Academic Performance, Employment, and Sleep Health: A Comparison between Working and Nonworking Students

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Abstract

Interest in overall health and well-being of students in higher education has grown. Retention and success in college has been linked to various health aspects including sleep and alchol usage. The purpose of this study is to: 1) assess sleep health and related behaviors, 2) examine relationships between sleep health and work conditions, and 3) determine if there is a relationship between sleep health and academic performance. Because many students work in service industries due to the flexibility of these jobs, comparisons are made between students working in service industries, students working in other industries, and non-working students. The online survey data from 736 participants, representing six U.S. universities, was analyzed. Findings indicated that average grade point was associated with sleep, work hours, and household income; student employees working in the service industry had a sleep score slightly lower than students working elsewhere.

Keywords: academic performance, college students, employment, shift work, sleep, sleep aids

1. Introduction

College students' academic ability, relevant work experiences, and health are all important for success. For students to successfully balance studying, working, and health wellness, sleep is one key aspect. Sleep is a basic physiological need for all humans and a vital component of health wellness; sleep also has potential linkage to academic learning. The impact of shift work, a common work type for college students, on sleep has received attention in recent years. Poor sleep has been associated with absenteeism, accidents, and various diseases (Caruso & Rosa, 2012; Rosekind et al., 2010; U.S. Department of Labor [USDL, 2005]).

According to the Bureau of Labor Statistics, in 2004, millions of Americans were shift workers; of that group, the service industries had the highest proportion (38.3%) of shift workers (USDL, 2005). More recently, Torpey (2015) summarized U.S. government data from 2011 to 2014 and showed that foodservice employees worked in the evening (between 6 p.m. and 10 p.m.) at a rate that was approximately twice as high as the average rate of total employed people. Additionally, service industries employ the largest number of young workers. According to 2019 data, there were 19,332,000 workers between 16 and 24 years old; of that group, 5,730,000 (29.6%) young workers were employed in service industries, followed by 3,852,000 (19.9%) in wholesale and retail trade industries (USDL, 2020).

Existing literature and government data suggest that students working in service industries, such as restaurants and hotels, may be at greater risk of sleep problems. However, few studies have explored sleep related behaviors and the effect of sleep on academic success for student employees. It is difficult for educators and employers to start conversations about students' studies, work, and sleep because there is a lack of associated studies. Therefore, the purpose of this study is to examine college students' sleep health, sleep behaviors, employment type, and academic performance.

2. Literature Review

2.1 Sleep and College Students

In an extensive review, Hershner and Chervin (2014) indicated that daytime sleepiness, sleep loss, and irregular sleep schedules are common sleep problems for college students. The researchers summarized the causes and consequences of sleep problems including: class and/or work schedules, sleep disorders, and bad habits (e.g., using alcohol as a sleep aid, having caffeine after lunch, and using technology before bed). Consequently, these sleep problems may have a negative impact on a student's mood, driving ability, and academic performance (Hershner & Chervin, 2014). There appears to be evidence, albiet self reported, that graduate students have better sleep behaviors than undergraduate students (Oswalt & Wyatt, 2015). Partial explanation for this difference may be living environments. Undergraduates may be more likely to live on campus and experience sleep challenges related to campus residency such as noise and uncomfortable room temperatures (Qin & Brown, 2017).

2.2 Academic Performance

Academic performance, often measured using grade point average (GPA), is a focal point of multiple studies. Researchers have assessed the impact of health behaviors, including sleeping and drinking, on academic performance (e.g., An, Loes, & Trolian, 2017; Ruthig, Marrone, Hladkyj, & Robinson-Epp, 2011). Although the impact of sleep problems on college students' academic performance has been studied for more than 40 years, findings are mixed. The key findings of previous works include: 1) college students who had very good sleep quality reported relatively high grades (Gomes, Tavares, & de Azevedo, 2011), slept more than nine hours (Kelly, Kelly, & Clanton, 2001), and did not delay their sleep (Lack, 1986); 2) daytime sleepiness, sleep duration, and sleep latency significantly impacted GPA (Chiang, Arendt, Zheng, & Hanisch, 2014; Singleton & Wolfson, 2009); and 3) correlations between sleep variables and GPAs were not consistent. Some researchers found that student GPAs were not significantly correlated with sleep variables, such as daytime sleepiness, dissatisfaction with sleep, sleep hours, and sleep quality (Howell, Jahrig, & Powell, 2004; Peters, Joireman, & Ridgway, 2005); whereas, others reported that GPA was negatively correlated with sleep variables such as daytime sleepiness, delayed bedtime, sleep duration, sleep schedule, time awake before getting out of bed, and differences between sleep timing on wordays and weekends (Haraszti, Ella, Gyöngyösi, Roenneberg, & Káldi, 2014; Singleton & Wolfson, 2009; Taylor, Vatthauer, Bramoweth, Ruggero, & Roane, 2013).

In addition to sleep, other variables may impact college students' academic performance, such as parental expectation and socioeconomic status (Grossman, Kuhn-McKearin, & Strein, 2011; Pearce, 2006; Vartanian, Karen, Buck, & Cadge, 2007). When assessing 5th grade students and following up with the same population at 8th grade, Grossman et al. (2011) found that parental expectation, gender, and socioeconomic status were correlated with student achievement. In Vartanian et al's (2007) study, they found that Asian parents had high expectations for their children to complete college. Additionally, when comparing Whites with Chinese Americans, Pearce (2006) found that higher parental expectations were associated with higher student achievement for both groups. These findings suggest that socioeconomic status and parental factors may also have potential effects on college students' academic performance.

2.3 Sleep and Employment

It is common for college students to work while simultaneously attending school. A recent report targeting students between 16 and 24 years old, showed that about 5.6 (44.9%) of 12 million college students were employed (USDL, 2019). College students intermingle work and study for different reasons. For those students who have financial needs, a job is necessary to cover tuition and/or living costs. For other students, industry experience (i.e., work experience or an internship) is required for graduation; for example, most hospitality programs require a certain number of intern or work hours to graduate (Kay & DeVeau, 2003). However, it can be challenging for students to maintain the delicate balance of study, work, and sleep. Students may sacrifice sleep time to work and/or study; additionally, the pressures of work and their studies may impact sleep quality and quantity.

Researchers have studied the relationship between sleep, work, and student employees' grades, but these studies were limited because each sampled from only one institution. Sampling 185 student employees from a large private U.S. university, Trockel, Barnes, and Egget (2000) found that sleep habits and work hours might serve as predictors for student employees' grades. In another study sampling 903 student employees, Miller, Danner, and Staten (2008) explored the effects of work hours on sleep hours and student GPA; findings revealed that participants who worked 20 hours or more were less likely than those who worked less hours to achieve a GPA of 3.0 or greater.

Getting quality sleep can be beneficial for students' learning and memory abilities, and in turn, it may benefit their

studies and work performance. Previous studies have reviewed evidence supporting the beneficial relationship between sleep, learning, and memory (Curcio, Ferrara, & De Gennaro, 2006; Hershner & Chervin, 2014). In addition, a study sampling 117 student employees from a large state university found a positive relationship between self-reported sleep quality and job performance (Chiang et al., 2014). However, other related literature has not found a strong connection between sleep and student employees' academic performance.

2.4 Sleep and Working in Service Industries

For students working in the service industry (e.g., restaurants and hotels), sleep and college studies may be negatively affected by irregular work schedules, long hours, night shifts, and weekend hours. At the same time, poor sleep may affect students' physical, mental, and social health, as well as their academic success. Brand, Hermann, Muheim, Beck, and Holsboer-Trachsler (2008) explored whether a nonstandard work schedule affected students' sleep and/or mental health by examining the relationships between sleep, work, and strain among students employed in service industries. The researchers showed that sleep quality was negatively correlated with depression and anxiety. They also found that increased work hours were associated with decreased sleep hours as well as higher levels of insomnia.

A few studies have focused on the relationship between sleep and academic performance for students working in service industries; one study found a weak relationship between sleep and academic performance (Chiang et al., 2014). It is possible that some students achieve high grades using strategies (e.g., drinking caffeinated beverages) to cope with sleep problems (e.g., daytime sleepiness, delayed bedtime, poor sleep quality, sleep disturbances, sleep deprivation). In other words, the effects of sleep on academic performance might be masked by other variables, which would pose a challenge to understanding the importance of sleep in higher education settings as well as to determine the importance of balancing study, work, and sleep for students.

2.5 Research Questions

The above literature review identified research gaps in current scholarship regarding the relationship between sleep, work, and academic performance in college students and student employees. Based on the review, the following research questions will be answered.

1) How do sleep health and related behaviors compare between students working in the service industry, students working in non-service industries, and students without jobs?

2) What is the relationship between sleep health and work conditions of college students, when comparing students working in service industries and students working elsewhere?

3) Are sleep health and related behaviors associated with academic performance when comparing students working in service industries, students working elsewhere, and students who are not working?

3. Method

3.1 Population and sample

The target population was undergraduate college students. The sample was recruited from six universities geographically dispersed throughout the U.S. offering a 4-year baccalaureate programs in service-oriented majors (e.g. foodservice and lodging). The database used for university selection was *The Guide to College Programs in Hospitality, Tourism, & Culinary Arts* (ICHRIE, n.d.). Institutional Review Board approval was obtained prior to any human subjects contact.

3.2 Instrument

An online survey was developed and used for collecting data. An expert panel review and a pilot test were conducted to confirm the content validity of the instrument. Items were revised based on experts' and participants' comments. The three questionnaire sections are elaborated below: sleep health, academic performance and demographic items.

A measurement of sleep health was adapted from Buysse (2014, p. 17B) including five items: satisfaction with sleep, alertness during waking hours, timing of sleep, sleep efficiency, and sleep duration (SATED). Given SATED uses a 3-point scale (0 = rarely/never, 1 = sometimes, and 2 = usually/always), the range for the total score is 0-10; whereby, established interpretation is that zero indicates poor sleep health and 10 indicates good sleep health. In addition, there were seven sleep-related items including amount of alcoholic beverage consumption, frequency of drinking alcoholic beverages, use of sleep aids, use of technology before bed (e.g., TV, video games, computers, laptops, tablets, and smartphones), and consumption of caffeinated beverages. Participants were also asked about their perceptions regarding the impact of technology and caffeinated beverages on sleep.

Self-reported cumulative GPA was used as a measure of academic performance, which is similar to other studies (e.g., Kelly et al., 2001; Peters et al., 2005; Taylor et al., 2013). Demographic data were collectedincluding sex, age, race/ethnicity, classification status, work/internship requirement, parental education, parental expectation, and permanent address zip code. Zip codes were then linked to median household income for the county (U.S. Census Bureau, 2016). Parental expectation was measured by five items adapted from the family expectation-driven motivation subscale of the Student Motivation for Attending University (Cote & Levine, 1997; Dennis, Phinney, & Chuateco, 2005; Phinney, Dennis, & Osorio, 2006). Parent expectation scale used a 5-point Likert-type scale (1 = strongly disagree to 5 = strongly agree) and was found to be reliable with a Cronbach's alpha of .82. Items regarding employment were placed at the end of the instrument including workplace, managerial/supervisory responsibility, work shift, work hours, and length of employment in current job.

3.3 Data Collection and Analysis

A recruitment email with a link to the online survey, including an informed consent, was sent to students directly or via institutional contacts (e.g., research directors, department chairs, instructors) during the fall semester. Two reminders were sent to contacts at the beginning of the second and third week of the data collection period to increase the response rate as recommended by Dillman, Smyth, and Christian (2014). Demographic information and the scaled data were analyzed using descriptive statistics, Cronbach's alpha, correlations, and analysis of variance (ANOVA). The assumption of homogeneity of variance for between-group comparisons using t-tests or analysis of variance (ANOVA) was checked by applyling the Levene's test. Given the large number of college students working in service industries (e.g., restaurants, cafes, and hotels) and the industries' unique schedule requirements such as shift work, night hours, and irregular schedules, this study compared service employees, non-service employees, and students who did not have a job. Participants were divided into these three groups and the data were analyzed accordingly.

4. Results

4.1 Sample Demographics

There were 736 participants; of those, 175 (23.8%) were students working in the service industry, 265 (36.0%) were students working elsewhere, and 296 (40.2%) were students who did not have jobs. Institutional contacts who sent out the survey link did not report numbers who received the link; therefore, a response rate could not be calculated. The majority of the sample was female (n = 460, 62.5%), 18-24 years old (n = 708, 96.2%), Caucasian (n = 501, 68.1%), and juniors or seniors (n = 493, 66.9%). Before graduating, about 30% (n = 219) of participants were required to complete an internship and about 15% (n = 110) of participants were required to have work experience. The majority of participants were from counties within the United States where the median household income was between $50,000 and $74,999 (n = 513, 76.5%). Approximately 40% (n = 299) of participants reported that their parents' or guardians' highest education level was a bachelor's degree. Table 1 shows the details of the sample demographics.

In the sample, 440 (59.8%) were employed; this percentage is higher than the reported percentage of employed U.S. college students (44.9%, USDL, 2019). Of the 440 student employees, 71.2% (n = 312) did not have managerial or supervisory responsibilities, 72.5% (n = 319) worked 20 hours or less per week, and 86.4% (n = 380) had worked at their current job for two years or less. Fifty-three percent (n = 235) of the student employees were shift workers. Of the 235 shift workers, 49.8% (n = 117) were employed in service industries.

As shown in Table 1, the three groups (service, non-service, and not working) were similar in sex, age, race/ethnicity, classification status, median household income, and parental education. Higher percentages of requiring internship and work experience were found in the service group than the other two groups (51.4% versus 23.0% and 23.1%; 33.1% versus 6.8% and 11.5%, respectively. Of the service group, 66.9% (117 out of 175) were shift workers, and this percentage was almost twice as many (38%) as reported by U.S. Department of Labor (2005). The service group had a higher percentage of participants working over 20 hours per week than the non-service group (38.9% versus 20.0%, respectively).

4.2 Sleep and Related Behaviors

The total sleep score indicated participants' satisfaction with sleep, alertness during waking hours, timing of sleep, sleep efficiency, and sleep duration (Buysse, 2014). On average, the total sleep score was 6.01 (± 2.40) for the entire sample. The mean sleep scores for each group were: 5.83 (±2.36) for service, 6.00 (± 2.43) for non-service, and 6.13 (± 2.39) for non-working groups. Figure 1 shows a comparison of the sleep mean scores between the overall sample and sample groups. Based on these sleep scores, participants' sleep health was middle level, trending toward good

sleep health (Buysse, 2014, p. 17B). Service student employees' sleep health was relatively worse than non-service student employees and students who did not have a job. However, using ANOVA, no significant difference in total sleep scores was found between groups (see Table 2).

Potential causes of poor sleep may include high frequencies of using alcohol as a sleep aid, using sleep aids, drinking caffeinated beverages in the afternoon to stay alert, and using technology before bed (Ebrahim, Shapiro, Williams, & Fenwick, 2013; Rosenzweig, Breedlove, & Watson, 2005). The majority of participants reported less than seven drinks per week (n = 578, 78.6%), which indicated that they were below the moderate level for drinking ("Drinking levels defined," n.d.). Most participants reported never consuming alcoholic beverages (n = 625, 85.1%) or using sleep aids (n = 574, 78.2%) to help them fall asleep. However, it should be noted that the legal drinking age in all states where data were collected was 21 years of age. Of the total number of participants, 360 (48.9%) were under the age of 21 and of those, 227 (30.8% of the total sample) reported consuming at least one to two drinks per week. Additionally, the percentage of participants using alcohol as a sleep aid was 14.9%, which was slightly higher than the percentage (11.4%) reported by another undergraduate-focused study (Taylor & Bramoweth, 2010). A large percentage of participants (n = 665, 90.5%) usually used technology within an hour of going to bed; although, only 30.2% (n = 222) agreed that this behavior made it difficult for them to fall asleep. Similarly, the majority of participants sometimes consumed caffeinated beverages in the afternoon to help them stay alert (n = 452, 61.7%), and 35.1% (n = 258) agreed that this behavior made falling asleep difficult. Table 4 shows the means and standard deviations of sleep related behaviors and perceptions for the overall sample and sample groups.

Table 1. Sample demographics (*N* = 735-736).

Item	**Service** (***n*** **= 175)**		**Non-Service** (***n*** **= 263-265)**		**Not Working** (***n*** **= 295-296)**		**Total** (***N*** **= 735-736)**	
	n	***%***	***n***	***%***	***n***	***%***	***N***	***%***
Sex								
Female	124	70.9	174	65.7	162	54.7	460	62.5
Age								
18–24 years old	164	93.7	259	97.7	285	96.3	708	96.2
25 years old and older	11	6.3	6	2.3	11	3.7	28	3.8
Race/Ethnicity								
African-American (non-Hispanic)	7	4.0	8	3.0	6	2.0	21	2.9
Asian/Pacific Islanders	24	13.7	31	11.7	66	22.3	121	16.4
Caucasian (non-Hispanic)	121	69.1	187	70.6	193	65.2	501	68.1
Latino or Hispanic	21	12.0	26	9.8	18	6.1	65	8.8
Others	2	1.1	13	4.9	13	4.4	28	3.8
Classification Status								
First-year	23	13.1	18	6.8	69	23.3	110	14.9
Sophomore	23	13.1	46	17.4	64	21.6	133	18.1
Junior	47	26.9	105	39.6	72	24.3	224	30.4
Senior	82	46.9	96	36.2	91	30.7	269	36.5
Internship Requirement								
Yes	90	51.4	61	23.0	68	23.1	219	29.8
No	85	48.6	204	77.0	227	76.9	516	70.2
Work Experience Requirement								
Yes	58	33.1	18	6.8	34	11.5	110	14.9
No	117	66.9	247	93.2	262	88.5	626	85.1

Median Household Income[a]								
$25,000~$49,999	23	14.5	25	9.7	22	8.7	70	10.4
$50,000~$74,999	119	74.8	210	81.4	184	72.4	513	76.5
$75,000 or more	17	10.7	23	8.9	48	18.9	88	13.1
Parents' or Guardians' Highest Education Level								
Less than Bachelor's degree	77	44.0	107	40.4	91	30.7	275	37.4
Bachelor's degree	62	35.4	100	37.7	137	46.3	299	40.6
Professional degree	36	20.6	58	21.9	68	23.0	162	22.0
Managerial/Supervisory Responsibility[b]								
Yes	53	30.3	73	27.8	-	-	126	28.8
No	122	69.7	190	72.2	-	-	312	71.2
Work Shift[b]								
Day shift	58	33.1	146	55.3	-	-	204	46.5
Evening, overnight, or rotating shifts	117	66.9	118	44.7	-	-	235	53.5
Average Work Hours Per Week[b]								
Less than or equal to 20 hours	107	61.1	212	80.0	-	-	319	72.5
More than 20 hours	68	38.9	53	20.0	-	-	121	27.5
Length of Employment[b]								
2 years or less	152	86.9	228	86.0	-	-	380	86.4
More than 2 years	23	13.1	37	14.0	-	-	60	13.6
CGPA > 3.0								
Yes	104	59.4	170	64.2	177	60.0	451	61.4
No	71	40.6	95	35.8	118	40.0	284	38.6

Note. [a]Information was based on county data and international students were excluded (Service n = 159, Non-service n = 258, Not working n = 254, Total n = 671). [b]*N* = 438-440.

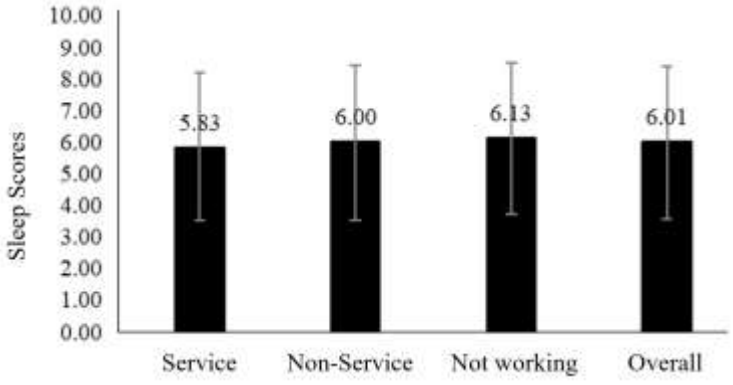

Figure 1. Means for total sleep scores by employment category (0 = poor sleep and 10 = good sleep). Error bars represent one standard deviation.

Table 2. Sleep score comparisons.

Variable	*n*	*M*	*SD*	*F*	*p*
Employment				0.844	0.430
Service industries	175	5.83	2.36		
Non-service industries	265	6.00	2.43		
Not working	296	6.13	2.39		
Use alcohol as a sleep aid				3.647	0.057
Yes	109	5.61	2.16		
No	625	6.08	2.43		
Take sleep aids				7.818	< .01
Yes	160	5.54	2.35		
No	574	6.13	2.40		
Use technology before bed				0.245	0.621
Yes	723	6.01	2.40		
No	12	5.67	2.46		
Have caffeinated beverages				14.721	< .001
Yes	597	5.84	2.38		
No	135	6.71	2.35		
Shift work[a]				2.476	0.116
Yes	235	5.77	2.35		
No	204	6.13	2.46		
Work hours per week[a]				5.341	< .05
Less than or equal to 20	319	6.09	2.32		
More than 20	121	5.50	2.57		
CGPA >3.0				5.601	< .05
Yes	451	6.18	2.38		
No	284	5.75	2.41		

Note. [a]*N* = 439-440.

Table 3. Comparison of sleep related behaviors and perceptions.

Item	Service Workers (*n* = 175)		Non-Service Workers (*n* = 265)		Not Working (*n* = 296)		Total (*n* = 736)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Amount of alcoholic drinks[a]	1.45	1.476	1.42	1.222	1.45	1.439	1.44	1.373
Frequency of consuming alcoholic drinks[b]	1.17	.481	1.22	.595	1.23	.572	1.21	.560
Frequency of taking sleep aids[b]	1.40	.809	1.34	.792	1.38	.795	1.37	.797
Perceived impact of technology on sleep[c]	3.20	1.061	3.08	1.171	3.11	1.065	3.12	1.103
Frequency of using technology before bed[b]	4.57	.820	4.55	.830	4.56	.846	4.56	.833
Perceived impact of caffeinated beverages on sleep[c]	3.14	1.197	3.05	1.152	2.95	1.205	3.03	1.185
Frequency of consuming caffeinated beverages[b]	3.09	1.334	2.93	1.282	2.86	1.315	2.94	1.309

[a]The amount of alcoholic drinks per week included five categories (0 = 0 drinks, 1 = 1–2 drinks, 2 = 3–6 drinks, 3 = 7–14 drinks, 4 = 15–30 drinks, and 5 = over 30 drinks).
[b]A 5-point scale was used (1 = never to 5 = always).
[c]A 5-point scale was used (1 = strongly disagree to 5 = strongly agree).

Sleep score comparisons based on sleep related behaviors are shown in Table 3. The sleep score mean of participants who used alcohol as a sleep aid (M = 5.61, SD = 2.16) was 0.47 points lower than those who did not (M = 6.08, SD = 2.43), although no significant difference was found. Research has suggested that drinking alcohol before going to sleep changes peoples' normal sleep cycles and makes them still feel tired after waking up; although, it does help

them fall asleep quickly (Ebrahim et al., 2013). There was a significant difference between the sleep score of participants who used sleep aids (M = 5.54, SD = 2.35) and those who did not (M = 6.13, SD = 2.40). Increased frequency of nightmares has been identified as a common side effect of using sleep aids and thus have the potential to disrupt sleep (Rosenzweig et al., 2005).

There was no statistically significant difference between the sleep score of participants who used technology before bed (M = 6.01, SD = 2.40) and that of those who did not (M = 5.67, SD = 2.46). Almost all participates (n = 723, 98.2%) used technological devices before bed although this result might be biased due to highly unequal group sizes. Researchers have linked this behavior to insufficient sleep, sleep latency, and daytime sleepiness (Exelmans & Van den Bulck, 2016; Thomée, Eklöf, Gustafsson, Nilsson, & Hagberg, 2007).

A significant difference in sleep mean scores was found among those who consumed caffeinated beverages. The score of participates who had caffeinated beverages in the afternoon or evening (M = 5.84, SD = 2.38) was 0.87 points lower than those who did not (M = 6.71, SD = 2.35). Negative effects of caffeine on sleep include: increased time to fall asleep, reduced sleep hours, and insomnia; although, effects vary by when, how much, and how often an individual consumes caffeinated beverages (McKim, 2007).

4.3 Sleep and Work Conditions

Work conditions assessed in this study included work type (shift worker or non-shift worker) and work hours (10 hours or less, 11-20 hours, and more than 20 hours). As shown in Table 2, the sleep score of shift workers (M = 5.77, SD = 2.35) was 0.36 points lower than that of non-shift workers (M = 6.13, SD = 2.46), but no significant difference was found. There was a significant difference between the total sleep score of participants working 20 hours or less per week (M = 6.09, SD = 2.32) and those working more than 20 hours (M = 5.50, SD = 2.57). This finding is in line with Miller et al's (2008) study showing that college students working 20 hours or more were less likely to sleep seven hours or more.

4.4 Sleep and Academic Performance

The majority of participants reported their cumulative GPAs were higher than 3.0 (n = 451, 61.4%). Similar percentages were found in the service (n = 104, 59.4%), non-service (n = 170, 64.2%), and non-working (n = 177, 60.0%) groups (see Table 1). A significant difference in total sleep scores was found between participants with CGPAs of 3.0 or less (M = 5.75, SD = 2.41) than those with CGPAs higher than 3.0 (M = 6.18, SD = 2.38) (see Table 2).

Potential indictors of cumulative GPAs included sleep, work hours, median household income, parents' or guardians' education level, and parental expectation. Correlations between cumulative GPAs and potential indicators were computed (see Table 4). Positive relationships were found between cumulative GPAs and total sleep scores ($r = .115$, $p < .01$) as well as county median household income ($r = .130$, $p < .01$). A negative relationship was found between cumulative GPAs and work hours ($r = -.154$, $p < .01$). Parental influence on cumulative GPAs was not found. The present findings in combination with similar results of previous studies (Chiang et al., 2014; Chiang & Arendt, 2016) may assist in explaining the weak relationship between sleep and student GPA. That is, despite a lack of sleep, students may use coping strategies to combat sleepiness or to assist them in falling asleep, which in turn helps them perform well academically.

Table 4. Correlations between cumulative GPA and potential indicators.

Variable	***M***	***SD***	***r***	***p***
Sleep score[a]	6.01	2.40	0.115	< .01
Work hours[b]	2.16	0.98	-0.154	< .01
Median household income[c]	$59,580.02	$12,442.95	0.130	< .01
Parents' or guardians' education level[d]	5.13	1.93	0.002	0.961
Parental expectation[e]	3.71	0.87	-0.079	< .05

Note. [a]0 = poor sleep health and 10 = good sleep health.

[b]Work hours included five categories (1 = 10 hours or less, 2 = 11–20 hours, 3 = 21–30 hours, 4 = 31–40 hours, and 5 = over 40 hours).

[c]Information was based on county data and international students were excluded.

[d]Education level included eight categories (1 = less than high school, 2 = high school diploma or equivalent, 3 = some college, no degree, 4 = postsecondary non-degree award, 5 = associate's degree, 6 = bachelor's degree, 7 = master's degree, and 8 = doctoral or professional degree).

[e]A 5-point scale was used (1 = strongly disagree to 5 = strongly agree).

5. Discussion

5.1 Summary of Findings

The findings and implications of this study are applicable to employed students, academic administrators and employers. On average, the sleep score reported by service student employees was slightly lower than non-service student employees and non-working students. The three sample groups reported similar sleep related behaviors. Participants who had low sleep scores reported long work hours. This might suggest that students who work more also have poor sleep health. The service student employee group had a higher percentage of shift workers, participants working over 20 hours, and internship/work experience requirements than non-service student employee group. Participants who had low sleep scores reported lower GPAs. It is difficult to determine if poor sleep leads to lower GPAs or if students who have lower GPAs might have poor sleep due to other variables not studied.Multiple indicators of student GPA were studied—including, but not limited to sleep—and significant relationships were found between sleep, work hours, household income, and student GPAs.

5.2 Implications for Higher Education

For academic administrators, there are several practical implications based on the findings of this study. Students struggling to balance sleep, study, and work, often sacrifice sleep to study more or work longer hours. However, this sacrifice may result in excessive sleepiness, depression, or anxiety and in turn, result in daytime dysfunctions (e.g., having difficulties understanding materials, taking longer to complete assignments/tasks) (Brand et al., 2008; Gillen-O'Neel, Huynh, & Fuligni, 2013; Hershner & Chervin, 2014). Living environment is another aspect that affects college student sleep quality and quantity; particularly those living in residence halls (Qin & Brown, 2017). Looking at this issue from a broader perspective, the consequences of poor sleep health may impact college students' academic performance, job performance, financial well-being, and in turn, graduation and retention rates. This study is vital and applicable when developing curricula, improving work schedules, and emphasizing work-life balance programming.

5.3 Limitations and Future Research

This study had a few limitations. First, results of this study are not generalizable to other countries due to the limited sample size, differences in curriculum design, and percentage of college students holding jobs. Second, participants may underestimate their alcohol consumption due to impression management bias (i.e., ones' attempt to make a good impression on others) (Davis, Thake, & Vilhena, 2010). Third, voluntary participation in the study may not respreent students with less sleep and more work demands because they may be less likely to participate in a survey. The accuracy of self-reported GPAs may be a concern; however, in research by Author (2013), self-report GPA data were 80% accurate (135 out of 172 participants) when comparing participants' self-reported cumulative GPAs to their official cumulative GPAs. Working students' sleep health and associated effects are understudied. Future researchcould assess mental health (e.g., stress, anxiety, and depression) as extraneous variables for a more comprehensive understanding of the association between sleep health, employment, and academic performance.

6. Conclusion

A better understanding of sleep will benefit academic administrators by increasing awareness of coping strategies (e.g., caffeinated beverages, sleep aids), informing program requirement decisions, and developing initiatives focusing on healthy lifestyles (e.g., text messaging to promote sleep health) (Jones et al., 2019). Additionally, findings of this study may increase employers' attention to sleep and influence work scheduling practices. If academic administrators understand the potential impact of sleep on overall student success and utlize study findings, greater emphasis may be placed on sleep as an overall wellness strategy. In turn, students may be encouraged to balance their time spent studying, working, and sleeping instead of sacrificing one in favor of another.

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