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The Relationship between Sleep Duration, Body Mass Index and Optimism Levels in Generation Z

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ABSTRACT

In this study, we examine the relationship between sleep duration and reported levels of optimism in Generation Z (i.e., born after 1996) students aged 17 to 24. This study hypothesizes that optimism and duration of sleep will have a statistically significant positive relationship. Participants in this study are Generation Z college students located in the Southeastern United States. The sample consisted of 1562 students enrolled in a required physical activity class. A Pearson's correlation determined that there was a statistically significant positive relationship between sleep and optimism. Research implications and future research trends on sleep and optimism are discussed.

Keywords: happiness, health, quality of life, sleep, university

Optimism is the mindset to hold positive and favorable expectations towards the future (Elovainio et al., 2017). Popan (2018) suggests that optimists feel this way because of personal confidence in their own abilities and trust in a greater power. Additionally, optimists view negative events or outcomes as rare and believe that a negative outcome is not a result of their own actions (Popan, 2018). Having a positive worldview allows optimists to look beyond frustrating situations. Optimism is also correlated with an increased ability to problem solve, maintain composure, and recover from setbacks (Popan, 2018). It is considered a universal, positive psychological strength that increases an individual's welfare.

LITERATURE REVIEW

There is documented evidence of many physical and mental health benefits to being optimistic (Dalley & Vidal, 2013). Optimists are known to have a higher expectancy of accomplishment when completing challenging tasks or goals (Cappelleti, 2015). Expressing optimism has been found to help people attain goals and persevere through adversity (Wurm & Benyamini, 2014). Optimism is negatively associated with stress, depression, and general psychopathology (Alloy et al., 2006). Furthermore, optimists exhibit greater physical health than pessimists regarding mortality, pain management, immune function, pregnancy outcomes, and cardiovascular health (Rasmussen, Scheier, & Greenhouse, 2009).

The holistic impact of optimism on well-being has become an increasingly prominent area of research and public health focus. Previous studies have examined optimism in adults and older adults, but research lacks optimism and the current generation of college students, also known as Generation Z. Generation Z, or Gen Z, includes those born in the late 1990s and early 2000s (Cooper, 2018). Gen Z can be described as being competitive, focused, entrepreneurial, independent, socially conscious, and impatient (Miller, 2018). Another quality attributed to this generation is its poor sleep habits. Crouch (2017) claims that Generation Z is getting less sleep than ever and has dubbed the situation a national health crisis. While seven to nine hours of sleep are recommended for this age group, only 15% of Generation Z get that much sleep (Crouch, 2017). Sleep quality and quantity are associated with academic success and mental health in college students (Orzech, Salafsky, & Hamilton, 2011). Inadequate sleep is associated with a wide variety of health detriments, such as anxiety, depression, somatic pain, academic performance, greater risk-taking such as drug use and drunk driving, and overall detriments in social, psychological, and physical health (Crouch, 2017; Lund et al., 2010).

One theory that can help understand the beneficial impact of sleep quality and quantity is the restorative theory (Ezenwanne, 2015). This theory

postulates that during sleep, the human brain replaces and replenishes what has been used throughout the day, specifically neurotransmitters. During this process, both consolidations of procedural and spatial memory occur, as well as "unlearning" of various cell network interactions. The restorative theory also postulates that sleep serves the body in the form of rest and repair, to allow for dreaming, to promote immune function, and to detoxify the body (Aalling, Nedergaard, & DiNuzzo, 2018; Cox et al., 2018; Manger & Siegel, 2020; Walker, 2017; Xie et al., 2013). Such restoration is a possible cause for why individuals feel mentally sharper after achieving more sleep and could explain an increase in optimism levels or a more positive worldview (Ezenwanne, 2015).

Previous research has examined the relationship between optimism and sleep in children, adults, and older adults. For example, individuals with insomnia scored lower in both optimism and self-esteem, regardless of age or gender (Lemola et al., 2012). Additionally, inadequate sleep of fewer than six hours was correlated with lower optimism, while those meeting sleep guidelines exhibited higher optimism levels (Lemola et al., 2012). Furthermore, a study with children found that sufficient sleep quantity and good sleep quality were related to optimism (Lemola et al., 2011). Another study with Chinese college students revealed a bi-directional relationship between sleep quantity and optimism (Lau, Hui, Lam, & Cheung, 2017). While these research studies provide initial insight into the relationship between sleep and optimism, further investigation is needed on the current generation of college students in the United States. This current study aimed to understand the relationship between optimism and sleep in a Generation Z college sample.

RESEARCH METHOD

This study used a quantitative approach with a cross-sectional survey design, which was the best method of data collection and analysis given the exploratory nature of the topic.

Participants

This study included 1,562 college-aged students enrolled in required physical activity classes at a midsized southeastern university. Participants were recruited if they were students at the chosen midsized southeaster university, were enrolled in the physical activity classes during the semester, and if they were between the ages of 18 and 22 years old. Graduate students, students not enrolled in the physical activity classes, and students who were older than 22 were excluded from analysis. Although the age of participants varied from 18 to 22 years old, the study's emphasis was focused on the

student school classification (i.e., freshman, sophomore, junior, or senior). Further demographic information can be found in Table 1.

Procedures

Following Institutional Review Board approval, students who were enrolled in required physical activity classes were emailed a voluntary survey during the last two weeks of the semester. The survey included an introductory recruitment email explaining the study as well as a link to informed consent. Recruitment through class announcements was completed in an attempt to increase participation. Interested students completed an electronic survey that included the informed consent, a demographic survey, the Life Orientation Test, the Subjective Happiness Scale and self-reported physical activity and sleep questions. Participation was anonymous and participants were allowed to stop answering questions or withdraw at any time without penalty.

Measures

Demographics. Various questions assessing demographic information included height, weight, BMI (as a measure of overall health), race, ethnicity, sex, school classification, self-reported physical activity frequency, self-reported average sleep hours per night, and satisfaction the physical activity course.

Optimism. The Life Orientation Test-Revised (LOT-R) (Scheier, Carver, & Bridges, 1994) was used to assess dispositional optimism. The LOT-R is a ten-item questionnaire that assesses optimism and pessimism about the future using a five-point scale from (0) strongly disagree to (4) strongly agree. Scoring is from 0-24, with four items measuring optimism, four measuring pessimism, and four unscored items. The LOT-R exhibits strong internal consistency (Cronbach's alpha) ranging between .74 and .78 (Schou, Ekeberg, Ruland, Sandwik, & Karesen, 2004).

Subjective Happiness Scale. The subjective happiness scale (SHS) was a 4-item scale that measured global, subjective happiness. Two of the questions asked participants to characterize themselves relative to their peers. Two other items asked participants to choose whether various descriptions described them (i.e., happy and unhappy descriptions) (Lyubomirsky & Lepper, 1999).

Data Analysis

Data were screened with missing data removed from analysis. Data were then analyzed using SPSS statistical analysis version 24 using descriptive analysis (i.e., frequencies, means, standard deviations), relational

analysis (i.e., Pearson's r correlation), group comparisons (i.e., one-way ANOVA) (IBM, 2016). Descriptive statistics included the means and standard deviations as a function of race and gender. Pearson's r correlation determined if there was a relationship between the number of hours of self-reported sleep and optimism as measured by the LOT-R. A t-test and one-way ANOVA were used to determine any significant difference between demographic variables, optimism, and sleep duration.

RESULTS

The sample population had a mean age of 19.95, with 63% reporting a healthy category BMI. Forty-two percent were freshmen, with the remaining distributed across sophomore to senior. Fifty-seven percent were female, and two-thirds of the population was white, which was representative of the university's population.

Table 1: Participant Characteristics (*N* =1,562)

Construct	*M*	*SD*
Age (years)	19.95	3.37
	Category	*%*
Body Mass Index	Healthy	63.20
	Overweight	20.30
	Obese	11.60
Gender	Male	43.00
	Female	57.00
Race	White	63.10
	Black	26.60
	Other	10.30
School Classification	Freshman	41.80
	Sophomore	25.30
	Junior	17.80
	Senior	15.10

Note. M = Mean, *SD* = Standard Deviation, % = Percent.

Correlational Analysis

Pearson's r correlations were used to examine the relationship between variables. There was a statistically significant, but weak correlation between overall health (i.e., BMI classification) and happiness (r = .17), and a statistically significant, weak, positive correlation between overall health and optimism (r = .15). A strong and statistically significant correlation was

found between happiness and optimism (r = .52). Correlations between sleep and other measures were generally weak, but statistically significant. The amount of weekday sleep was significantly correlated with overall health (r = .11), total happiness (r = .08), and optimism (r = .06). Weekend sleep was also significantly correlated with happiness (r = .07) and optimism (r = .07).

Group Differences in Outcome Variables

Further analyses, using separate one-way ANOVAs, were conducted to investigate the influence that gender and race had on the outcome measures of overall health and optimism. There was a statistically significant difference between males and females for overall health, $F(1, 1{,}562) = 99.83$, $p = .001$. Females reported significantly greater overall health (M = 2.80, SD = .83) than males (M = 2.44, SD = .84). There was not a statistically significant difference between genders for optimism ($p < .001$) or self-reported sleep duration ($p = .12$). There was a statistically significant difference in overall health between African-Americans (M = 2.81, SD = .87) and Caucasians (M = 2.57, SD = .82), $F(5, 1{,}662) = 7.20$, $p = .001$. There was not a statistically significant difference observed in optimism scores ($p < .001$) between races.

Regression Analysis

Finally, a regression equation was generated to predict happiness using overall health, sleep, and optimism. The results of the regression indicated that the three predictors explained 28.7% of the variance in happiness ($R2 = .29$, $F(4, 1558) = 157.14$, $p < .001$).

DISCUSSION AND CONCLUSIONS

Overall, our hypothesis was supported. Fewer hours of sleep correlated to less happiness as well as less optimism. Positive traits increased as sleep duration increased, proving the linear relationship that was hypothesized. Essentially, subjects that slept longer were happier and more optimistic regardless of differing demographic factors, such as age, gender, or race. Additionally, this correlation was present in both weekday and weekend sleep, implying that this variable was insignificant in the relationship. Related studies found similar relationships between sleep duration and optimism across varying age groups, from childhood to adulthood (Doolin et al., 2018). However, a study of particular interest by Lemola et al. (2012) found that optimism decreased when subjects slept for less than six hours or greater than nine hours, indicating that there may be a bell-curve to the sleep duration and optimism relationship that our results did not show. This could be due to the demographics, size, or location of our population sample. Additional research with varying sample populations would need to be conducted to confirm or deny the relationship.

A physiological system could potentially explain the relationship found in our study. Physiology is the branch of science that applies to living things and examines the mechanisms behind the body's proper functioning (Rittenhouse & Miller, 2019). Future research should investigate if there is a definitive physiological system that accounts for the relationship between sleep and optimism. As Ezenwanne stated in 2015, the replacement and consolidation of neurotransmitters could be responsible for sleep's beneficial aspect. This process is thought to occur during non-REM sleep and its main function is to maintain neural networks. Neural networks are responsible for immune functions, memory consolidation, and of particular interest to this study, stabilization of emotions, and regulation of mood (Mansfield, Antic, Rajaratnam, & Naughton, 2017). It is then possible that a current neural network, one for emotion stabilization or mood regulation, could explain the relationship between sleep duration and optimism. If such a system exists, it asserts that its efficiency can be manipulated, thereby purposefully increasing our sleep, optimism, or both. This would suggest that stress, depression, and mortality could also be purposefully decreased (Popan, 2018).

Generation Z, specifically, can benefit from this study's results as it pertains to mental health. As previously mentioned, Generation Z has the lowest reported satisfaction with their mental health among current generations. They have also been found to experience significant sleep deficits, with only fifteen percent of those in Generation Z achieving the recommended eight to ten hours per night (Crouch, 2017). Previous research has shown that sleep deficits directly correlate with depression, while this study has shown a correlation between duration of sleep and reported levels of optimism (Crouch, 2017). This relationship should be studied further to analyze the variables of sleep duration and reported levels of depression. The results are significant in this way because it stresses the importance of sleep for mental well-being.

IMPLICATIONS

The literature review and the present study clearly indicate that increased sleep duration among Generation Z can have a significant impact on mental health and improve individuals' overall well-being. The main limitation of this study was the exploratory design with self-report data. Obtaining objective sleep data as well as data from numerous universities with varying demographics would improve translation. A holistic approach to sleep education, from clinicians, researchers, educators, and healthcare providers is necessary to help adolescents understand how sleep habits can impact well-being. Researchers could also examine the dose-response relationship between optimism interventions and both sleep quality and quantity.

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