, STRESS, AND EATING DISORDERS 30

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Appendix A

Tables and Figures

Table 1

Descriptive statistics for critical values

	Mean	Std. Deviation	N
Eating disorders	75.5556	15.59547	63
Stress	23.3333	6.56481	63
Sleep quality	12.0794	7.03746	63

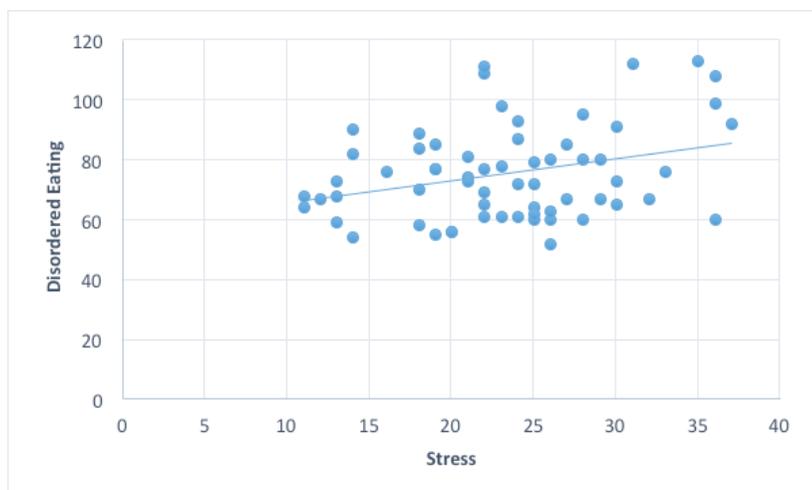


Figure 1. Regression line between stress (x axis) and disordered eating (y axis)

SLEEP QUALITY, STRESS, AND EATING DISORDERS 32

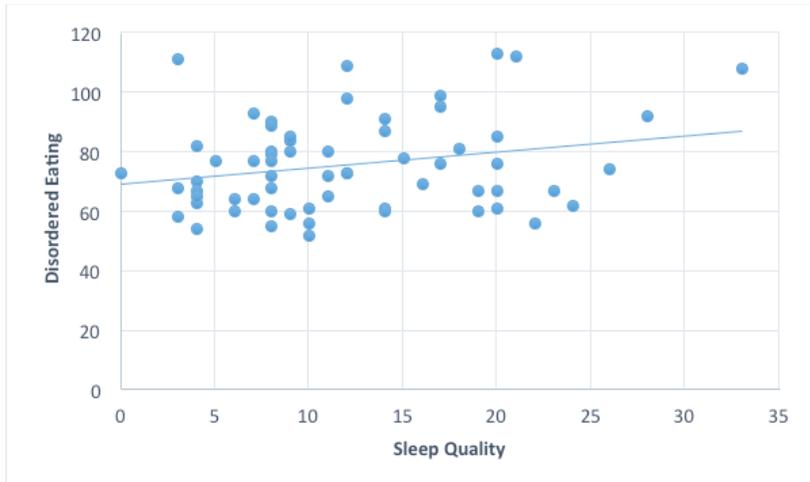


Figure 2. Regression line between sleep quality (x axis) and disordered eating (y axis)