“Just Sleep, You’ll Feel Better in the Morning and the Long-run: An Investigation of the Impact of Sleep on Affect and Cognition”

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Introduction

The significance of sleep on the human body is undeniable, yet there is never enough being said regarding the effects of it on mental health, which is reliant on the body's ability to self-regulate. Self-regulation is a term often interchangeably used with self-awareness, will, or self-control, when in reality, these terms represent different concepts of a larger construct. Self-control and self-regulation are the most difficult to distinguish, but they differ in the sense that self-control refers to being able to hinder impulses and emotions, whereas self-regulation pertains to moderating the intensity and frequency of the impulses. In Dr. Larissa Barber et al.'s article, "Consistent-Sufficient Sleep Predicts Improvements in Self-Regulatory Performance and Psychological Strain," she focuses on the effects of sufficient and consistent amount of sleep on self-regulation and psychological strain, by introducing the Self-Regulatory Strength Model, which examines how certain activities that are more demanding on the brain's executive functioning, the processes that have to do with managing oneself to achieve a goal, exhaust biological resources that allow humans to regulate themselves. Dr. Reut Gruber et al. also focuses on the relationship between sleep and emotional regulation by illustrating how sufficient sleep leads to healthy emotional functioning in both a biological and psychological manner in her article, "The Interplay Between Sleep and Emotion Regulation: Conceptual Framework Empirical Evidence and Future Directions." Those who struggle with the ability to emotionally self-regulate tend to have a hard time managing stress and frustration, which is exhibited through episodes of anxiety, depression, or anger, but how exactly does getting a sufficient amount of sleep affect the body's ability to self-regulate and combat psychological disorders such as depression and anxiety? Research shows that with lack of sleep, one's ability to self-regulate drastically decreases, meaning that in the same scenarios, the way humans react when they have not received a sufficient amount of sleep is less thought out, rash, and induces higher levels of

stress as the brain is not able to process the situation in a more logical, controlled manner. This, in turn, exacerbates the issues for those who are more susceptible to developing a mental illness or are already suffering from one.

Initially, this paper will proceed by examining the effect of sleep on cognition and the significance of this on students, focusing on the memory aspect of cognition. Concepts such as cognition, memory-encoding performance, and predictive ability of performance will be defined, and further connected to emotional regulation. Then there will be a transition to sleep and self-regulation with a description of what the term means and the significance of this function both biologically and socially. Afterwards, the association between sleep and self-regulation will be made, and how sleep directly effects affect and emotional regulation. The concept of how sleep and psychological distress work in cycle will also be discussed, as decreased sleep quality results in increased stress which promotes precursors to mental illness, which aids in further sleeping issues. Following, the Self-regulatory Strength Model will be looked at, which examines the importance of both sleep sufficiency and sleep consistency when combatting and preventing psychological consequences as a result of sleep deprivation. Afterwards, a concept of sleep that is not widely discussed will be incorporated into the argument; discussing the harmful effects of being an eveningness chronotype. Counterarguments will also be discussed following all the evidence, as they are also valid. However, considering the fact that it is difficult to argue against the importance of sleep, different aspects of sleep will be discussed such as polyphasic sleep and too much sleep.

The Role of Sleep in Cognition

Especially for high school and college students, sleep is considered a privilege, as academic and social pressures put too much burden on students and eventually lead to sleep insufficiency. One

of the most detrimental effects that sleep deprivation has is on the cognition of students. Though frequently discussed, cognition is defined as the mental action or process of acquiring knowledge, and comprehension through thought, experience and the sense. Therefore, with sleep insufficiency the brain's ability to process and retain information decreases drastically. Considering the fact that the majority of students are losing sleep in order to succeed in school, the act of staying up to study or complete schoolwork, in reality, is counterproductive because lack of sleep results in lower memory retention and memory encoding. This means that the things that they think they are learning are not being fully encoded and retained in their brain, so when it comes time to test what they think they have learned, they will not be able to recall the information, which will result in exacerbated stress levels as grades decrease. Dr. Matthew P. Walker, famous professor and Founder and Director of the Center for Human Sleep Science at University of California, Berkley, focuses on the impact that sleep has on cognition, specifically memory, and emotional regulation, in his article, "The Role of Sleep in Cognition and Emotion." Through the research that he conducted he found that "Significant impairments in retention were evident in a group of subjects deprived of sleep for 36 h, the subjects scoring significantly lower than controls, even in a subgroup that received caffeine to overcome nonspecific effects of lower alertness. Furthermore, the sleep-deprived subjects displayed significantly worse insight into their memory-encoding performance, resulting in lower predictive ability of performance" (Walker 170). Oftentimes adolescents will cope with their lack of sleep through caffeinated beverages attempting to obtain any source of energy that they can after subsequent nights of sleep deprivation. Though the subjects were deprived of a more extreme amount of sleep in a short span of time, the detrimental effects that lack of sleep has on memory-encoding

performance, which lowers the predictive ability of performance, is still apparent in adolescents who experience a chronic lack of sleep and other sleep disturbances.

The memory-encoding performances that Walker refers to in his article are similar to that of an exam in school, activities that require retrieving information from things learned in the past, and the predictive ability of performance pertains to if someone can predetermine how well they will do on a memory-encoding performance. For instance, a student who studies regularly, and acquires sufficient and consistent levels of sleep will have a relatively high predictive ability of performance because their patterns of work ethic and sleep are stable and consistent. This means that when they take a practice exam and receive a score of 96 percent, there are likely to preform to that extent on the actual exam. Whereas for a student who receives a 94 percent on the practice exam from staying up late studying, the likelihood that they will perform just as well on the real exam is not as high compared to the student with the stable sleeping schedule. Nowadays students will consume coffee or other caffeinated beverages as a backup source of energy, assuming that it will allow them to function equally to when they have sufficient sleep. However, the study that Walker describes in his article shows that even these methods result in lower levels of retention and performance in memory-encoding. The fact that sleep deprivation shows an association with lower predictive ability of performance could also add to the initial levels of stress that students experience because they might not be getting the scores that they expect to receive on assignments and assessments or witnessing an inconsistency in the grades they are receiving despite the hours that they sacrifice to do work. All this evidence just goes to show the counter-productiveness of staying up for students who are attempting to succeed academically. In “The role of sleep in declarative memory consolidation: passive, permissive, active or none?” written by Jeffrey Ellenbogen, he also examines the impact that sleep has on the

human cognition pertaining to certain concepts such as memory, and how that relates to emotional regulation. Through the studies that he conducted they were able to determine “that an entire night of sleep led to enhanced consolidation of arousing emotional stimuli” (720), this goes to show that the impact that sleep has on cognition and memory transfers to the body’s ability to process emotional stimuli, and how it is processed afterwards. With a sufficient sleep throughout the entire night, the mind will be more capable to accurately retain and consolidate the emotional stimulus collected from the day.

The interplay between sleep, cognition, and emotional regulation are often not recognized, and people view the effects of sleep on cognition and emotional regulation as two separate entities. However, both Walker and Ellenbogen suggest the interplay between all three variables. From the research that Walker conducted, “It is clear that those who slept encoded and retained a balanced mix of both positive and negative memories. In contrast, those who did not sleep displayed a skewed relative distribution of encoding, resulting in an overriding dominance of negative memories, combined with a retention deficit of positive and neutral memories” (Walker 172). These findings go on to capture the manner in which lack of sleep affects cognition in terms of memory encoding and retention, more specifically how lack of sleep results in an overload of negative memories and deficit of positive or neutral memories aiding in a higher likelihood of developing a psychological disorder such as depression. The fact that lack of sleep encodes and retains negative memories to a greater extent than positive memories could also result in lower trait resilience amongst adolescents, as the memories that are being retained are negative, which would discourage students from trying to work harder and overcome possible obstacles because the recollection of past memories is overrun by negative ones. The lack of motivation to overcome future obstacles, and a sense of hopelessness because of the

majority of negative memories, all a consequence of sleep disturbances, result in a decreased emotional state, which promotes possible diagnosis of a psychological disorder such as depression. There is a higher incidence of depression amongst populations who experience sleep disturbances, and the selective memory encoding process that occurs with lack of sleep could provide a possible explanation for why this occurs.

The Role of Sleep in Affect

Everyone is different. Therefore, depending on its severity relative to one's needs, sleep deprivation will impair emotional regulation in various ways. All humans have the capability to self-regulate, which "is the process of exerting control over one's cognitions, affect and behavior in order to align with a desired standard" (Barber 315). This plays a key role in one's emotional reactivity which describes that "ability to control extreme states of arousal or reactivity to allow mutual, reciprocal social interaction is essential for healthy socio-emotional functioning" (Gruber 3). This is essential as "High levels of negative emotional reactivity directed toward other people (e.g., anger), oneself (e.g., depression) have been associated with mood disorders, addiction or impulse control" (Gruber 3). Dr. Katherine Baum explores the effects of sleep on emotional self-regulation specifically on adolescents in her article, "Sleep Restriction Worsens Mood and Emotion Regulation in Adolescents," where she conducts an experiment restricting hours of sleep and how the participants react in terms of mood and mood regulation. One of the greatest factors that affect one's ability to self-regulate is sleep as "Multiple correlational and experimental studies have established that whole-night sleep deprivation or markedly curtailed sleep across multiple nights (chronic sleep restriction) adversely affects adults' emotional functioning and self-regulation" (Baum 180).

It should be noted that the average amount of sleep that someone needs changes overtime. Those of ages thirteen to eighteen require eight to ten hours of sleep whereas those eighteen years or older require seven to eight hours daily. Oftentimes these recommended hours of sleep are overlooked, but even for healthy adolescents ages 14 to 17.9, with 6.5 hours of sleep a night for a few days, participants "experienced decreased energy and increased fatigue and confusion. They reported feeling less alert, less efficient, and more helpless, forgetful, and exhausted. In addition to lacking energy, during sleep restriction, the adolescents also reported increased feelings of tension, anger, and anxiety" (Baum 186). This goes to show how regardless of age, the effects of sleep are undeniable in both daily functioning as well as affect because the feelings of hopelessness and tension that are exhibited through lack of sleep are precursors to mental illness. In the experiment, the hours of sleep that the participants were granted was solely one and a half hours less than the minimum recommended amount, and it still had such an impactful effect. All of the feelings that the participants experienced, feeling less efficient, helpless, lacking in energy, would simply add to whatever stressors they are already experiencing because they are not able to focus on what they need to.

It is essential for people to sleep enough at night and have healthy sleep hygiene as "Sleep processes and physiology affect key emotional processes central to socio-emotional adjustment and emotional memory. Nighttime sleep affects daytime mood, emotional reactivity and the capacity to regulate positive and negative emotions; conversely, daytime experiences affect sleep. Hence, there is a complex interplay between sleep and emotional regulation" (Gruber 6). The relationship between sleep and emotional regulation is like a cycle. Those who have a rough day tend to have a hard time falling asleep, and those sleep irregularities result in another rough day. Sleep from the previous night plays a great role in how the following day

proceeds. With a good night's rest people are biologically proven to think more critically and maintain a stable emotional state. It is very important to note how sleep and emotional regulation are so interconnected because it's not something that people often correlate together, but the significance of the study done in the article is important for the argument proposed for the research topic. Research clearly states the crucial nature of nighttime sleep and the effects that it has on mental and emotional health. In order to prevent further emotional and even psychological damage or strain, research is showing that sleeping early could be the solution.

Self-Regulatory Strength Model: Resource Enhancement and Replenishment

Oftentimes people prioritize sleeping more rather than being consistent with their sleeping schedule, but this also has a detrimental effect on the body's ability because consistency is something that the body thrives on. This concept is illustrated by the terms resource enhancement and resource replenishment, which is sleep consistency and sleep sufficiency respectively. The Self-Regulatory Strength Model proposed by Muraven and Baumeister states how "resource replenishment is only one aspect of managing self-regulatory resources, and it only applies to relatively short-term resource allocation. The second aspect, resource enhancement, suggests that routine exercises in self-control may help build self-regulatory capacity over time. Self-control is considered to be the critical component of self-regulatory success (with the other two being setting appropriate goals/standards and self-monitoring; Baumeister & Heatherton, 1996; Carver & Scheier, 1982) because it entails the ability to alter, maintain or terminate one's current behavior in order to respond to environmental demands" (Barber 315). This theoretical framework goes on to show the significance of both sleep sufficiency and consistency when it comes to maintaining healthy self-regulation in order to promote healthy mental health and stress coping. "Markarian and colleagues investigated the

relationship between emotional regulation difficulties and depression, anxiety and stress symptoms. Interestingly, symptomology was positively related to emotional regulation impairments in all cases but strongest in cases whereby participants reported poor sleep quality. As such, poor sleep quality may play a role in dampening emotional regulation in participants who are already vulnerable to emotional regulation difficulties" (Gruber 5). This study illustrates the fact that sleep is adding to the problem of emotional dysregulation and mental disorders, rather than the fact that it is what is causing these issues, which is what is often misinterpreted.

The inconsistency and lack of sufficient sleep is not what is causing any mental illnesses, it is rather that the impact is more pronounced when there is already a preexisting factor or risk of mental health issues. In addition, it should be noted that this quote has a heavy emphasis on sleep quality, which is dependent on both sleep consistency and sufficiency, which are the concepts of resource enhancement and replenishment. The importance of sleep on those who suffer from preexisting factors is illustrated through a case study done by P.S. Moore in "The use of social stories in a psychology service for children with learning disabilities: a case study of a sleep problem," where the effects of sleep are measured on a four year old boy named Peter with severe learning disabilities, autistic spectrum disorder, and receptive speech and language delay. Most people would think that sleep does not have a huge effect on mental health issues, but by introducing a healthy sleep schedule Peter became more readily open to change and adapting to different situations. Two weeks into the experiment, "it was decided that it was time to introduce Peter's brother to sleep in the top bunk of Peter's bed. Again, this was successful, and Peter was willing to allow this change" (Moore 136), and "On the whole Peter's mother felt that his challenging behavior was better after the program" (Moore 137). This goes to show that healthy

changes that were made regarding sleep led to improved effects regarding mental health issues, and the significant impact that sleep has on those who already suffer from preexisting factors.

Sleep Chronotypes: Morningness and Eveningness

Something that pertains to sleep, but not nearly discussed enough is chronotypes. Dr. Judith Owens in her article, "Self-Regulation and Sleep Duration, Sleepiness, and Chronotype in Adolescents," examines the correlation between sleep duration, eveningness chronotype, daytime sleepiness, and self-regulation. Chronotypes, otherwise known as "circadian-based morningness–eveningness preference (i.e., the tendency to be a "morning lark" or "night owl",) are another aspect of sleep regulation that may independently influence self-regulation" (Owens 2). Often times people do not find an issue with their chronotype, whether they are night owls and of the eveningness chronotype, or if they are a morning lark and of the morningness chronotype. However, "Eveningness has been associated with emotional dysregulation in both adults and adolescents… Specifically, evening types are more likely to be diagnosed with an anxiety disorder, addiction disorder or personality disorder" (Gruber 5). Those of the eveningness chronotype tend to stay up later, which means that regularities in the circadian rhythms are thrown off, which leads to emotional abnormalities resulting in being more predisposed to mental disorders such as depression or anxiety. This is significant to the study of sleep and mental health because oftentimes people are slow to realize the importance of sleeping early when maintaining adequate mental health or even combating mental disorders so during times of emotional adversity they tend to stay up, but this is actually doing more harm than good. A lot of people claim to be night owls who are more productive in the evening time, but in the long run research shows that this is harmful to their mental health and emotional regulation. Therefore, it is better to sleep early and wake up early to maximize emotional and mental health.

The average person isn't familiar with the term "chronotype" but with more awareness, people might think twice before they push back their responsibilities for the nighttime which would risk staying up later. "Given that evening types cannot easily fall asleep earlier at night and must still meet societal demands to wake up and function early in the morning, this often results in a sleep duration that is insufficient to meet sleep needs… Eveningness is also a risk factor in adolescents for a number of conditions that have also been associated with poor self-regulation: emotional and behavioral problems, substance abuse, obesity, health risk behaviors, and lower school performance" (Owens 2). Chronotypes are an essential factor of sleep that impact self-regulation despite the fact that it is not nearly discussed enough in comparison to something like sleep duration. Self-regulation is crucial in one's everyday functioning as it pertains to being able to control oneself in cognition and behavior, so if something happens like spilling coffee on your shirt, the reaction to that would be reasonable and non-impulsive rather than emotionally driven and disruptive. The manner in which being of the eveningness chronotype is harmful to one's ability to self-regulate was something that was left unclear in other sources. However Owens shows that because those of the eveningness chronotype have a circadian-based preference to sleep later, but still must conform to societal norms of getting up at an early time whether it be for school or work, they are not able to get the same amount of sleep as those of the morningness chronotype or nearly enough sleep for them to self-regulate. This goes to show that it is not necessarily the fact that those of the eveningness chronotype sleep at a later time, but it is actually the fact that they are not able to get a sufficient amount of sleep because they are going to sleep later but still having to wake up at the same time as everyone else due to societal norms. If those of the eveningness chronotype were able to adjust their personal schedules based off their circadian preferences rather than those of society, it is possible that they

would not have to experience such serious consequences regarding self-regulation, behavioral problems, or even substance abuse because they would be able to obtain the necessary amount of sleep, just at a later time than those of the morningness chronotype. Being a "morning lark" or "night owl" seems so harmless, but the fact that, for adolescents being of the eveningness chronotype has connections to obesity, health-risk behaviors and even substance abuse, which all take a notable toll on mental health and increases stress, more should be done to adhere to those of the eveningness chronotype. For instance, in terms of school, something as trivial as starting later could have an enormous, beneficial impact on numerous students for the long-run.

Counterarguments: Polyphasic Sleep and Too Much Sleep

The healthy sleep habits that are described today are reflective of the current society. Habits such as sleeping early are endorsed in order to function in today's society where both school and work begin at early hours. In the article, "Polyphasic Sleep/Wake Patterns and their Significance to Vigilance" written by Jürgen Zulley and Josef Bailer, they explore how when there are no restraints or conditions on sleep, "the sleep/wake pattern exhibits a polyphasic distribution" (Zulley 1), which is when the usual hours of sleep in a 24 hour period is split into more than two intervals, this also provides an explanation for why humans tend to take naps throughout the day. This goes to show how all the research that is provided regarding sleep is a reflection not of what is preferred biologically by the body, but rather what is needed in order to function in today's society. In Zulley's experiment where they studied the sleep patterns of humans when there were not any restraints or conditions on sleep, they found that "the human sleep/wake system is characterized not only by a strong propensity to obtain a sleep episode once per circadian day, but also by a prominent tendency for a shorter sleep episode to occur halfway between successive 'night sleep' episodes" (Zulley 168). Researchers promote humans to belong

to the morningness chronotype, where time to sleep and hours of functioning begin earlier, and discourage those of the eveningness chronotype. However, given the evidence from Zulley's study, this provides an explanation and solution for those of the eveningness chronotype. The reason why eveningness people tend to sleep later could possibly be because their circadian rhythm needs a nap during the day to recharge after waking up early to function in society, but this in turn results in later sleeping hours because at the normal hour to sleep, they are not tired given the nap that they took.

In today's society where students and workers have to get up at unreasonable hours, sleep deprivation can be seen as inevitable. Therefore, unhealthy habits such as oversleeping are promoted as it appears to be a luxury. However, in David Millet's article, "Cardiovascular: Oversleeping raises stroke risk," he conducted a study in which he followed the sleeping habits of 10,000 elderly patients and examined the detrimental health effects of oversleeping. In today's society, the majority of people encourage getting as much sleep as possible, but from the study that Millet conducted, he found that for those who reported sleeping longer than eight hours a day, they "had a 46% greater risk of stroke, while those who reported sleeping for longer at both points in the study were twice as likely to have a stroke as those who reported persistently average sleep duration" (Millet 1). The fact that people had a 46% increased risk of stroke simply by sleeping above the average sleep duration raises a lot of concern considering the fact that there is no consensus as to what the recommended hour of sleep is. It was previously stated that there was "no significant association among adolescents between sleep duration and aspects of self-regulation" (Owens 5). However, Millet's study shows that sleep duration does have an impact on health.

Conclusion:

The significance of sleep on cognition and emotional regulation is undeniable, and despite its importance, it is seldom discussed in relation to improving mental health. Especially for students who are constantly burdened by academic and social pressures, sleep is crucial in their brain development, but often sacrificed in order to complete school assignments, study for assessments, or foster social relationships despite its counterproductive nature. The role of sleep in cognition shows that with lack of sleep the brain's ability to encode and retrieve information decreases drastically, which affects students as exams essentially test one's memory-encoding performance. Not to mention, those who obtain a high score on a practice exam from studying late at night rather than sleeping are less likely to perform just as well on the actual exam. With a decrease in academic performance, additional stress is inevitable, but that is not the sole effect that sleep has on memory. Studies have also shown that with sleep deprivation, more negative memories are encoded, meaning that affect will also be negatively affected, as more negativity results in worse affect. The Self-Regulatory Strength Model examines the importance of obtaining both sufficient and consistent sleep in order to combat against inevitable exhaustion of the body's ability to self-regulate after taxing usage of the brain. Sleep is the body's natural and most effective manner to rehabilitate and recharge, coffee and energy drinks do not nearly have the same restorative abilities that sleep has. Despite the fact that the body's natural Circadian rhythm aligns with the polyphasic sleep schedule, in order to be a functioning, healthy member of society, the only solution is to practice good sleeping habits, preferably that of a morningness chronotype, in order to maintain adequate mental health. Lack of sleep results in a drastic decrease in self-regulation, which exacerbates the issues for those who are more susceptible to developing a mental illness or are already suffering from one. In today's society, getting a

sufficient amount of sleep is seen as nearly impossible, but that does not mean that the importance of sleep should be forgotten or neglected.

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