

## Sleep Quality of Online Doctor of Nursing Practice Students

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### ABSTRACT

*Sleep problems are common among university students and approximately one third of the general population; however, little is known about the sleep quality of online Doctor of Nursing (DNP) students, and whether the flexible schedule offered by online programs helps support students to adopt a healthy sleep pattern. Guided by the Orem's theory of self care and deficit, underpinned by DNP essentials, this DNP project examined the sleep quality of online DNP students before and after starting doctoral studies and the factors that influence their sleep quality. Two surveys: 1). Cross-sectional survey, and 2). Pittsburgh Sleep Quality Index (PSQI) were used to collect data from Aspen University – DNP online students. Results suggest that the sleep quality of online DNP students is impacted by their studies. These findings suggest that online DNP students are not immune to the sleep problems that commonly plague brick and mortar university students. There may be a correlation between online studies and sleep quality, but further studies are needed to confirm this relationship. Application of this project and its findings is useful to the nursing profession and to other online programs. An effort may be to institute a health promotion strategy to assess the sleep quality of new incoming online students, followed by re-assessment at interval(s) throughout the programs. This health promotion strategy may provide the online student insight to their sleep quality that may lead to self-care intervention.*

### Keywords

Sleep, Sleep pattern, Online, DNP students, Stress, Sleep quality.

### Introduction

The fundamental importance of sufficient, restorative sleep in maintaining an individual's physical and mental health is well accepted among health professionals and researchers [1]. Researchers have identified inadequate sleep and a high prevalence of fatigue among graduate/doctoral students is a concerning health issue [2-5]. Poor sleep quality is associated with higher odds of poorer mental health, diagnosed high blood pressure, diagnosed diabetes, diagnosed heart disease, poor/fair self-rated health, obesity, current smoking, and hazardous drinking [4,6].

Online education programs have become popular because of their flexible access to content and instruction at any time; and on average, students enrolled in online learning performed modestly better academically than those receiving face-to-face instruction [7]. Online DNP programs provide the flexibility to

access curriculum at any time; especially as nurses work variable days, afternoons, and evening's night shift while juggling other responsibilities. Transitioning educational programs from traditional brick and mortar to online is not new and has been studied extensively, including student locus of control [8]. Online DNP programs have also adapted to support DNP students learning experience in virtual environment by providing novel support systems such as virtual preceptors [9]. However, little is known about how this access to course material at any time of the day or night affects the sleep quality of online DNP students. The opportunity was to examine the sleep quality of online DNP students guided by Dorothea Orem's theoretical model of patient self-care and self-care deficit [10,11]; underpinned by DNP essentials. Orem's model of patient self-care and self-care deficit is relevant today from a health promotion and disease prevention perspective. Orem's models theorizes that individuals are distinct, responsible for their own care and by knowing of potential health, problems may provide the impetus for the individual to change behavior [12].

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This DNP project examined sleep quality of online DNP students through three clinical questions. First, to determine how the sleep pattern of online DNP students compared to their sleep pattern before starting their DNP program. The second was to determine whether the sleep pattern of online DNP students improved during course breaks. Third, from a disease prevention perspective, identify key variables that affected DNP students sleep quality. These gaps of knowledge pertaining to the sleep quality of online DNP students is an impediment to self care, to online DNP programs, and to the profession itself to support their doctoral students.

### Literature Review

Examining papers using Fineout-Overholt et al. [13] critical appraisal framework, ten papers of quality and/or interest specific to sleep quality of online DNP student informed this DNP project including establishing the definition of sleep quality. Sleep quality is defined as “one’s satisfaction of the sleep experience, integrating aspects of sleep initiation, sleep maintenance, sleep quantity, and refreshment upon awakening” [14]; and sleep quality is measured using the PSQI – a validated and verified tool [14].

Four papers will be highlighted beginning with research conducted by Gilbert and Weaver [15], who sought to examine the relationship between sleep deprivation, sleep quality, and academic performance. They hypothesized that participants who had higher levels of sleep deprivation and poorer sleep quality would have lower grade point average (GPA) and course incompletions versus participants with good sleep quality [15]. Sample size was 557 of undergraduate introductory psychology students; of which 35.7% ( $N=199$ ) male and 64.3% ( $N=358$ ) female. Data points included GPA, global sleep quality, hours slept, gender, number of drop courses, withdrawals and incompletes and they controlled for depression [15]. Data collection utilized demographic survey, Goldberg depression inventory tool, and the PSQI; and concluded that for optimal cognitive functioning, an individual required good quality sleep for learning, memory consolidation, critical thinking and decision making that is necessary for academic success in higher education [15]. A significant relationship noted between sleep quality and academic performance for women, however this same relationship did not exist for men [15]. A paper by Cort-Blackson [16], sought to understand the effects of sleep deprivation on the academic performance of online university students. Sample size was small - only 10 online Psychology university students – undergraduate and graduate. Qualitative in nature using interview face-to-face questions and open-ended interview questions. Weaknesses to this paper included a non-validated collection tool and a small number of participants; therefore, results cannot be assumed representative of the larger population [16]. A third paper by Okano et al. [17], sought to explore how sleep affects university students’ academic performance by objectively and ecologically tracking their sleep throughout an entire semester secondary aim was to understand gender differences in sleep and academic performance. Their population were 100 students at MIT enrolled in a particular course; using a novel wearable technology – a Fitbit—a wearable activity tracker. Fitbit uses a combination

of the wearer’s movement and heart rate patterns to estimate the duration and quality of sleep. Appraising the research, highlighted new insights about the timing of the relation between sleep and academic performance; however, weaknesses include the lack of measuring online doctoral students, and a lack of generalizability because the sleep quality measures were made with proprietary algorithms of Fitbit where there is no published evidence that Fitbit’s 1~10 sleep quality scores represent a valid assessment of sleep quality.

A fourth paper by Batten et al. [18], sought to replicate the outcomes of a Canadian study by evaluating the sleep behaviors of university students in Australian and found themes associated with sleep issues. These themes included pressure to maintain grades; therefore, deprioritizing sleep as important [18]. Students experience higher than average mental health and physical issues due to lack of sleep; consistent with studies that found that sleep is a contributing factor to overall physical and mental health [1,18]. Batten et al. [18] study confirmed that approximately 70% of participants would be receptive to receive information about sleep and sleep strategies via email, a handout and or a one-on-one consultation with a health care professional. The outcomes of the Batten et al. [18] study replicated the results of the Canadian study suggesting that sleep issues in university students is truly a universal health issue [19]. Interestingly, the Batten et al. [18], study highlighted a gap by identifying that although nearly 30% of university students reached out for help to address sleep issues; their choice of professional in descending order were to their doctor – 69%, family or significant other 41.3%, or friend 24.8% and a distant 6% sought out help from a nurse. Nursing is a caring profession and for the past eighteen years, continues to rank as American’s most trusted profession [20]. These findings highlight an opportunity for nurses to become a trusted partner for sleep consultations, health promotion and increase the collaboration between nursing and other health professions in the field of sleep.

### Methodology

The primary methodology of this DNP project was quantitative; and deployed two instruments. First, a cross-sectional survey to gather information about the sleep behaviors and factors influencing the sleep pattern of online graduate students. An online survey tool, known as survey monkey, was enabled to collect data, while providing anonymity for the participants. Eleven questions were included in the survey. Four demographic questions were posed at the beginning of the survey to collect information from the participants about their gender, age, shift work and the number of months of doctoral studies they had completed. The second instrument, Pittsburgh Sleep Quality Index (PSQI) developed by Buysse et al. [14], was used with permission to assess sleep quality in students. The PSQI is a nineteen-item, self-rated questionnaire utilized to measure sleep quality during the previous month. The main survey items are grouped into seven components, each weighted equally on a 0 to 3 scale. The seven components consist of: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction over the last month. These component

scores were added together to produce a "global PSQI score", which has a range of 0 to xx; with higher scores indicating worse sleep quality. Diagnostically, a global score of 5 or below is considered good sleep quality; whereas scores above 8 are considered, to be suggestive of poor sleep quality [14]. The PSQI may be completed in 15 minutes. A convenience sample was used to recruit volunteer participants for the DNP project. The DNP project volunteer participants were recruited from the Aspen University online DNP student body via the online DNP lounge. DNP project purpose, process, ethics and consent were clearly provided. No payment was made to any of the participants.

## Results

15 participants gave consent in the cross-sectional survey. One participant did not answer any survey questions and hence was removed from the data analysis. The final sample size for the cross-sectional survey was 14. Table 1 presents the demographics of the 14 participants. 100% were female. 50.0% were 51-60 years old. Nearly 30% of the participants (28.6%) had been pursuing online DNP studies for less than 6 months. Majority of the participants (85.7%) did not work rotating shifts.

**Table 1:** Demographics of Participants for the Survey of Sleep Quality.

Variable		N	%
Gender	Female	14	100
Age	30-40 years old	2	14.3
	41-50 years old	1	7.1
	51-60 years old	7	50.0
	61 years old or older	4	28.4
Length of time pursuing online DNP studies	Less than 6 months	4	28.6
	6-12 months	3	21.4
	13-18 months	3	21.4
	19-24 months	2	14.3
	25+ months	2	14.3
Work rotating shifts	Yes	2	14.3
	No	12	85.7

## Summary of Survey Responses for PSQI

25 participants provided consent for the PSQI. Sixteen participants did not answer questions 1-9 of PSQI; hence were removed from the data analysis. The final sample size for the PSQI was 9.

The first clinical question was to determine how the sleep pattern of online DNP students compared to their sleep pattern before starting DNP studies. Before beginning online doctoral studies, participants moderately agreed that they went to bed at the same time ( $M = 4.00$ ,  $SD = 0.78$ ; Table 2) and felt rested when getting up ( $M = 3.29$ ,  $SD = 1.33$ ), and that they were able to balance all aspects of their life ( $M = 4.07$ ,  $SD = 1.38$ ). Since beginning online doctoral studies, participants moderately agreed that the time they went to bed had changed ( $M = 4.07$ ,  $SD = 1.07$ ), felt less rested when they got up ( $M = 3.79$ ,  $SD = 1.31$ ), laid awake at night thinking or worrying about everything they had to do ( $M = 3.79$ ,  $SD = 1.25$ ), and had made changes to their daily/weekly routine to support a healthy sleep pattern during their studies ( $M = 4.00$ ,  $SD = 0.78$ ). Participants did not feel that they were able to balance all aspects

of life to ensure adequate sleep about the same as they could before starting online graduate studies ( $M = 2.36$ ,  $SD = 1.15$ ).

**Table 2:** Descriptive Statistics for Q2, Q3, and Q4 of the Survey Questionnaire of Sleep Quality.

Item	M	SD
Q2. Before beginning online doctoral studies:		
a) I went to bed at the same time	4.00	0.78
b) I felt rested when I got up.	3.29	1.33
c) I was able to balance all aspects of my life	4.07	1.38
Q3. Since beginning online doctoral studies:		
a) The time I go to bed has changed.	4.07	1.07
b) I feel less rested when I got up.	3.79	1.31
c) I lie awake at night thinking or worrying about everything, I have to do.	3.79	1.25
d) I have made changes to my daily/weekly routine to support a healthy sleep pattern during my studies	3.64	1.15
Q4. I feel that I am able to balance all aspects of my life to ensure adequate sleep about the same as I could before starting online graduate studies.	2.36	1.15

The second clinical question was to determine whether the sleep pattern of online DNP students improves during course breaks. Q5 of the survey questionnaire for sleep quality was used to answer the 2<sup>nd</sup> clinical question. The mean response score for Q5 was computed. The mean scores ranged from 1 to 5, with higher scores indicating higher agreement to the statement. The mean score of Q5 was 4.07 ( $SD = 0.92$ ) (Table 3), indicating that participants moderately agreed that, during course breaks, the amount and quality of sleep they were improved.

**Table 3:** Descriptive Statistics for Q5 of the Survey Questionnaire of Sleep Quality.

Item	M	SD
Q5. During course breaks, the amount and quality of sleep I get improves.	4.07	0.92

The third clinical question was to identify some key factors that prevent online DNP students from adopting a healthy sleep pattern. To answer the third clinical question, Q3 and Q4 of the survey questionnaire for sleep quality (concerning sleep pattern since beginning online DNP studies) and the scores of the 7 components for PSQI and the global PSQI score was used.

As the sample size was small, age, length of time pursuing online DNP studies, and working rotating shifts were coded so each variable contained only two levels (age: 30-60 years old vs. 61+ years old; length of time pursuing online DNP studies:  $\leq 12$  months vs.  $\geq 13$  months; working rotating shifts: yes vs. no). The demographic variable, gender, was not included in the analysis, as all participants were female. Two-sample t-tests were used to determine a) if there was a difference in the response scores of Q3 and Q4 based on age, length of time pursuing online DNP studies, and working rotating shifts, and b) if there is a difference in the scores of the 7 components for PSQI (duration of sleep, sleep disturbance, sleep latency, day dysfunction due to sleepiness, sleep efficiency, overall sleep quality, and need meds to sleep) and the

global PSQI score based on bed partner/roommate (Q10 of PSQI: Do you have a bed partner or roommate?).

There was no statistically difference in the sleep quality by age Q3 and Q4, or sleep quality by length of time pursuing online DNP studies, or working shifts; however there was a statistically difference in the mean response scores of Q3c (I lie awake at night thinking or worrying about everything I have to do) between participants 30-60 years old ( $M = 3.30, SD = 1.16$ ) and participants 61+ years old ( $M = 5.00, SD = 0$ ) ( $t(9) = -4.636, p = 0.001$ ). Comparing to participants 30-60 years old, participants 61+ years old more often laid awake at night thinking or worrying about everything they had to do.

Table 4 shows the descriptive statistics for PSQI scores by bed partner. There was no statistically difference in the mean scores of PSQI component – duration of sleep between participants with no bed partner ( $M = 1.67, SD = 1.53$ ) and participants with a bed partner in same bed ( $M = 1.50, SD = 1.05$ ) ( $t(7) = 0.196, p = 0.850$ ). There was a statistically difference in the mean scores of PSQI component – sleep disturbance between participants with no bed partner ( $M = 1.33, SD = 0.58$ ) and participants with a bed partner in same bed ( $M = 2.17, SD = 0.41$ ) ( $t(7) = -2.546, p = 0.038$ ). Participants with no bed partner had statistically significantly better sleep quality in terms of PSQI component – sleep disturbance than participants with a bed partner in same bed.

**Table 4:** Descriptive Statistics for PSQI Scores by Bed Partner.

	No bed partner ( $N = 3$ )	Partner in same bed ( $N = 6$ )
PSQI components		
Duration of sleep	1.67 (1.53)	1.50 (1.05)
Sleep disturbance	1.33 (0.58)	2.17 (0.41)
Sleep latency	1.00 (1.00)	1.67 (1.03)
Day dysfunction due to sleepiness	1.33 (0.58)	1.00 (0.63)
Sleep efficiency	1.00 (1.73)	1.33 (1.37)
Overall sleep quality	1.67 (0.58)	1.33 (0.52)
Need meds to sleep	1.00 (1.73)	1.50 (1.22)
Overall PSQI score	9.00 (1.73)	10.50 (4.32)

There were a few notable selfcare findings from the PSQI. 50% respondents reported having difficulty staying awake with Activities of Daily Living (ADL) i.e. Feeding and/or Instrumental Activities of Daily Living (IADL) i.e. driving a car. 60% used over the counter sleep supplements or prescription sleep medication, and 90% reported having difficulty to keep up enthusiasm to get thing done, which suggests an impact to their mental health.

## Conclusion

The aim of this DNP project was to fill the knowledge gap by developing an improved understanding of the behaviors, attitudes, and factors influencing the sleep pattern of online DNP students. Based on the data collected and synthesis, this DNP project provided deeper insight and answered the clinical questions that suggests, there may be a correlation between online studies and sleep quality, but further studies are needed to confirm this relationship. Upon analysis, synthesis and reflection, there are

multiple thematic areas of further inquiry that this DNP project has illuminated but did not pursue. For example, This DNP project was undertaken against the backdrop of a global pandemic and evidence continues to suggest that the pandemic has caused burn out for all healthcare professionals [21]. The sample group were working nurses and further study into whether burn out due to pandemic affected their sleep habits. This and other limitations, and unanswered questions require future projects and research into the, what, and why? Sleep quality issues affect online DNP students. This is a call to action for online DNP programs to review and/or implement health promotion services such as surveys used in this project to assess the sleep quality of online DNP students. This health promotion strategy may provide the online student insight to their sleep quality that may lead to self-care intervention.

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