

## ORIGINAL RESEARCH

# Sleep deprivation in nursing students: The negative impact for quality and safety

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## ABSTRACT

**Objective:** The purpose of this pilot study was to understand nursing students' perception of the relationship between sleep deprivation and learning, and personal and patient safety when in a clinical or work setting.

**Methods:** Design: The researchers used a cross-sectional correlational design. Setting: The study was conducted in a Mid-western state university school of nursing with an average of 400 undergraduate pre-licensure nursing students. Sample: All 328 undergraduate pre-licensure nursing students were invited to participate in the study. The convenience sample of 179 (response rate of 55%) pre-licensure, nursing students completed the study. Methodology: The Sleep Deprivation of Nursing Students, a 4-point Likert scale questionnaire, consisted of demographic questions and forty-five questions on personal sleep habits, caffeine/stimulant use, and sleep inducing aids, motor vehicle safety, spare time activities, and safety during work and clinical experiences.

**Results:** One hundred and fifty-five (n = 155) students needed seven or more hours of sleep daily to feel rested, but received less than 5 hours/day. All participants reported (n = 179) feeling sleep deprived. Sleep inducing aids were used by (n = 56) participants, and (n = 35) took stimulants to stay awake. Students (n = 166) worked 8 or more hours at a job, and (n = 158) had at some 12 hour school clinical rotations, and (n = 64) reported a combined clinical and work of five to greater than 12 consecutive days. Students (n = 172) believed they provided safe practice at work and (n = 174) and safe practice in a clinical setting. Some students reported being awake 17-19 hours. The majority of students (n = 144) believed 12-hour-clinicals were too long, yet more than half of the students preferred 12-hour work and clinical experiences.

**Conclusions:** Nursing students may lack the knowledge that chronic sleep deprivation may result in personal and patient safety issues when in a clinical or work setting. Students are potentially exposing themselves to acute and chronic health problems as a result of sleep deprivation and the use of substances to remain awake or obtain sleep. Nurse educators and nurse managers must collaborate to reduce the number of consecutive clinical and work shifts, limit overtime hours, and better educate students on the negative impact of sleep deprivation.

**Key Words:** Sleep deprivation, Nursing student, Quality and safety

## 1. INTRODUCTION

Long work hours, consecutive shifts, and sleep deprivation in physicians and registered nurses have been associated to

negatively impact patient safety.<sup>[1-4]</sup> However, little information is available relating nursing students' sleep, work habits, and safety. Unhealthy habits formed during college years

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may later result in a lifetime of chronic health problems and for nurses adversely impact quality of care and patient safety. Nursing students may be more susceptible to developing poor sleep habits as a result of stringent program commitments and a lack of knowledge about the acute and chronic health consequences that may carry over into professional practice.

Historic studies as well as more recent research have confirmed sleep loss negatively affects performance of cognitive tasks, indicating slower reaction times and poor decision-making, as well as cardiac, metabolic, and gastrointestinal issues<sup>[5-7]</sup> while the sleep-deprived persons do not realize the extent to which they are affected or the long term impact to health.<sup>[3,8]</sup> College students, in particular, experience the pressing need to work and maintain social lives while balancing extensive class and study time. Hershner and Chevin<sup>[9]</sup> reported that 50% of college students suffer from daytime sleepiness, and 70% do not obtain sufficient sleep impacting grade point averages, the risk of academic failure, auto accidents, learning and memory. Researchers also found that a significant proportion of nurses and nursing students suffer from sleep abnormalities and associated medical issues (headaches, tiredness, back pain, gastroesophageal reflux, insomnia, and depression), as well as lower grades in those with significant lack of sleep.<sup>[3,10,11]</sup> Additionally, the circadian system of young people supports late nights for sleeping and late mornings or early afternoons for waking. Daytime sleepiness due to lack of natural sleep reduces academic achievement, learning, and behavioral performance.<sup>[9,12]</sup> The changes to behavioral performance can result in increased risk-taking, emotional disorders, and substance abuse, all of which increase the risk of accidents and injuries.

Furthermore, college students typically have irregular schedules, little or no adult supervision, and easy access to over-the-counter, prescription, and recreational drugs.<sup>[13]</sup> Challenging daily demands of college life combined with sleep deprivation can lead to a stimulation-sedation loop cycle: caffeine and other stimulant use during the day for wakefulness and depressant use at night to neutralize stimulant effect and to aid in sleep.<sup>[9]</sup> Alarming, four of five college-age students engage in alcohol use with up to 40% admitting to binge drinking, using alcohol as a sleep aid, or using caffeine late at night to prevent or delay sleep.<sup>[14,15]</sup> Close to 90% of young people entering drug rehabilitation programs admit to self-medicating for the promotion of wakefulness and sleep to deal with erratic college schedules.<sup>[16-18]</sup>

Lockley, Barger, Ayas, Rothschild, Czeisler, and Landrigan's and Scott et al.'s studies found that nurses working 12.5 hours or more made significantly more errors and had an increased risk for needle stick injury, hepatitis, HIV, and blood borne

illness and regretted some clinical decisions.<sup>[7,19]</sup> Scott et al. found that nurses working the night shift, those working 12-hours or greater, or were males had the most decision regret.<sup>[7]</sup> Lockley et al. also found that physicians working consecutive 24-hour shifts made more serious errors, attention failures, had more needle stick injuries, and doubled their risk of having a motor vehicle accident.<sup>[19]</sup>

While the literature presents a persuasive picture of the need for sleep and the impact sleep deprivation can have on students, and healthcare practitioners, a dearth of research surrounding, specifically, nursing students, sleep deprivation, and associated impact of sleepiness on health and safety exists. Therefore, the research question for this pilot study was, "What are nursing students perception of the relationship between nursing students' sleep habits and learning, and personal and patient safety when in a clinical or work setting?"

## 2. METHODS

A cross-sectional correlational design was used for the pilot study. A convenience sample of 328 pre-licensure nursing students from a Mid-western university was sought for the study. Internal Review Board (IRB) approval was obtained through the university. The anonymous questionnaire, informed consent, and all study materials were sent via Qualtrics,<sup>[20]</sup> an online survey method, to all undergraduate nursing students via students' university email accounts. Students had been or were currently enrolled in a nursing course with a clinical component. The data will be stored in a locked file cabinet in the researchers office for a year period of time after study completion.

### 2.1 Participants

Three hundred twenty-eight pre-licensure undergraduate nursing students in a Mid-western university were invited to participate in the study. Of the convenience sample (n = 328), 182 students responded and 179 completed the study, resulting in a 55% response rate. Eighty-eight percent of the participants (n = 157) were nineteen to twenty-four years of age. The majority of the students were seniors (n = 164), female (n = 169), and single (n = 163) with no children (n = 164). One hundred fifteen (n = 115) participants drove to work 0-15 minutes, n = 23 participants drove 16-30 minutes to work, only 22 participants drove 31-45, and n = 12 participants drove greater than 45 minutes to work.

### 2.2 Instrumentation

The questionnaire was developed by the researchers and titled, Sleep Deprivation of Nursing Students, and included demographic and 45 survey questions. After extensive review

of the literature questions were developed by four researchers using expert judgment resulting in content validity. Section (A) of the questionnaire addressed general sleep habits, (B) addressed school clinical and personal work experiences, section (C) addressed motor vehicle use, after working and program clinical experiences, part (D) of the questionnaire addressed what students do in their spare time, and (E) their experiences around safety during work and clinical experiences. The questionnaire was based on a 4-point Likert scale ranging from never, sometimes, often and always, and degrees of time or distance.

### 2.3 Procedures

The 328 undergraduate, pre-licensure, nursing students were emailed an invitation letter to participate. The questionnaire was sent by an Internet Technology (IT) technician, serving as part of the team, using the student's university email address and Qualtrics, an online survey delivery method. There were no incentives provided for completing the study. Three email reminders were sent to the participants during the six-week study completion period. The data analysis was completed by four researchers and a university statistician.

### 2.4 Data analysis

Participants were asked to rate their responses to posed questions or statements on a 4-point Likert scale. Researchers calculated the percentage for each question or statement or groups of like questions/statements. The research team analyzed the question results and like groups of questions to determine their relationship to one another. All data analysis was completed using IBM SPSS Statistics for the Macintosh, Version 22.0. There were similar groups of questions included within specific categories of the questionnaire such as, general sleep habits, work and school clinical experiences and sleep, travel time, and accident history after work or a clinical experience, travel distance, how personal time is spent when not working or in a school clinical experience, and safety when working or engaged in a school clinical experience.

## 3. RESULTS

One hundred and eighty-two students agreed to participate, and 179 students completed the study questionnaire. When asked about general sleep habits, 24 participants believed they needed 5-6 hours of sleep, 120 participants required 7-8 hours of sleep, and 35 participants needed greater than 8 hours of sleep to feel rested. However, the majority of participants (n = 107) only slept 5-6 hours before class or clinical

experience and often felt sleep deprived. One hundred and thirty-two participants believed they would perform better academically if more sleep was obtained. To stay awake, 152 participants consumed some form of caffeine, while a third consumed some form of sleeping aids. The majority of participants (n = 158) had school clinical hours of 7-12 or greater. There were 95 student participants not working in a healthcare related area, and 51 participants were not working at the time of the study. The average work hours were 5-12 hours per day during the academic year.

There were four questions related to feelings of being tired and falling asleep at work or clinical and three questions related to 12-hour shifts worked during employment or a clinical experience. One hundred and fifty-seven participants felt tired while working, and 168 felt tired during the required school clinical hours. Twenty-three participants reported having fallen asleep at their job or during a clinical experience. More than half of the participants preferred to work and have school clinical experiences of 12-hours in sharp contrast to 144 students believing that 12-hour shifts were too long for clinical experiences.

There were eight questions about driving a motor vehicle when feeling tired after work or a clinical experience of 12 or more hours. All of the student participants felt tired when driving a motor vehicle after working or a clinical experience and over half had either fallen or nearly fallen asleep while driving after working or a clinical experience. Thirty-three participants reported that they had almost had a motor vehicle accident after a 12-hour clinical experience. There were two questions related to the number of miles driven after work or clinical. Ninety-nine participants drove 5 to greater than 12 miles to work, and 121 drove 5 or greater than 12 miles to a clinical experience. When given the time 170 participants tried to catch up on sleep.

Eight questions were directed to safe practice when working or in a school clinical experience. Almost all student participants believed they provided safe practice at work (n = 172) or during a clinical experience (n = 174). Participants did not believe working 12-hour shifts negatively impacted safe practice (n = 152) or safety during school clinical experiences (n = 145). However, participants did believe that school clinical experiences of 12 hours or more decreased the ability to learn (n = 139). There were 63 students who stated that they have worked and also had clinical experiences of 12 hours or more back-to-back shifts. There were (n = 64) participants who had combined consecutive days of work and school clinical experiences of five to greater than 10 days (see Table 1).

**Table 1.** Sleep study result highlights

<b>1A General Sleep Habits</b>					
1a. On average I need-----hours of sleep to feel rested	0-4 ----- 0	5-6 ----- 24	7-8 ----- 120	Greater than 8 ----- 35	Total Responses 179
2a. On average I obtain-----hours of sleep prior to class	0-4 ----- 4	5-6 ----- 107	7-8 ----- 65	Greater than 8 ----- 3	179
3a. On average I obtain ----hours of sleep prior to a clinical experience	0-4 ----- 37	5-6 ----- 112	7-8 ----- 28	Greater than 8 ----- 2	179
4a. I feel sleep deprived?	Never ----- 0	Sometimes ----- 74	Often ----- 91	Always ----- 14	179
5a. I would perform better academically if I had more sleep	Never ----- 3	Sometimes ----- 44	Often ----- 47	Always ----- 85	179
<b>1B. Nursing Program Clinical Hours and Work Experiences</b>					
1b. My school clinical experience hours are-----	1-4 ----- 2	5-6 ----- 17	7-12 ----- 106	Greater than 12 ----- 52	Total Responses 177
2b. I have been employed -----hours during the academic year	Not working ----- 51	1-4 ----- 6	5-8 ----- 20	8-12 ----- 100	177
3b. I am employed in a healthcare related field	Yes ----- 82	No ----- 95	177		
6b. I feel tired while working	Never ----- 7	Sometimes ----- 79	Often ----- 65	Always ----- 13	164
7b. I feel tired during my school clinical experience	Never ----- 2	Sometimes ----- 72	Often ----- 80	Always ----- 16	170
<b>E. Safety at Work or Clinical Experience</b>					
1e. I believe I provide safe practice at work	Never ----- 1	Sometimes ----- 2	Often ----- 62	Always ----- 108	Total Responses 173
2e. I believe I provide safe practice during a school clinical experience	Never ----- 0	Sometimes ----- 1	Often ----- 55	Always ----- 118	174
3e. Working 12-hour shifts does not negatively impact safe practice	Never ----- 16	Sometimes ----- 80	Often ----- 49	Always ----- 23	168
4e. School clinical experiences of 12 hours or more do not impact safe practice	Never ----- 25	Sometimes ----- 75	Often ----- 49	Always ----- 21	170

**4. DISCUSSION**

Many nursing students need or choose to work while in college and/or during clinical activities requiring up to 12-hour shifts. Also, faculty are finding it increasingly difficult to secure clinical sites and may need to have students drive

farther distances,<sup>[21]</sup> as well as use weekend and night clinical shifts as an alternative to day shifts. The longer clinical hours coupled with longer commuting may place students in situations that jeopardize their safety as well as compromise patient safety. While there has been much discussion

about the difficulty new registered nurses are experiencing with the role transition to professional practice, there are still important questions being asked about preparation for the transition.<sup>[22]</sup> We found that all of the student participants were or had been working at some time during the college experience.

The majority of the participants (87%) needed 8 or more hours sleep to feel rested but 62% obtained 6 hours or less before class time, and more alarming, 83% received 6 hours or less before a clinical experience. This potentially places the students at risk for less than optimal learning in the classroom and more significantly creates potential safety issues in the clinical environment. Caruso and Scott, Arslanian-Engoren and Engoren,<sup>[2,7]</sup> have found that cognitive abilities, reaction time, and decision-making are all negatively impacted by lack of sleep and 12-hour shifts. Students may mistakenly believe they are safe in a clinical environment with less than 5 hours of sleep but the research strongly indicates they are not. All of the participants felt sleep deprived and believed they would perform better academically if they had more sleep.

To combat the need for sleep participants admitted consuming caffeine or took stimulants and then consumed sleeping aids to fall or stay asleep. This pattern may lead to future chronic health issues and potential addiction.<sup>[16-18]</sup> What is not known is the type of caffeine or stimulants being consumed, such as the current trend of highly caffeinated energy drinks, coffee, sodas, or pills. This is alarming since Bootzin and Stevens' (2005)<sup>[16]</sup> study, and the current rise in illicit drug use, indicates that up to 90% of college age people entering drug rehabilitation programs admitted to self-medicating to stay awake and then to obtain sleep. This behavior may carry over to the work environment when the now professional nurse is working multiple 12-hour shifts, potentially leading to chronic health, addiction, and safety issues as confirmed by Hershner and Chervin, and Sivertsen et al.<sup>[9,23]</sup>

In spite of the current research indicating increased error rates and safety issues with 12-hour shifts participants still believed they engaged in safe practice at work and during a clinical experience. Participants (90%) also believed work or clinical experiences (85%) of 12-hour shifts or more did not impact safety, and 82% of the participants did not believe 12 hour clinical experiences decreased their ability to learn. This finding is the opposite of Hershner and Chevin's study findings that 50% of college students suffer from daytime sleepiness, which results in lower GPA's and the ability to learn, negatively impacts motor vehicle driving, and influences their moods.<sup>[9]</sup> There is also support that fatigue results in an organizations financial loss due to errors, absenteeism,

loss of productivity, turnover, disability, death and increased risks for decreased patient safety and increased motor vehicle accidents.<sup>[2]</sup>

Our findings are consistent with Luckhaupt, Tak, and Calvert's (2010) report that at least 32% of healthcare employees receive 6 hours or less of sleep.<sup>[24]</sup> This is a disturbing trend that not only impacts the health and safety of the employee, but also the patients and supports the findings of this study. Nursing student's safety should be at the forefront of nurse educators and employers when engaging students in school and work requirements. We must teach our students about proper sleep and health habits that will hopefully carry over into their professional careers.

#### 4.1 Limitations

This pilot study used a convenience sample at a Mid-western university, and the results may not be generalizable to other schools of nursing of differing sizes, especially those in large urban areas. Also, due to the unique nature of the study, the authors developed a new instrument that needs further testing for validity and may need changes to some questions to obtain more detailed answers. Lastly, although the researchers strived to convey to potential participants that no punitive actions or rewards would be given if the survey was completed or not, students still may have perceived that they needed to participate in the study to satisfactorily meet program or course requirements.

#### 4.2 Implications and recommendations for nursing

This study investigated undergraduate pre-licensure nursing students' self-reports of sleep habits, academic performance, use of stimulants, the number of employment and clinical hours, feelings of tiredness, performance in the clinical setting and driving and adverse effects of fatigue and driving on participants. Students obtaining less than optimal sleep, remaining awake 18-19 hours per day, and consuming substances to stay awake or fall asleep impacts their ability to learn, clinical judgment, and may lead to substance abuse, health issues, and accidents. Educators must determine how many clinical activities should include 12-hour shifts that have been well documented to lead to increased errors, decreased cognition, sleepiness, and motor vehicle accidents. The results indicated that half of the students (53%) were not employed in a healthcare related area. As educators and clinicians should we be concerned about this. Further inquiry needs to take place as to why students who are working towards a professional healthcare position are not seeking employment in healthcare related fields, while still in school. Could it be that there is a lack of suitable jobs in healthcare facilities? Or, is it possible that students may earn more money

and have more flexible hours in jobs outside of healthcare. Future research should investigate if employment outside of healthcare is adversely impacting students transition into professional practice, affecting quality of care and astute safety practices.

These findings give us concern and raise additional questions that while 12-hour shifts are the norm for the professional nurse, 12-hour shifts may not be the best option for all levels of nursing students. It is the responsibility of the nurse educator and employer to educate nursing students on the dangers of sleep deprivation, use of substances to aid sleep or wakefulness and long, consecutive work and clinical hours. This can be accomplished by holding workshops, providing Fact Sheets, gradually increasing clinical hours, and having students and employers monitoring the combined number of days and hours worked and engaged in a clinical requirement per week. In addition, educators and nurse managers must work collaboratively to provide the best schedule for the student/employee. Limited personal work hours during the time students have clinical requirement rotations seems to be a logical and reasonable solution. While this study was limited to one group of students in a Mid-western university future research on a national level is planned to strengthen the validity and reliability of the newly developed questionnaire and gain more information about nursing students sleep habits on a broader scale.

## 5. CONCLUSION

Over 30 years of research has shown the negative effects of sleep deprivation, circadian misalignment, and human performance in physicians and nurses. There is little, if any, investigation to date, into the effects of those same variables on nursing students. Post-study, we conclude that it is incumbent that educators realize the responsibility to recognize how; sleep, employment, and clinical variables affect personal safety and overall clinical judgment. Educators and employers may need to collaborate to determine if limits on work and clinical experiences are needed and to teach students about proper sleep, health habits, and safety. The transition to professional practice may be improved, and students may develop better health habits that carry over to their professional careers and personal lives. Finally, providing nursing students with the information about sleep deprivation and safety may also better ensure patients receive quality and safe care.

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## CONFLICTS OF INTEREST DISCLOSURE

The authors declare that there is no conflict of interest.

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