

# **The Impact of an Online Prematriculation Sleep Course (Sleep 101) on Sleep Knowledge and Behaviors in College Freshmen: A Pilot Study**

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## ***Abstract***

College students have a high prevalence of poor sleep quality and sleep deficiency which negatively impacts their academic, mental and physical performance. A prematriculation course focused on improving sleep knowledge and behaviors may reduce sleep problems. "Sleep 101" is an online prematriculation course developed to educate incoming college freshmen about the importance of sleep in their lives and to recommend behaviors that will improve their sleep health. In a pilot program, "Sleep 101" was administered to freshman at four universities. The results of a voluntary survey after completion of the course indicated that there was an improvement in knowledge about sleep and the effects of caffeine use, and that students were less likely to drive drowsy and pull "all-nighters." These pilot data suggest that an internet administered prematriculation course on the importance of sleep and the adoption of healthy sleep behaviors will be effective in reducing sleep problems among college students.

## ***Introduction***

Poor sleep hygiene among college students is common (1). Not surprisingly, there is a high prevalence of sleep problems (2). Sleep deficiency in college students has been linked to poor academic and physical performance, depression, accident risk, excessive caffeine and stimulant medication use, impairment in social relationships and worse overall health (3-5). Unfortunately, unlike the efforts to reduce the use of alcohol and sexual misconduct on campuses, there has been relatively little attention paid to poor sleep health and its impact on individual health and performance.

Although there have been a few studies using in-person educational programs to improve sleep knowledge and behaviors, the impact of these have been inconsistent and in most cases limited to small numbers of students. Over the past 15 years, internet usage among college students has become ubiquitous (6). Thus, a sleep educational program delivered over the internet has the potential to reach large numbers of students. In a recent study, we demonstrated that an internet-based sleep learning module administered as component to an introductory college psychology course resulted in an improvement in sleep knowledge and changes in sleep habits (7). In an effort to provide a more comprehensive sleep educational intervention, we have developed an interactive internet-based sleep course, "Sleep 101." The course is

intended to be administered to matriculating freshmen in order improve their sleep knowledge and to prevent the development of poor sleep habits with their resultant adverse impacts on academic and physical performance, and personal health. This report describes the result of the “Sleep 101” pilot program at four universities.

### ***Methods***

In the fall of 2016, freshmen at four universities were asked to complete a pilot online educational course, “Sleep 101,” on the importance of obtaining sufficient sleep in their college lives. At two of the universities, the students were informed that completion of the course was required although there was no penalty for non-completion. At the other two universities, the students were required to take the course as part of a freshman seminar series. At the end of the course, a voluntary brief survey was administered to assess students’ opinion of the course, to obtain data regarding ease of course navigation and to identify any “software bugs.” One of the universities is located in the Midwest and has a total enrollment of approximately 6000 undergraduates. The other three universities are located on the East Coast. Two have undergraduate enrollments of approximately 4000 students and the other has an undergraduate enrollment of approximately 6700 students. All are private coeducational institutions.

The content of Sleep 101 includes material related to basic sleep physiology, the impact of sleep on mood, academic and physical performance, the impact of sleep deficiency on driving and personal health, the interactions among sleep and various substances including alcohol and caffeine and a review of common sleep disorders. The curriculum was developed in Articulate Storyline 2 and uses engaging video clips of actual students and sleep experts, interactive activities and text. Selected images from the course can be viewed by clicking the following link [[Sleep 101 Slides](#)]. At the end of the course, colleges have the option of including custom links to health resources at their university. The program is designed to be completed in 45-60 minutes. A link to the course is available upon request to one of the authors.

### ***Results***

The Table shows aggregate and institutional response to four knowledge and behavior questions related to sleep:

- knowing more about sleep;
- knowing more about the effects of caffeine;
- the likelihood of “pulling an all-nighter”;
- the likelihood of driving drowsy.

**Table: Survey Responses After Completion of Sleep 101**

	Respondents	Knowing More About Sleep		Knowing More About Caffeine		Less Likely to Pull an All-Nighter		Less Likely to Drive Drowsy	
	<i>N</i> <sup>a</sup>	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
<b>University A</b>	628	463	74	495	79	284	46	371	59
<b>University B</b>	104	92	89	98	95	58	56	62	60
<b>University C</b>	9	9	100	9	100	7	78	5	71
<b>University D<sup>b</sup></b>	63	63	100	--	--	--	--	45	71
<b>Aggregate</b>	804	627	79	602	82	349	47	483	60

<sup>a</sup> Some students did not complete all survey questions

<sup>b</sup> The survey was abbreviated at University D

In the aggregate results as well as for each institution, over three quarters of the students responded that they knew more about sleep and the effects of caffeine. In addition, nearly half indicated that they were less likely to stay up all night studying. Importantly, 60% of respondents indicated that they were less likely to drive when drowsy. When asked whether the course was easy to use, there were no major navigational issues.

### ***Discussion***

The results of this pilot study demonstrate that “Sleep 101” improved students’ knowledge about sleep and the effects of caffeine. In addition, they were less likely to “pull an all-nighter” and drive when drowsy. The data suggest that our course has the potential to improve the sleep of college students and ultimately their school performance and college experience.

Sleep in college students is notoriously poor. When deciding whether to sleep, study or socialize, most students will choose the latter two activities. The impact of poor sleep is broad. Sleep deficiency negatively affects academic and physical performance. There are impairments in mood and social relationships (8). Furthermore, reduced sleep is a risk factor for cardiac disease, hypertension, stroke and type 2 diabetes (9). To mitigate the effects of sleep deficiency, many students increase caffeine consumption and some use stimulating medications such as amphetamine and dextroamphetamine (Adderall) (10, 11). Both can potentially have an adverse impact on health. Thus, interventions to improve sleep health can potentially have a major impact on the health and well-being of college students.

Our pilot data indicate that a pre-matriculation curriculum focused on good sleep health can have a positive impact by improving knowledge concerning the importance of sleep and reducing behaviors that adversely affect sleep. Thus, the results are consistent with our previous study demonstrating a positive impact on sleep knowledge and behavior in a group of undergraduates enrolled in an introductory psychology course using an internet-based educational module (7). In addition, Kloss et al reported improvements in sleep hygiene knowledge and sleep quality four weeks after an in-person sleep educational intervention (12). However, not all previous studies have been so

encouraging. No difference in sleep hygiene knowledge was noted between sleep education and control groups after six weeks by Brown *et al.* (13). Similarly, no changes in sleep quality were reported by Clark *et al.* and Lamberti *et al.* (14, 15). Explanations for these inconsistencies are unclear, but there were significant differences in the curriculum and the methods of content presentation, and the number of participating students was small in most of the studies.

“Sleep 101” was developed as an e-learning course to be taken online. Other sleep education programs in college students used in-person delivery of content (12-15). However, use of the internet will provide much greater scalability than in-person delivery. The latter will be logistically difficult and costly for universities with large enrollments.

Although promising, our data must be interpreted as preliminary. Not all students finished the course and completion of the survey was voluntary as well. Thus, a selection bias towards those who had an interest in improving their sleep was likely. In addition, the pilot universities had relatively small enrollments. Nevertheless, our feedback suggests that a sleep intervention for college students delivered through the internet such as “Sleep 101” is feasible and effective. The results provide an impetus for its dissemination to additional universities nationwide.

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