Distribution Agreement

In presenting this Thesis as a partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my Thesis in whole or in part in all forms of media, now or hereafter known, including display on the World Wide Web. I understand that I may select some access restrictions as part of the online submission of this Thesis. I retain all ownership rights to the copyright of the Thesis. I also retain the right to use in future works (such as articles or books) all or part of this Thesis.

_____

Signature of Student Date

EVALUATION OF EMORY UNIVERSITY'S
ONLINE SLEEP ENHANCEMENT CURRICULUM
FOR STUDENTS

BY

Amy Mackey Goodman
Degree to be awarded: M.P.H.
Career MPH

Grant T. Baldwin, PhD, MPH Committee Chair	Date
Heather A. Zesiger, MPH, MCHES Committee Member	Date
Melissa Alperin, MPH, MCHES Chair, Career MPH Program	Date

EVALUATION OF EMORY UNIVERSITY'S ONLINE SLEEP ENHANCEMENT CURRICULUM FOR STUDENTS

BY

Amy Mackey Goodman
M.P.H., Emory University, 2013
B.A., Miami University, 2000

Thesis Committee Chair: Grant T. Baldwin, Ph.D., M.P.H.

An abstract of
A Thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements of the degree of
Master of Public Health in the Career MPH program
2013

Abstract

EVALUATION OF EMORY UNIVERSITY'S
ONLINE SLEEP ENHANCEMENT CURRICULUM
FOR STUDENTS

BY
Amy Mackey Goodman

SleepWell@Emory – Online was a voluntary, 5-week self-improvement program offered to students by Emory University's Office of Health Promotion in the Blackboard Learn system. The interactive online course was based on a psychoeducational model intended to improve participants' sleep-related knowledge, behaviors, and beliefs during and after the course. Content included information on sleep hygiene and stimulus control instructions tailored for a college audience. This study evaluated the process and outcomes associated with piloting the online course to two student cohorts. Quantitative and qualitative data were collected through a mixed-methods approach in order to answer the evaluation questions. Outcomes were assessed through course reports and electronic pre-, post-, and 6-week post-course participant surveys. Process data was gathered through course observation, instructor communications, and participant interviews. Rates of course participation and survey completion were low and declined over time. In the two cohorts, 80.0% of the 65 registrants participated in some content during the course timeframe, while 10.8% of registrants participated in all 5 weeks. Findings indicated that participants' sleep knowledge and some key behaviors (e.g. sleep schedule consistency) and beliefs (e.g. confidence in ability to improve sleep without medication) improved during and 6 weeks after the course. Course participation was not associated with improved academic performance. School-related demands were positively correlated with a lack of course participation and stopping a learned sleep enhancing behavior 6 weeks after the course. Students perceived the course's educational materials, references, and tools as helpful and relevant. Results suggest that online content should be available to a broad audience for an extended period of time and require minimal interaction. Specific recommendations are described, including techniques for refining course content, minimizing barriers for students related to competing priorities, and expanding university partnerships. This evaluation demonstrated that an online sleep curriculum for university students offers benefits consistent with those described in the literature, and provided information on the challenges of virtually engaging and retaining students in health promotion educational practices during the academic semester.

EVALUATION OF EMORY UNIVERSITY'S ONLINE SLEEP ENHANCEMENT CURRICULUM FOR STUDENTS

BY

Amy Mackey Goodman
M.P.H., Emory University, 2013
B.A., Miami University, 2000

Thesis Committee Chair: Grant T. Baldwin, Ph.D., M.P.H.

A Thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements of the degree of
Master of Public Health in the Career MPH program
2013

TABLE OF CONTENTS

List of Tables

List of Figures

CHAPTER 1: INTRODUCTION

Introduction

College students have reported experiencing twice as many sleep problems as the general population (Brown, Buboltz, & Soper, 2001). The social norms and schedules of college students perpetuate unhealthy sleep practices like studying late at night during the week, sleeping until the afternoon on weekends, and using alcohol and caffeine at times and in quantities that can interfere with sleep. In addition to individual behaviors, the sleep environment on college campuses often includes noise, bright light, roommates, and other distractions to optimal sleep. In response to the trends on their campus and the nation, Emory University's Office of Health Promotion (OHP) created *SleepWell@Emory*, a small group, in-person educational intervention designed to help students enhance their sleep and mitigate the risks that sleep difficulties posed to their health, performance, and overall wellbeing. Seven student cohorts participated in *SleepWell* between 2008 and 2011. In 2012, the traditional mini-course was converted into an online format: *SleepWell@Emory - Online*. The purpose of this study is to evaluate the process and outcomes associated with delivering the *SleepWell – Online* course to two student cohorts during the 2012 academic year.

Overview of the Problem

When asked about the top health-related impediments to academic success, respondents to the fall 2011 National College Health Assessment (NCHA) at Emory University (n=1,574) ranked "sleep difficulties" (16.6%) third after "stress" (26.7%) and "anxiety" (17.6%). These results are similar to the top academic impediments reported by college students nationally (20.4% for "sleep difficulties," 28.6% for "stress," and 20.0% for "anxiety"). Sleep challenges themselves may be a source of stress and anxiety in students' lives. Among Emory students,

21.5% of respondents reported sleep difficulties as "traumatic or very difficult to handle" within the past 12 months, only slightly lower than the national rate of 25.0%. The fourth (12.9% for "cold/flu/sore throat") and eighth (10.8% for "depression") most common academic impediments selected by Emory respondents are risk factors for, and may be exacerbated by, sleep difficulties.

Further, sleep difficulties had a negative effect on self-reported daytime performance and wellbeing. Responding to their experience over the last 7 days, only 10.8% of Emory students "got enough sleep to feel rested in the morning" on 6 or more days, while 92.4% "felt tired, dragged out, or sleepy" during 1 or more day, and 89.5% experienced some problem with sleepiness during daytime activities (defined as "a little problem," "more than a little problem," "a big problem," or "a very big problem") (American College Health Association [ACHA], 2011b; Office of Health Promotion, 2012b). In terms of mental health, insomnia was the only disorder reported by a larger percentage of Emory respondents (4.3%) in 2011 than by respondents nationally (3.8%) (Office of Health Promotion, 2012a).

The most recent survey data was consistent with prior findings. In both the 2006 and the 2008 NCHA at Emory, students indicated that sleep difficulties were among the top health-related impediments to their academic performance. College health educators nationwide provided input to increase the number of sleep-related questions included on the 2008 NCHA as a result of growing recognition that sleep is a priority issue for college health intervention. At the time of the 2006 NCHA at Emory, Student Health and Counseling Services offered interventions for stress management, but no intervention existed for sleep enhancement. Findings from the 2006 NCHA at Emory were the primary catalyst for the development of *SleepWell@Emory* (Zesiger, 2008, 2010a).

Description of the Program: *SleepWell@Emory*

In response to data that indicated sleep was a prevalent health concern and a perceived barrier to academic performance, director of Emory's Office of Health Promotion (OHP) and health educator, Heather Zesiger, MPH, MCHES, developed a sleep enhancement intervention for students. The design of *SleepWell@Emory* was informed by a psychoeducational intervention for college students (*Sleep Treatment and Education Program for Students*, or *STEPS*) that had been shown to significantly improve sleep quality and sleep hygiene behaviors for participants on another mid-sized university in the southern United States (Brown, Buboltz, & Soper, 2006). With the authors' permission, Ms. Zesiger adapted the *STEPS* intervention. Additionally, she consulted the health promotion staff at the University of Florida who had tailored the *STEPS* program for their students. With the UF staff's permission, Ms. Zesiger modified their *Sleeping in the Swamp: A Sleep Improvement Program* (University of Florida Division of Student Affairs, 2012) script for use at Emory.

Based on the *STEPS* and UF materials, Ms. Zesiger developed a residentially based three-part mini-course on sleep enhancement strategies. The mini-course was intended to be a voluntary, self-improvement program available at no charge to interested Emory undergraduate and graduate students. *SleepWell@Emory* was "designed to build community within a residential setting by engaging a small group of students in a self-improvement process over three weeks, with ample discussion time and opportunities to practice new skills between sessions" (p. 2). The initial program met once a week for 3 consecutive weeks; each session was 90 minutes in length. The mini-course design utilized the expertise of multiple OHP health educators, as both content providers and presenters (Zesiger, 2008).

SleepWell@Emory was offered to seven student cohorts in on-campus settings between 2008 and 2011. Ms. Zesiger has been the lead insturctor for the mini-course during all offerings. While the course implementation has been refined with each iteration and materials have been enhanced, the overall content has remained fairly consistent from the initial to the most recent course offering. **Table 1** contains the lesson outline for the current version of *SleepWell@Emory*.

Table 1. *SleepWell@Emory* Mini-Course Lesson Outline (2011)

Session 1:	***(90 min.)***
• Introductions • Course overview • Ground rules and expectations	*Discussion*
• Behavior change • Being a critical consumer of health information • Emory student and class sleep trends	*Presentation delivered by instructor*
• The role of sleep in academic, athletic, and social success	*Presentation delivered by instructor*
• Emory University Student Health and Counseling Services overview	*Informational handout and brochure*
• Sleep for success tips and support	*Informational handout and brochure*
• SleepWell action plan	*Worksheet*
• Two-week sleep diary	*Worksheet*
• Create a two-week behavioral action plan	*Group brainstorm and individual activity*
Individual Assignments	
• Keep a sleep diary for the week • Practice new behaviors described in action plan	*Homework*
Session 2:	***(90 min.)***
• Stimulants, depressants, your brain, and sleep	*Presentation delivered by guest counselor*
• Nutrition, sleep, and stress	*Presentation delivered by guest dietician*
• Guidelines for healthy meals and snacks	*Informational handout*
• Progressive muscle relaxation and other mindfulness skills	*Practice guided by guest health educator*
• Resources for developing a relaxation response	*Informational handout*
Individual Assignments	
• Continue keeping sleep diary for the week • Continue practicing new behaviors described in	*Homework*

action plan; Modify plan, if needed	
Session 3:	***(90 min.)***
• Next steps and behavioral intentions	*Discussion; Pillowcase decoration activity*
• Course review	*Discussion or game*

Participants were asked to commit to attending all three sessions and practicing sleep-enhancing behaviors between sessions. Further, students were encouraged to sign up for *SleepWell* with a friend or peer group to increase the likelihood that the skills they were learning would be reinforced outside of class. At the beginning of the first session, each student was given a folder of reference materials related to presentation content, a sleep diary, and a behavioral action plan template. During the third session, the instructor gave each student a white pillowcase and supplies to decorate the pillowcase with images and text that would serve as personal cues to action. The pillowcase decorating activity was intended to provide students with an enjoyable way to close the course while supplying them with a long-term behavioral reinforcement tool (Zesiger, 2008).

The course format was modified at various points to accommodate the requests of different audience subgroups and the academic calendar. For all except the fifth cohort, the course delivery format was three 90-minute face-to-face evening sessions over 3 consecutive weeks, such that participants spent a total of 4.5 hours in class. Cohort 5 was offered in two 120-minute face-to-face evening sessions over 2 consecutive weeks, such that participants spent a total of 4 hours in class. **Table 2** summarizes the timing and population reached by *SleepWell@Emory*.

Table 2. Attendance and Attrition for *SleepWell@Emory* Cohorts (2008 - 2011) (Zesiger, 2008, 2009, 2010a, 2010b, 2011, 2012)

Cohort	Semester	Attendance (n)				Attrition (%)				Attendees by Class Year (%)+					Attendees by Gender (%)	
		Registered	Session 1	Session 2	Session 3	Registration & Session 1	Sessions 1 & 2	Sessions 2 & 3	Registration & Session 3	First-Year	Second-Year	Third-Year	Fourth-Year	Grad / Prof School	Male	Female
1	Spring 2008	19	12	12	8	37	0	33	56	17	75	-	-	-	25	75
2	Fall 2008	28	13	11	11	54	15	0	61	-	91	-	9	-	18	82
3	Fall 2008	20	16	13	13	20	19	0	35	38	38	8	8	8	69	31
4	Fall 2009	17	13	11	11	24	15	0	35	36	36	27	-	-	9	91
5	Spring 2010	18	16	16	-	11	0	-	11*	26	21	11	21	-	47	53
6	Fall 2010	27	24	21	21	11	13	0	22	-	63	3	8	17	23	77
7	Fall 2011	41	23	19	14	44	17	26	66	39	39	4	13	-	35	65

+ Total <100% in Cohort 1 due to a faculty member in attendance, and in Cohort 5 due to 4 students with undisclosed class year.

* Refers to final session for this cohort, which was Session 2.

While the instructor found that the learning and health outcomes for *SleepWell* were generally favorable, she noted some challenges with the course. Specifically, attrition was higher than ideal (i.e. in some cohorts more than one-third of students dropped between the first and third sessions). Based on feedback the instructor received from students, the reasons for non-attendance were unanticipated class, work, and extracurricular activity time conflicts. *SleepWell* sessions were held during the evening. For the instructor and her colleagues who served as guest presenters, this created personal scheduling demands (e.g. the need for additional childcare) and time commitments outside of normal working hours. Further, given the need to attend the course in person, the potential audience for *SleepWell* was limited to Emory students who lived on or near campus and who did not have other obligations during the course times. In order to address these three limitations and potentially expand *SleepWell's* reach at Emory, Ms. Zesiger proposed creating an online version of the mini-course.

In late 2011, OHP recruited an instructional design intern from Emory's master of public health students to convert the *SleepWell @Emory* course from a traditional face-to-face to an entirely online format. The investigator was selected for the internship due in part to her professional experience in online training and adult instructional design. In collaboration with Ms. Zesiger, the investigator designed and developed an online version of *SleepWell* during a Spring 2012 practicum experience.

Description of the Program: *SleepWell@Emory - Online*

The university's secure, internet-based course platform, Blackboard Learn, was selected as the mode of delivery for *SleepWell - Online*. Course activities were designed to be self-paced and facilitated by an instructor (Ms. Zesiger) during a designated 5-week timeframe. Each offering consisted of a single cohort of up to 40 Emory undergraduate and graduate students who were

enrolled in the course within Blackboard. The learning objectives that guided the design and assessment strategies for *SleepWell@Emory - Online* are displayed in **Table 3**.

Table 3. *SleepWell@Emory - Online* Course Learning Objectives (2012)

Learning Objectives
At the conclusion of the course, participants will be able to: 1. Describe how the quantity and consistency of sleep can affect academic performance. 2. State at least three examples of physical and/or psychological health problems that result from poor sleep. 3. Identify at least two activities and two environmental factors that interfere with sleep quality. 4. Recognize common sources of caffeine in food and beverages and recommend two strategies for minimizing caffeine's affects on sleep. 5. Explain how drinking alcohol affects sleep quality. 6. Design a meal containing foods that help increase energy and a meal containing foods that help prepare for sleep. 7. Describe two strategies that can be used to elicit the relaxation response. 8. Practice three strategies to enhance sleep.

All participants were expected to review course materials, contribute to online discussions, and practice skills, as assigned, throughout the duration of the course. **Table 4** contains the lesson outline for *SleepWell@Emory - Online*.

Table 4. *SleepWell@Emory - Online* Course Lesson Outline (2012)

Week 1:	
Getting Started	
• Post an introduction	*Class blog*
• Agree to course ground rules	*Class discussion board*
• Student Health and Counseling Services overview	*Informational handout*
Our Goals and Current Practices	
• Our class – by the numbers	*Informational handout*
• Sleep trends at Emory	*Informational handout*
Health Behavior and Health Information	
• Health behavior and health information	*Video presentation (8 min.)* *or Printable presentation document*
• Fact finding mission	*Class discussion board*
Individual Assignments	
• Take a digital photo of sleep space	*Individual activity (outside of Blackboard)*
• Keep a sleep diary for the week	*Individual activity (outside of Blackboard)*
Week 2:	
Role of Sleep in Academic, Athletic and Social Success	
• Sleep 101	*Video presentation (11 min.)* *or Printable presentation document*
• What affects sleep?	*Video presentation (11 min.)* *or Printable presentation document*
• Tips for sleeping well	*Informational handout*
• Sleep routine discussion	*Class discussion board*
• Post photo of sleep space and discuss it	*Class blog*
Individual Assignments	
• Create a three-week behavioral action plan; Practice new behaviors described in the plan	*Individual activity (outside of Blackboard)*
• Continue keeping a sleep diary for the week	*Individual activity (outside of Blackboard)*
Week 3:	
Stimulants, Depressants and Sleep	
• Caffeine and sleep	*Video presentation (12 min.)* *or Printable presentation document*

• Alcohol and sleep	*Video presentation (9 min.)* *or Printable presentation document*
Diet and Sleep	
• Diet and sleep	*Video presentation (10 min.)* *or Printable presentation document*
• Healthy meal and snack ideas	*Informational handout*
Individual Assignments	
• Complete alcohol and diet knowledge check	*Interactive quiz*
• Post food for focus, food for snooze ideas	*Class blog*
• Continue practicing behaviors in action plan; Modify plan, if needed	*Individual activity (outside of Blackboard)*
• Continue keeping a sleep diary for the week	*Individual activity (outside of Blackboard)*
Week 4:	
Stress and Sleep	
• Stress and sleep	*Video presentation (14 min.)* *or Printable presentation document*
• Tips for reducing stress at Emory	*Informational handout*
• Progressive muscle relaxation	*Audio podcast (7 min.)*
• Body scan	*Audio podcast (8 min.)*
• Time management resources	*Informational handouts and worksheets*
Individual Assignments	
• Continue practicing behaviors in action plan; Modify plan, if needed	*Individual activity (outside of Blackboard)*
Week 5:	
Ecology of Sleep and Health	
• How can Emory make sleeping well easier?	*Class discussion board*
• How will I approach my sleep differently?	*Class discussion board*
Individual Assignments	
• Create and post a design for pillowcase	*Individual activity and class blog*

A key design goal for the online course was to create an enjoyable educational experience for participants that afforded ample opportunity for online interaction with the instructor and fellow classmates. In an effort to achieve this goal, the Blackboard discussion board, blog, and quiz

funtions were utilized. YouTube videos were created using Microsoft PowerPoint and TechSmith Camtasia software. Podcasts were recorded and made available for students to download as MP3 files. The instructor and the three guest presenters from OHP served as subject matter experts during the course creation process and they recorded the audio portions of their respective weekly presentations and podcasts.

The instructor used detailed PowerPoint slides to deliver the presentations in the first session of the traditional face-to-face course and these slides provided the foundation for the presentations used in the first and second weeks of the online course. The guest presenters used minimal slides, if any, to deliver their content in the face-to-face model. Thus, the majority of presentation content used in the third and fourth weeks of the online course was developed by the intern and reviewed by the OHP subject matter experts. The majority of informational handouts included in the course (in Microsoft Word or PDF) were used in the traditional face-to-face version of *SleepWell* or existed on the OHP website. A list of citations for all presentation content was included in each online lesson. Additionally, each weekly lesson included a dicussion forum for students to post questions or comments for the instructor related to the presentation material. Students were encouraged to email the instructor directly with any concerns of a personal nature before, during, and after the course. New content was made available to students each week. Students were able to refer to prior weeks' content throughout the course. See **Appendix A** for images of some of the online course screens.

SleepWell - Online was offered twice during the Fall 2012 semester, with one cohort beginning in September and another beginnig in October. It was not feasible to pilot the online course during the summer due to OHP staff time constraints and abbreviated academic semesters, thus the combined fall offerings served as the course pilot.

Logic Model

An outcome approach logic model for *SleepWell@Emory - Online* is displayed in **Figure 1**. This simplified model illustrates the proposed relationships between implementing the online course and the desired results over time. It takes the perspective of OHP in terms of work required and measurable indicators of progress toward achieving the ultimate goals of the course. This logic model may be used as a guide for planning and monitoring *SleepWell - Online* (W.K. Kellogg Foundation [WKKF], 2004).

Inputs

Inputs are the human, electronic and print resources necessary to promote and conduct the online course with Emory students (WKKF, 2004). The current format requires an instructor that is knowledgeable on the scientific and socio-behavioral aspects of sleep for college students. Blackboard is the current course delivery platform and houses all course materials. Should course materials need to be modified or expanded in the future, OHP would utilize a combination of content development and editing tools within their department and those available to them at Emory's Center for Interactive Technology (ECIT). ECIT is OHP's point of contact for educational software (e.g. Camtasia) and technical support for online course creation and editing. Additionally, ECIT staff members provide consultative services to OHP on the use of Blackboard for teaching. SurveyMonkey is OHP's primary online survey creation, distribution, and analysis software. All pre- and post-tests for *SleepWell* currently reside within SurveyMonkey. OHP advertises their mini-courses using a variety of paper-based displays (e.g. bulletin boards and flyers) and electronic announcements (e.g. on the department website and social media page, or emailed through listservs and more targeted groups). OHP staff members also present information on their mini-courses during campus events. Emory's clinicians,

counselors, faculty, and staff may refer students to the course for a variety of reasons, including as part of a treatment strategy for a specific health condition or an extra-credit opportunity in a required class. Referring individuals may work with students in Student Health and Counseling Services, Residence Life, or any of Emory's colleges, graduate, or professional schools.

Activities

Inputs are used in the activities required to conduct *SleepWell - Online* (WKKF, 2004). Activities may be divided into tasks performed before, during, and after the course. The model assumes that the instructor executes all tasks herself or delegates them to a capable member of her staff. Before each offering, the instructor must: determine the course timeline, identify any partners in marketing or course delivery, plan the evaluation strategy, advertise through appropriate channels, perform course set-up functions in Blackboard, distribute the electronic registration and pre-test to interested participants, generate a graphic summary of some of the pre-test results for use during the first week of the course, enroll all participants into the course in Blackboard, send an email welcoming students to the course, and post the initial announcement in Blackboard. Throughout the course, the instructor maintains communication with students, and monitors and facilitates all activity within Blackboard. Within the course, the instructor: posts a minimum of one announcement each week and emails the announcement to participants, monitors class discussions, responds to questions, clarifies and emphasizes key points, and motivates students to practice behavior changes. The instructor uses information available to her in Blackboard to contact individually "no shows" and students who appear to have stopped participating in the course. Immediately after the course, the instructor distributes an electronic post-test survey to all participants and performs the functions necessary to close the course within Blackboard. The instructor also follows-up with any faculty members who request

participation information for extra-credit reasons. At a designated period after the last day of the course (e.g. 6 weeks), the instructor distributes a long-term post-test to participants. Once all data is available for analysis, the course is evaluated. Ideally, the plan for evaluation and metrics were established at the start of activities and the evaluation is completed during this phase.

Outputs

Outputs provide evidence of the course activities (WKKF, 2004). Three outputs that are readily measurable and offer a point of comparison from one *SleepWell* cohort to the next are: the number students (undergraduate, graduate, and professional) who register for the course, the number of registered students who complete the course, and the number of times the course was offered during a single academic year.

Outcomes

Outcomes are the specific changes that result from participation in the course (WKKF, 2004). These include changes in the participants' self-reported: sleep hygiene knowledge, behaviors that affect sleep quality and quantity, and beliefs that support the intended behaviors. Outcomes that gauge the course's perceived value for students are measured by participants' satisfaction with the course experience and increased awareness of the importance of the health topic addressed in *SleepWell* from the larger body of Emory students, clinicians, counselors, faculty, and staff. Improvements on the knowledge, behavior, belief, and course satisfaction outcomes are measured using data from three online instruments distributed to participants: the registration and pre-test, post-test, and long-term post-test. Increased awareness of the health issue is measured by OHP metrics on consultations with students and notices of course referral.

Impact

The impact of *SleepWell – Online* is reflected in the intended, ultimate goals of the course for Emory (WKKF, 2004). These include reductions in the percentages of students who self-report sleep difficulties as an impediment to their academic success, feeling tired during the day, and experiencing sleepiness during their daytime activities, as well as an increase in the proportion of students who report feeling rested upon waking in the morning. Impact will be measured using data collected by OHP in the National College Health Assessment (NCHA) at Emory (ACHA, 2011b).

Figure 1. Logic Model for *SleepWell@Emory - Online* (2012)

Inputs	Activities	Outputs	Outcomes	Impact
Instructor/health educator Blackboard Learn™ Online course materials Content development/editing tools ECIT support staff Advertising materials & venues SurveyMonkey™ Online registration & assessment instruments Referring clinicians, counselors, faculty & staff	***Before the course:*** • Plan & advertise offering • Set-up in Blackboard • Send pre-test • Create results summary • Enroll participants • Send welcome email ***During the course:*** • Post announcement weekly • Monitor discussion boards & respond • Monitor blogs & comment • Display new content weekly • Contact "absent" students • Respond to student emails & calls ***After the course:*** • Send post-test • Close-out in Blackboard • Report extra-credit status • Send long-term post-test • Conduct course evaluation	Number undergraduate, graduate & professional students who register Number undergraduate, graduate and professional students who complete Number sessions offered during academic year	***Improved knowledge:*** • Sleep hygiene ***Improved Behaviors:*** • Sleep schedule consistency • Time to sleep onset • Sleep quantity • MOS sleep disturbances score ***Improved Beliefs:*** • Intent to continue practicing behaviors • University cares about wellbeing • Ability to improve sleep without medication • Ability to work with others to create sleep environment • Use strategies to reduce stress ***Course Satisfaction:*** • Positive effect on academic performance • Recommend course to a friend ***Increased Awareness:*** • Requests for individual OHP consultations • Referrals from clinicians, counselors, faculty & staff	Reduction in percent of Emory students for whom "sleep difficulties" are an impediment to academic success Increase in percent of Emory students who get enough sleep to feel rested in the morning Reduction in percent of Emory students who feel tired during the day Reduction in percent of Emory students who experience a problem with sleepiness during daytime activities

Evaluation Purpose

Program evaluation is an essential practice in public health. Evaluation provides a method for determining whether a health promotion program is effective at reaching its stated objectives, a framework for improving existing programs, and a means of demonstrating the results of program investments. Participating in the process of program evaluation may itself benefit evaluation team members and stakeholders in unanticipated ways (i.e. by improving organizational communication and creating experiential skill building opportunities for staff) (Centers for Disease Control and Prevention [CDC], 1999). In recognition of the importance of evaluation in fulfilling their mission "to facilitate student learning, engagement, and wellbeing, and to collaborate for a healthy and socially just campus environment," the Office of Health Promotion included "perform assessment and evaluation to inform practice" as one of their five departmental goals (Emory University, 2012b; Office of Health Promotion, 2012c).

After 4 years and 7 cohorts, *SleepWell@Emory* has earned a positive reputation among its participants and partners. Comparisons of pre- and post-test results have demonstrated that students report improvements in sleep-related knowledge, behaviors, and outcomes after participating in *SleepWell*. In all, approximately 120 students participated in the traditional course.

The online course was created to meet the anticipated unmet demand among a broader population, and to do so with greater flexibility to student and instructor schedules, while using fewer OHP resources. Both the development of *SleepWell – Online* and the act of teaching it were the first projects of their kind for OHP. Consequently, OHP is interested in determining whether the process of instructing the pilot *SleepWell - Online* sessions should be replicated or

modified before future course iterations. Further, OHP is interested in assessing whether the online course achieves the desired outcomes and if it should be continued in its current form. The purpose of this study is to conduct a process and outcome evaluation of the *SleepWell@Emory – Online* course pilots that were conducted by OHP during the Fall 2012 semester.

Evaluation Questions

The questions in **Table 5** represent OHP's priorities for the evaluation and served as a framework for the analysis of the course's process and outcomes.

Table 5. *SleepWell@Emory - Online* Evaluation Questions (2012)

Evaluation Questions
1. Is *SleepWell - Online* effective at increasing students' sleep-related knowledge?
2. Is *SleepWell - Online* effective at improving students' sleep-related behaviors?
3. Do students experience longer-term (i.e. six weeks or more post-course) benefits from participating in *SleepWell - Online* ?
4. What is the overall user satisfaction with *SleepWell – Online*'s course curriculum and delivery model?
5. What are the strengths of *SleepWell – Online*'s course curriculum and its delivery model?
6. What modifications, if any, should be made to *SleepWell – Online*'s course curriculum and delivery model prior to future offerings?

Findings from this study will be used to make specific recommendations for how the online course curriculum and delivery model could be enhanced to improve students' sleep-related outcomes. Further, study findings will be used to propose how other OHP educational programs

could be adapted to benefit from the strengths of the online course curriculum and delivery model.

CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

A literature review was conducted to provide insight into the connection between *SleepWell@Emory – Online* and the outcomes and impact described in the evaluation logic model (see **Figure 1**). Published journal articles were reviewed for evidence of the efficacy of program content and for findings from studies on face-to-face and internet-based sleep interventions that are relevant to *SleepWell's* content and delivery method. Results of prior evaluations of the face-to-face *SleepWell* intervention were also reviewed.

Empirical Foundation of the Program

Sleep difficulties can contribute to problems that span the full spectrum of wellness, including physical and mental health, academic and occupational performance, and social relationships (CDC, 2012; National Sleep Foundation, 2006). Among college students, poor sleep quality has been associated with emotional imbalance, tension, anger, depression, lower levels of life satisfaction, and concentration and memory difficulties (Pilcher, Ginter, & Sadowsky, 1997). Students with unhealthy sleep habits have been shown to have poor awareness of sleep-promoting behaviors (Hicks, Lucero-Gorman, Bautista, & Hicks, 1999). Further, college students may not recognize or understand the effect that disrupted sleep can have on their academic achievement (Buboltz et al., 2009; Pilcher & Walters, 1997). Thus, a lack of understanding about what healthy sleep habits are and how to practice them may contribute to poor sleep (Brown et al., 2006) and create a preventable barrier to academic success. Characteristics of the college lifestyle can contribute to the emergence new sleep problems for some students or exacerbate undiagnosed sleep disorders for students entering college. Yet, as an environment that fosters learning and wellness, college may be an ideal window of opportunity

for the prevention and treatment of sleep disorders that could have lifelong implications (Kloss, Nash, Horsey, & Taylor, 2011).

Based on their review of meta-analytic studies, Brown et al. (2006) determined that psychoeducational sleep interventions are among the most effective techniques. As described by Blunden et al. (2012): "psychoeducation uses a combination of empowerment techniques with scientifically-based treatments and knowledge delivery with effective education methods" (p. 366). Psychoeducational approaches are intended to increase an individual's knowledge of and insight into a health problem and its treatment with the goal of behavior change (Vreeland, 2012). In their double-blind repeated-measures case-control trial, Brown et al. confirmed that sleep hygiene guidelines (i.e. activities that can either help or hinder sleep) and stimulus control instructions are two psychoeducational sleep interventions that were effective at improving the sleep of college students. Based on the psychoeducational framework established by Brown et al., *SleepWell@Emory* was developed primarily as an intervention to prevent sleep difficulties from hindering students' academic performance (Zesiger, 2008).

Findings from Prior Evaluations of *SleepWell@Emory*

Evaluation reports exist for the seven traditional *SleepWell* cohorts. Summarized results from the evaluations are displayed in **Tables 6** and **7**. Results indicated that the *SleepWell* course consistently improved sleep-related knowledge and behaviors for most participants. Additionally, students viewed participation in the course as a positive experience, as evidenced by post-course responses indicating that almost all participants across the cohorts would have recommended the course to a friend and that they intended to continue practicing behaviors learned after the course. When asked during follow-up post-tests, the majority of respondents reported that participation in the course helped their sleep, which is an overall indicator that they

viewed the course as worthwhile. Participants also rated favorably the presentation materials, informational handouts, and tools used in the course (Zesiger, 2008, 2009, 2010a, 2010b, 2011, 2012).

The post-test assessments of each cohort included questions specific to the course learning objectives and at least one item that requested open-ended comments. Over time, the instructor added questions to the pre-test, post-course test, and follow-up test, as she determined appropriate and useful for improving the course. Some of the questions assessed students' beliefs (e.g. "I believe that Emory cares about my wellbeing" and "I believe that my participation in *SleepWell* will have/has had a positive impact on my academic performance"), the course experience (e.g. "Is there any other information you hoped to get from this program?"), and students' post-course intentions (e.g. "I intend to continue modifying my behavior to improve my sleep outcomes based on what I have learned in this mini-course").

Consistent with the Brown et al. study (2006) on which *SleepWell* was based, the instructor used the Pittsburgh Sleep Quality Index (PSQI) to measure respondents' self-reported sleep quality over the last month and the Sleep Hygiene Awareness and Practices Scale (SHAPS) to measure respondents' self-reported sleep hygiene knowledge, caffeine knowledge, and sleep hygiene practices (see **Table 6**). However, after the fourth cohort, the instructor noted that the lengthy PSQI and SHAPS had a poor response rate, there were concerns about instrument quality (Brown, Buboltz, & Soper, 2002), and there was minimal resonance with the learning outcomes for the course (Zesiger, 2009). The instructor selected the RAND Medical Outcomes Study (MOS) Sleep Scale as a replacement for the PSQI and SHAPS. The MOS Sleep Scale measured respondents' self-reported sleep disturbances and, as part of the scoring process, a dichotomous "optimal sleep" score was derived (RAND Corporation, 2012; Zesiger, 2010b). The instructor

also added separate questions about caffeine and medication use, which were part of the PSQI and SHAPS but were not included in MOS (Zesiger, 2011) (see **Table 7**).

Table 6. Assessment and Outcomes for *SleepWell@Emory* Cohorts (2008 - 2009) (Zesiger, 2008, 2009, 2010a)

Cohort	Semester	Assessment Methods			Question Types (n)/Instruments Used in Assessments									Outcomes						
														Course-End Post-Test			Pre-Test to N-week Post-Test			
		Registration & Pre-Test	Course-End Post-Test	N -week Post-Test	Sleep Hygiene Knowledge	Beliefs	Behavioral Intent	Behavioral Practices	Course Experience	Course Materials	SHAPS	PSQI	MOS Sleep	LOs Met	Recommend (%)	Intend (%)	SHAPS Knowledge	SHAPS Behavior	PSQI	LOs Maintained
1	Spring 2008	y	y	6 wk	4	-	1	-	-	-	y	y	-	y	100	-	5 i 2 u 1 d	3 i 1 u 4 d	np	-
2	Fall 2008	y	y	6 wk	6	-	1	-	2	-	y	y	-	y	100	100	2 i 6 u 0 d	7 i 0 u 1 d	5 i 2 u 1 d	-
3	Fall 2008	y	y	6 wk	6	-	1	-	2	-	y	y	-	y	100	100	3 i 1 u 2 d	4 i 0 u 2 d	6 i 0 u 0 d	-
4	Fall 2009	y	y	12 wk	7	2	1	-	2	-	y	y	-	y	90	100	4 i 1 u 3 d	5 i 1 u 1 d	7 i 0 u 1 d	d

Legend: LO = Learning Objectives; SHAPS = Sleep Hygiene Awareness and Practices Scale; PSQI = Pittsburgh Sleep Quality Index; MOS = RAND Medical Outcomes Study; y = yes; all = all students; i = raw score(s) improved, u = raw score(s) unchanged; d = raw score(s) declined; np = not provided in evaluation of cohort

Other findings: After Cohort 1, the instructor received unsolicited feedback from a psychologist who noted sleep improvements in both of the students she referred, and one participant who was a rising resident advisor requested the course for his first-year students.

Table 7. Assessment and Outcomes for *SleepWell@Emory* Cohorts (2010 - 2011) (Zesiger, 2010b, 2011, 2012)

Cohort	Semester	Assessment Methods			Question Types (n)/Instruments Used in Assessments									Outcomes							
														Course-End Post-Test			Pre-Test to N-week Post-Test (n)				
		Registration & Pre-Test	Course-End Post-Test	N -week Post-Test	Sleep Hygiene Knowledge	Beliefs	Behavioral Intent	Behavioral Practices	Course Experience	Course Materials	SHAPS	PSQI	MOS Sleep	LOs Met	Recommend (%)	Intend (%)	Quantity	Variability	MOS Adequacy	MOS Somnolence	MOS Index I&II	Participation Helped Sleep (%)
5	Spring 2010	y	y	4 wk	7	2	2	1	2	-	-	-	y	y	100	100	5 i 2 u 1 d	5 i 6 u 1 d	8 i 2 u 3 d	6 i 2 u 5 d	6 i 2 u 5 d	85.7
6	Fall 2010	y	y	8 - 12 wk	7	2	2	4	2	-	-	-	y	y	100	100	10 i 4 u 0 d	np	np	np	np	87.5
7	Fall 2011	y	y	8 - 12 wk	7	2	2	4	2	17	-	-	y	y	100	100	9 i 1 u 1 d	np	np	np	np	69.2

Legend: LO = Learning Objectives; SHAPS = Sleep Hygiene Awareness and Practices Scale; PSQI = Pittsburgh Sleep Quality Index; MOS = RAND Medical Outcomes Study; y = yes; all = all students; i = raw score(s) improved, u = raw score(s) unchanged; d = raw score(s) declined; np = not provided in evaluation of cohort

Other findings: The majority of participants in cohort 7 rated all course materials as "helpful" (rather than "not helpful" or "I did not use this"). The only course content-related item that was rated "not helpful" was a set of speaker notes on caffeine and alcohol, which was reported by only one participant.

In general, these results must be interpreted with caution. None of the evaluations of the traditional course cohorts reported statistically significant differences in pre- and post-outcomes, due at least in part to the very small samples available for post-course testing ($n < 21$) (refer to **Table 2**). Thus, the instructor analyzed and reported raw scores in the evaluations. It also should be noted that post-test responses on the sleep hygiene learning objective questions were scored by the instructor using a rubric. Thus, determining which responses were correct involved the subjectivity of the instructor, and this was consistent across the cohorts. Sample learning objective questions included: "Describe three ways that quality sleep can enhance one's success at Emory," "List three healthful, sleep-enhancing bedtime snacks," "Explain why consistent sleep is better than variable sleep" (Zesiger, 2008, 2009, 2010a, 2010b, 2011, 2012).

The evaluations provide a historical account of some of the course's strengths and positive changes that were made during its lifespan. One benefit of the *SleepWell* model was the use of guest presenters from Student Health and Counseling Services who also collaborated in developing the course content. These presentations helped to convey the range of services available at SHCS, introduced students to additional health educators and counselors, and demonstrated the interconnectedness of sleep and other health behaviors (Zesiger, 2008). Further, by alternating presenters and integrating multiple types of active learning (e.g. progressive muscle relaxation, exercise using drinking glasses to guess the amount of alcohol), this model likely helped to enhance participants' interest and understanding in the course topics (H. Zesiger, personal communication, November 18, 2011).

A beneficial enhancement made to the course was the inclusion of questions about participants' sleep schedule (to assess quantity and variability), goals for the course, and caffeine use in the pre-test. The instructor grouped responses and presented them near the start of the first

class session to help demonstrate students' shared challenges and to normalize their concerns (Zesiger, 2010b), as well as highlight areas for improvement throughout the course (Zesiger, 2010a). Asking these questions prior to the course start also benefited the instructor by providing insight into areas of need for a particular cohort and allowed her to prioritize the delivery of content as appropriate.

Another strength of the *SleepWell* model that emerged over time was the inclusion of a community-level group brainstorm session toward the end of the course. This discussion encouraged participants to apply what they had learned about the environment's influence on sleep and to play a role in modifying campus ecology to promote better sleep (Zesiger, 2010a). The concerns and suggestions that were generated by students varied in specificity and feasibility to implement; the instructor shared all of them with the relevant campus partners (Zesiger, 2010b, 2011, 2012). This activity reflects an established principle in the social sciences: that creating an environment conducive to change facilitates the adoption of healthy behaviors (Bandura, 1986). While college students will not be able to control all aspects of their surroundings, it is important to give them a voice and demonstrate that their perspectives are valued, particularly those perspectives that have been shaped by their education and practice.

Similar Studies

The investigator found no published studies describing the development or evaluation of a sleep intervention for college students delivered in an interactive online course format (i.e. e-learning). However, the published literature on sleep education for college students and other internet-based sleep interventions for adults offers findings and recommendations relevant to an evaluation of *SleepWell@Emory – Online*.

Findings from in-person (face-to-face) sleep interventions with college students

In the foundational *Sleep Treatment and Educational Program for Students* (*STEPS*) study, the treatment group (n=82) received a 30-minute presentation on sleep hygiene guidelines and stimulus control instructions delivered by a trained graduate student volunteer during a regularly scheduled introductory psychology course. The control group (n=95) received a 30-minute presentation on the scientific method. When assessed 6 weeks later, the treatment group (n=56) reported taking fewer naps, going to bed hungry less frequently, and taking fewer medications with caffeine than the control group (n=66). Although to a lesser effect, the treatment group also reported an improvement in overall sleep quality (e.g. significantly shorter sleep onset time and fewer sleep disturbances). The authors concluded that sleep hygiene practices change first, followed by changes in overall sleep quality; they hypothesized that larger changes in overall sleep quality could occur over longer periods of time (Brown et al., 2006).

It is surprising to the investigator that one 30-minute presentation administered to an undergraduate population had such a measurable effect on their behaviors and experiences 6 weeks later, particularly given evidence that students' sleep habits diminish as the academic term progresses (Hawkins & Shaw, 1992). It is possible that the pre-test used in both conditions of *STEPS* alerted participants to the objectives of the study (Brown et al., 2006) and the desire to please the investigator played a role in the self-reported responses of participants in the treatment group more than in the control group, who likely realized they had not received a sleep intervention. Nevertheless, the *STEPS* study suggests that a brief presentation is capable of conveying a few facts that students may not anticipate (i.e. taking naps, going to bed hungry, and taking common medications which contain caffeine can all hinder sleep) and awareness of these facts may be sufficient to encourage some students to alter their behavior, at least temporarily.

Findings from online (internet-based) sleep interventions with adults

Vincent and Lewycky (2009) evaluated the effectiveness of a 5-week online treatment for adults with chronic insomnia (N=118) using a randomized controlled trial. While their Canadian study's population included only those with chronic insomnia and not a more general college-age population, there are interesting parallels to *SleepWell - Online*. The intervention contained a variety of multimedia components, including: audiovisual clips as the main teaching component, downloadable MP3 files for relaxation training (i.e. paced breathing, progressive muscle relaxation, imagery-induced relaxation, and self-hypnosis), PDF files for psychoeducation and cognitive therapy, and an interactive e-learning module titled *Cycles of Sleeping and Waking* created by the National Sleep Foundation. The intervention consisted of five modules. Module 1 presented psychoeducation about insomnia and the cognitive behavioral model of insomnia, Module 2 presented sleep hygiene and stimulus control information, Module 3 presented relaxation training, Module 4 presented the concepts of sleep restriction and medication tapering, and Module 5 presented cognitive therapy techniques. Participants were assigned homework corresponding to each module and weekly were asked to respond to questions based on their homework.

The chronic insomnia intervention participants submitted electronic questionnaires and sleep diaries immediately following the 5-week course and then again at a 4-week follow-up. The online treatment resulted in statistically significant improvements in insomnia severity, general fatigue, and sleep quality, as well as a reduction in erroneous beliefs about sleep and pre-sleep mental activity. The researchers also found that community-recruited participants were significantly less likely to drop out of the course than physician-referred participants (Vincent & Lewycky, 2009).

Ritterband et al. (2009) conducted a randomized controlled trial with adults who met their criteria for insomnia. Their internet-based intervention, *SHUTi*, was based on face-to-face cognitive behavioral therapy for insomnia and consisted of six cores that address behavioral, educational, and cognitive techniques. *SHUTi* was available for treatment group participants (n=22) to review during a structured 9-week window. The intervention was both individually tailored and highly interactive. At the start of each core, participants received new sleep restriction recommendations based on their sleep diary entries from the previous week. Content was presented using text, graphics, and animations in vignettes, quizzes, and brief games. Automated emails reminded participants when new core content was available, to complete homework, and of other behavioral prompts that reinforced learning and practice. Compared to the control group, those who received the online treatment reported significantly decreased insomnia severity at post-intervention, and those improvements were maintained at 6-month follow-up (Ritterband et al., 2009).

Kloss et al. (2011) reviewed findings from internet-based behavioral sleep medicine studies and concluded that cognitive behavior therapy is an effective and efficacious intervention for sleep problems in the general adult population. While no case-control trials of internet versus in-person cognitive behavior therapy had been conducted, Kloss et al. hypothesized that an internet version may be preferable for college students because of their high computer literacy, access to computers, and ease of fitting an on-demand intervention into their lifestyles and sleep-wake schedules. The authors also highlighted that online interventions are generally cost-effective and easily disseminated approaches to public health sleep education.

Findings from online (internet-based) sleep interventions with college students

Results of a quasi-experimental study conducted at a large, highly selective private university indicated that email could be an effective method of delivering a cognitive behavioral sleep improvement program to college students. In the study, first-year students living on-campus received self-help program materials weekly by email in eight PDF files. The PDFs incorporated vignette examples specific to college students. Students were encouraged to spend 30 minutes reviewing each weekly file. Students in one residence hall received materials for the *Refresh* program on sleep (n=48) and students in another residence hall received materials for the *Breathe* program designed to elevate mood and increase resilience to stress (n=53). At the conclusion of 8 weeks, *Refresh* participants reported significantly greater improvements in sleep quality than *Breathe* participants. Interestingly, the students in the *Refresh* program also reported greater improvements in depressive symptoms than those in the *Breathe* program. Further, student-reported rates of program completion were higher for *Refresh* than for *Breathe* (54% versus 28% completed the entire 8-weeks; 94% versus 81% completed 4 or more weeks). The sleep improvement program used cognitive restructuring and mindfulness meditation techniques to help students fall asleep. These techniques were not used in *Breathe*, which used strategies more focused on reducing depressive symptoms and improving coping skills (Trockel, Manber, Chang, Thurston, & Tailor, 2011).

These findings may suggest that cognitive restructuring and mindfulness meditation are well suited for an online self-paced format, or may be appealing and accessible techniques for college students to incorporate into their routines. The improvements in *Refresh* participants' sleep quality may be associated with the program's higher completion rate or due to demand characteristics. Yet, these results suggest that students are both interested in and willing to

allocate time to learning about sleep enhancement online. Another facet of this study that may be generalizable to other college populations is that self-help sleep interventions may benefit by being delivered to students within a large peer group simultaneously, particularly when the students share an environment of importance to the targeted behavior change.

Recommendations for sleep education content for college students

Based on their review of available studies, Buboltz et al. (2009) summarized the interventions that might be included in counseling sessions for students with sleep difficulties. They include sleep education (i.e. effects of poor sleep, maintaining consistent sleep-wake schedules, foods and drinks to avoid, proper sleep environment), implementing exercise (i.e. regular exercise a minimum of 3-4 hours before bedtime), bright light therapy (i.e. exposure to broad spectrum light for 30-60 minutes during the day), stimulus control therapy (i.e. instructional procedures that involve the context of sleep and the bedroom), sleep restriction therapy (i.e. limiting the amount of time in bed to actual sleep time), and cognitive behavior therapy (i.e. behavioral and cognitive imagery relaxation techniques, refuting irrational beliefs, thought stopping).

An earlier meta-analysis of psychological interventions found that general sleep hygiene information alone was unlikely to be sufficient for treating adults who experienced chronic problems falling asleep, staying asleep until the desired wake time, or both. Rather than simply advising individuals of what to do, the authors recommended also helping individuals perceive that they have control of their sleep problems, identifying habits that may inhibit sleep, and dispelling negative thoughts about sleep (Morin, Culbert, & Schwartz, 1994).

One cause of the ubiquity of sleep problems among college campuses may be the tendency for students to keep erratic sleep schedules (e.g. obtain insufficient sleep during the week and

attempt to compensate by sleeping long hours on the weekend). Brown et al. (2002) summarized the extensive toll that variable sleep schedules can have on students' physical and psychological health outcomes and the ways in which they can hinder academic performance. Sleeping less than 6 hours per night or shifting one's sleep schedule by more than 2 hours (even for a student who regularly sleeps 8 hours per night) has been shown to result in difficulties with attention, concentration, memory, and critical thinking. In addition to contributing to problems with mood and mental health (e.g. depression), variable sleep schedules likely interfere with the skills required for learning and academic performance. Given the evidence that college students are often unaware of the impact variable sleep schedules have on their day (Hicks et al., 1999) and may even perceive their cognitive abilities as improved when they are sleep deprived (Pilcher & Walters, 1997), this is a topic of particular importance for sleep hygiene education aimed at removing barriers to academic performance.

In Brown et al.'s (2002) study of undergraduate students (N=124), they found that knowledge of proper sleep habits did not necessarily influence sleep quality, but practicing proper habits was strongly related to good overall sleep quality. Hicks et al (1999) determined that students overestimate their knowledge of healthy sleep habits and how much they apply that knowledge in their own practices. A behavior tracking tool, like the sleep diary that is used in both the traditional and online versions of *SleepWell@Emory*, may help students put information into practice by identifying actual versus perceived behaviors and allowing them to see connections between sleep patterns and behaviors.

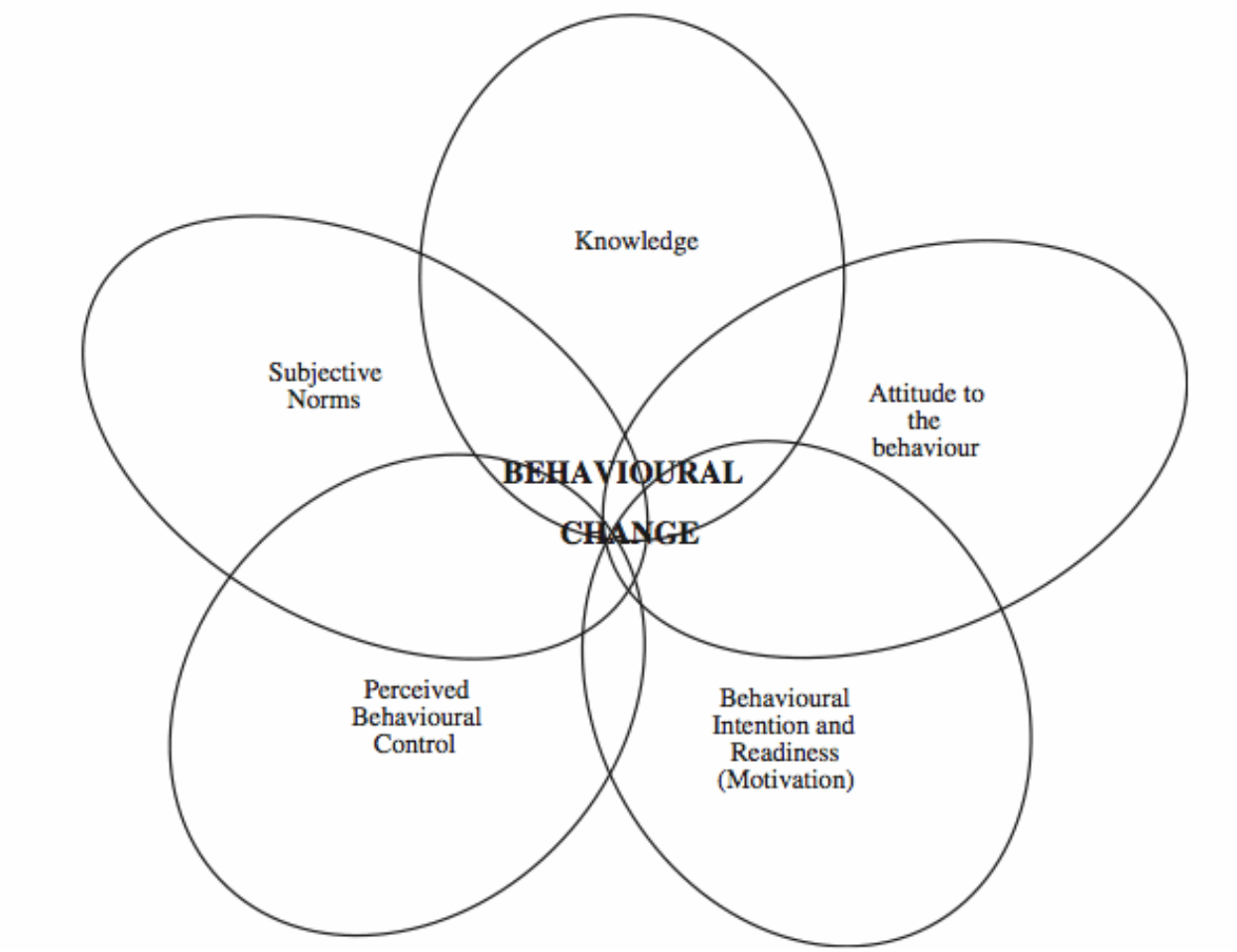
Online educational interventions may be a sufficient health enhancing solution for some students and a launching point into more targeted care for others who need it. Kloss et al. (2011) developed a stepped care model for behavioral sleep medicine for college students. In their

model, if students continue to experience sleep problems after participating in a self-administered behavioral sleep medicine intervention, such as a self-paced online course, they should be referred to an individual or small group counseling session. As needed, counselors should refer students who require further treatment to behavioral sleep medicine clinicians.

The role of theory in intervention design

In a review of studies on school-based sleep education for children and adolescents up to age 19, Blunden et al. (2012) found that an increase in sleep knowledge did not necessarily lead to sleep behavior change. The authors noted that few studies reported having a theoretical underpinning and suggested that applying a theoretical context to sleep education programs may be beneficial. Specifically, they proposed the use of a combined Theory of Planned Behavior and Stages of Change Transtheoretical model (Ajzen, 1985) to improve the efficacy of sleep education programs for young people. Blunden et al.'s model is shown in **Figure 2**. The model contends that a student's decision to change their behavior depends on their understanding of the effects of the behavior (i.e. from knowledge), their attitude toward their current behavior, their intent and motivation to change, their consideration of the behavior's importance in their life, and their readiness to change it. Additionally, in this model, the student assigns importance not only by his or her own assessment, but also by their perception of how significant others (e.g. friends, romantic partners, family) value the behavior change. Further, the student's intent to change is directly correlated with their amount of perceived control over the behavior (Blunden, Chapman, & Rigney, 2012). Bluden et al.'s model will be used in this evaluation to interpret some findings, particularly those pertaining to longer-term behavior changes, and to inform recommendations.

Figure 2. Blunden et al.'s Integrated Model of Behavior Change for Sleep Education Programs, Adapted (Ajzen, 1985; Blunden et al., 2012)



Evidence-supported recommendations for institutions

Universities have multifaceted interests in reducing the incidence and prevalence of sleep problems on their campuses. In addition to the more immediate benefits of improving students' health and grades, widespread reductions in sleep difficulties could increase university retention rates (Brown & Buboltz, 2002) and ultimately enhance the reputation and accomplishments of the institution. Buboltz et al. (2009) suggested that colleges implement the following strategies to prevent and treat student body-level problems with sleep quantity, quality, and routines:

1) Develop and deliver readily accessible programs that emphasize and communicate the importance of sleep habits as factors that can affect academic success.
    a) Present information in many formats and make it widely available to first-year and more advanced students.
    b) Design psychoeducational components to help participants understand the benefits of quality sleep, incorporate new information into their practices, overcome personal challenges, and accept responsibility for their own health behaviors.
2) Offer courses at a variety of times during the day to accommodate the various sleep schedules of students (e.g. afternoon course options would allow a student to go to bed at 2:00 a.m., awaken at 10:00 a.m., and be at peak alertness during class).
3) Strategically schedule extracurricular activities to avoid holding events at night, particularly those that involve physical activity at late hours.

CHAPTER 3: METHODOLOGY

Evaluation Process

The framework for program evaluation in public health is composed of six steps: engage stakeholders, describe the program, focus the evaluation design, gather credible evidence, justify conclusions, and ensure and share lessons learned. Consistent with the framework, this evaluation began by engaging those individuals and organizations with an investment in its findings. The perspectives, knowledge, and guidance of the stakeholders are invaluable elements of the evaluation cycle. Consequently, the investigator will attempt to engage stakeholders throughout the evaluation process and ensure that their concerns and values are reflected in its findings (CDC, 1999).

Stakeholders

The stakeholders of this evaluation include those who are involved in the operations of the *SleepWell* program.

- Emory University Office of Health Promotion (OHP) staff members have been influential in the design, content, and implementation of the *SleepWell – Online* course and will be affected by decisions made about the future of the course. OHP staff members serve as course subject matter experts, provide administrative program support, and participate in promoting the course to key groups and individuals on campus. Resources allocated to the *SleepWell* program may be diverted from other OHP programs and services. In contrast, a successful *SleepWell* experience could boost the image and awareness of the OHP "brand" among funders, students, and faculty, and encourage future participation in other OHP programs and services. The investigator will interview OHP staff members as

part of data gathering. Preliminary findings relevant to OHP staff's work will be shared with them, as will the final evaluation results.

- Emory University Student Health and Counseling Service (SHCS) is involved in making annual funding decisions and advocating for OHP programs to the Division of Campus Life (under which SHCS reports organizationally). In addition to making determinations about allocating limited funds, the other departments of SHCS are affected by the outcomes of OHP's student-facing programs. Refer to **Appendix B** for a chart of the SHCS organization. SHCS's Student Health Services and their Counseling and Psychological Services departments may refer students to a *SleepWell* course and provide *SleepWell* educational materials to students. Further, *SleepWell* could affect their patient volume and type (e.g. participation in the course could lead a student to see a specialist in one of these departments or divert a student who would have otherwise made an appointment with a specialist). The OHP director will share with SHCS any relevant preliminary findings, as needed, and will present the final results to them.
- Emory University Center for Interactive Teaching (ECIT), part of the Office of Information Technology, provided technical support and software during the development of the online course. ECIT provides ongoing assistance to OHP on the use of Blackboard for teaching. ECIT's services and tools may be requested by OHP if evaluation findings lead to the creation of new online content or the modification of existing content. Further, ECIT has an interest in how their clients may have benefited from their services in the past and in using these lessons learned to inform their practices with future clients. The OHP director and investigator will jointly share final evaluation results with ECIT.

- Informed by prior OHP course marketing, Emory College faculty members and academic advisors have referred students to *SleepWell*. In future iterations of the course, faculty and academic advisors throughout the university may be interested in referring students to *SleepWell – Online* for optional course credit or performance improvement purposes. OHP will inform faculty and academic advisors of future *SleepWell* opportunities through university-wide marketing channels. As appropriate, OHP will update faculty and advisors known to have referred students to *SleepWell* on the relevant evaluation findings and program enhancements.

Another critical stakeholder group includes those served or affected by *SleepWell*.

- Future course participants are directly affected by the results of this evaluation. The recommendations of this evaluation may lead to changes in the *SleepWell* program that could yield new benefits, or even decrease the usefulness of the existing program, for course participants. Given that sleep is a universal health topic, the entire Emory student body may be affected by having access to *SleepWell* materials and the opportunity to participate in the course. Further, *SleepWell* provides a venue for students to voice their concerns and suggestions for making environmental changes and shifting cultural norms about sleep within the Emory community as a whole. The investigator will interview one or more students to gain a student perspective on the course and potential future enhancements.
- Fall 2012 online course participants were affected by the evaluation process in terms of the additional effort and time requested of them to complete three online surveys. Course participants were informed that their input was valued and would be used to make enhancements to *SleepWell*. Written comments provided by Fall 2012 participants in the

online surveys, course discussions, and emails to the instructor help to represent the perspective of current and future students.

- Members of professional associations, specifically the American College Health Association (ACHA) and the National Association of Student Personnel Administrators' (NASPA) Health Education and Leadership Program (HELP) have an interest in the generalizability of findings to their campuses, the lessons learned by peer institutions, and in the contribution this evaluation may make to the identification of best practices. Evidence suggests that sleep is a prevalent problem on college campuses and one that has academic and health implications that affect student's immediate and longer-term wellbeing. This evaluation of *SleepWell* will provide insight into the process and outcomes of a modern intervention for addressing the problem of sleep among college students that is currently underexplored in the published literature. The evaluation client and investigator, as appropriate, will present relevant findings to this stakeholder group in future publications and conference presentations.

Intended Users

The client and primary intended user of this evaluation is Heather Zesiger in her role as Director of the Office of Health Promotion (OHP), Emory University Student Health and Counseling Services. Ms. Zesiger is responsible for the strategic planning, implementation, and evaluation of OHP's programs and oversees OHP's financial and human resources. Additionally, as the creator and instructor of the *SleepWell@Emory* program, Ms. Zesiger is an expert in the course content, delivery process, and its history at Emory. She has both an individual and organizational interest in ensuring that *SleepWell - Online* is successful, and if necessary, identifying a viable alternate intervention.

Ms. Zesiger agreed to the investigator's request to evaluate *SleepWell – Online* and collaborated with the investigator on establishing the evaluation design and questions. She serves as the principal contact for the investigator on requests for data and access to other stakeholders throughout the evaluation process. Further, Ms. Zesiger will review and provide feedback on the evaluation plan written by the investigator.

Population and Sample

Emory University is a private institution located in Atlanta, Georgia. In Fall 2012, the university had an enrollment of more than 14,000 students (7,656 undergraduate, 6,580 graduate and professional) (Emory University, 2012a). Individuals who were eligible to enroll in *SleepWell - Online* were all current (as of Fall 2012 semester) Emory undergraduate and graduate students ages 18 and older. The course registration and pre-test survey contained a field for date of birth that was used by the instructor to determine eligibility. This precaution was taken because the instructor was aware that a student investigator would evaluate the course in real-time and wanted to protect the rights of subjects while avoiding restrictions on the evaluator's access to information that might otherwise have been submitted by minors. No student who completed the registration survey was under 18 years of age. Had any student meeting this criterion submitted a registration survey, they would have been contacted by the instructor and informed of future course offerings rather than enrolled. No other exclusion criteria were used in the registration process. Registration was limited to the first 40 students to complete the survey. There were no known risks to participation.

Students learned about *SleepWell – Online* through one or more of OHP's marketing channels. Electronic channels included emails on university-wide listservs, posts on OHP's social networking sites (i.e. Twitter and Facebook), and announcements on OHP's website and

blog. The course was also advertised through print flyers that were displayed in the university gym, in residence halls, and in the waiting rooms of the student primary care health center and counseling center. Flyers were distributed at OHP's table at the August Student Activities Fair. Additionally, the instructor emailed approximately 60 staff members of Student Health and Counseling Services so they could refer students to the course, if appropriate.

In advance of the first offering, the *SleepWell – Online* instructor was contacted by a physical education instructor at Emory College who was interested in advertising the course to her students. She offered extra-credit to any of her students who participated in *SleepWell – Online*. There were no other known incentives offered to students for registration or participation in the course.

Because the course was conducted entirely online, students could have been located anywhere with an internet connection when participating in course activities and completing course surveys. Students were asked for their Emory network identifier (net ID) and Emory email address on the registration survey. These criteria were used by the instructor to enroll students into the course in Blackboard and served as verification that they were current students at Emory.

Students completed all course activities in Blackboard at their convenience using an electronic device of their choice (e.g. personal laptop, smartphone, computer within an Emory facility, etc.). Course surveys were emailed to students and completed online in SurveyMonkey.

Research Design

The credibility of an evaluation's conclusions can be strengthened by using multiple procedures to gather data and by involving stakeholders in the design and interpretation of data (CDC, 1999). A mixed-methods approach (quasi-experimental and observational) was used to

gather data for this evaluation. Additionally, Ms. Zesiger, the client for this evaluation, was actively involved in all phases of the evaluation process.

Given the evaluation team's desire to study the course process and outcomes in as natural a setting as possible and in a timely manner, a quasi-experimental design was chosen. Inherent in this design, there was minimal control over the variables under study and very little attempt made by the investigator to control for potentially confounding variables. While no definite statements can be made about cause and effect with this design, it is considered to be useful for uncovering potential relationships and showing where relationships likely do not exist in studies of complex behavior. Outcomes were measured using a time series design in which self-reported data from course participants was collected before, immediately after, and 6 weeks after the intervention (Ray, 1997).

The investigator collected process data using observational methods. Conducting the course through Blackboard provided a unique opportunity for the investigator to monitor course activity and the posts of all participants without being visible to the participants. The investigator had no direct contact with participants during the course, but rather viewed the course as an enrolled student would have. Additionally, the investigator was given access to information that only the instructor had, which allowed the investigator to collect quantitative data on student's use of Blackboard. The investigator aimed to uphold fundamental characteristics of the naturalistic observation method including noninterference in the process, noticing patterns that exist, having little prior knowledge of those being observed, and recognizing that only a description of the course process could be ascertained through observation (i.e. it is not possible to determine why something occurred with pure observation) (Ray, 1997). This approach was facilitated by the investigator's proficiency with Blackboard as both a student and instructor in her prior academic

experience. Further, the investigator was physically located in another geographic region throughout the evaluation process and had never met any of the course participants.

Procedures

Outcomes data were gathered primarily by the course instructor through electronic surveys. The investigator collaborated with Ms. Zesiger to create electronic surveys using OHP's account in SurveyMonkey, an electronic survey and results analysis tool. These surveys were based on pre- and post-tests used by Ms. Zesiger for prior *SleepWell* cohorts and modified to assess the online course objectives, format, and other research questions specific to this evaluation. The instructor provided students with a URL to take an online survey at three points in time: as part of the course registration process (pre-test), immediately following completion of the course (post-test), and 6 weeks after the course completion date (long-term follow up). All survey data was shared with the investigator for analysis.

The investigator gathered process data by observing course discussions and activities in Blackboard. The investigator monitored but did not participate in online course activity (e.g. reviewed discussion board activity, read student blog postings, etc.) from the system security role of a course instructor in Blackboard. The investigator ran standard course reports in Blackboard to obtain data on course material utilization and participant login history. At the start of each course offering, the instructor informed participants through a Blackboard announcement and email that the course was being evaluated; however, the investigator's name was not identified and the specific procedures being used for data collection in Blackboard were not disclosed to participants.

The investigator also noted any significant technological challenges experienced by the instructor and students, as well as frequently asked questions by the students. The investigator

remained in contact with the course instructor throughout the evaluation. The instructor provided copies of non-sensitive emails to the investigator if they pertained to students withdrawing from the course or providing feedback on the course experience. As needed to fully answer the evaluation questions, the investigator also conducted informational interviews with the course instructor and other key stakeholders.

The investigator received a formal letter from Emory's Institutional Review Board (IRB) on August 31, 2012 which stated their determination that this evaluation is a quality improvement study. IRB determined that this evaluation did not require IRB review because it did not meet the definition of "research" or "clinical investigation" as set forth in federal rules and Emory University policices and procedures.

Instruments

Using SurveyMonkey, one set of online surveys was created for the September session and another set for the October session of *SleepWell – Online*. A variety of question types were used including: open-ended (e.g. textboxes for comments), close-ended multiple choice with one correct answer (e.g. dichotomous "True" or "False" on knowledge items) and multiple correct answers (e.g. dichotomous "Yes" or "No" on belief questions or "Select all that apply" on a question about course advertisements), and likert rating scale multiple choice (e.g. "Strongly Disagree" to "Strongly Agree" on confidence questions). The September and October surveys were identical with the exception of the stated course dates and requested survey return dates. Each survey was assigned a unique hyperlink (URL). The instructor's contact information was included on all course advertisements and surveys.

Registration and pre-test

The registration and pre-test URL was included on all electronic and print advertisements for

the course. Students were encouraged to visit the appropriate URL to register for either the September or October session. It was estimated that the survey would take students approximately 15 minutes to complete. **Table 8** describes the sections within the registration and pre-test instrument.

Table 8. ***SleepWell@Emory - Online*** **Registration and Pre-Test Sections (2012)**

1. Registration	***(Questions 1 - 7)***
Types of information requested:	
• Name (*)	• Date of birth (*)
• Preferred email (*)	• Class year
• Network ID (*)	• How learned about course
Purpose:	
To enroll student in Blackboard course, evaluate cohort demographics and advertising strategies	
2. Pre-Test	***(Questions 8 - 12)***
Items assessed:	
• Sleep improvement goals	• Caffeine use
• Sleep schedule consistency	• Medication use (as relevant to sleep)
Purpose:	
To provide insight on instructional priorities for cohort, create class summary for use during first week of course, compare reported behaviors before and after course	
3. Sleep Knowledge	***(Questions 13 - 26)***
Items assessed:	
• Knowledge of sleep hygiene topics	• Confidence in ability to improve sleep without medication
• Confidence in university's concern about personal wellbeing	• Confidence in ability to reduce stress
• Confidence in ability to work with others to create sleep environment	• Confidence course participation will improve academic performance
Purpose:	
To evaluate whether learning objectives were met (by comparison before and after course), to compare sleep behavior change knowledge and beliefs before and after course, to evaluate OHP's metric of demonstrating that the university is concerned about student wellbeing	

4. Sleep Scale	***(Questions 27 - 29)***
Items assessed:	
• Time to sleep onset	• Sleep disturbance symptoms
• Sleep quantity	
Purpose:	
To compare student-reported sleep outcomes before and after course using the Sleep Scale of the Medical Outcomes Study (MOS), an instrument that has been demonstrated empirically as valid and reliable	

(*) denotes a required field

See **Appendix C** for the registration and pre-test survey that was used for the September cohort.

Post-test

The URL to the post-test was emailed to all participants on the day following the last day of their respective course session. Participants were identified as all students registered for the session who also logged into Blackboard at least once during the course period. It was estimated that the survey would take students approximately 15 to 20 minutes to complete. The sections within the post-test are described in **Table 9**.

Table 9. *SleepWell@Emory - Online* Post-Test Sections (2012)

1. Introduction	***(Questions 1 - 6)***
Items assessed:	
• Sleep schedule consistency	• Medication use (as relevant to sleep)
• Belief course participation improved sleep	• Intent to continue practicing learned behaviors
• Caffeine use	
Purpose:	
To compare reported behaviors before and after course, to evaluate overall helpfulness of course toward improving sleep, to measure intention to practice behaviors learned	
2. Sleep Knowledge	***(Questions 7 - 20)***
Items assessed:	
• Knowledge of sleep hygiene topics	• Confidence in ability to improve sleep without medication

• Confidence in university's concern about personal wellbeing	• Confidence in ability to reduce stress
• Confidence in ability to work with others to create sleep environment	• Confidence course participation has improved academic performance
Purpose:	
To evaluate whether course learning objectives were met, to compare sleep behavior change knowledge and beliefs before and after course, to evaluate OHP's metric of demonstrating that the university is concerned about student wellbeing	
3. Sleep Scale ***(Questions 21 - 23)***	
Items assessed:	
• Time to sleep onset	• Sleep disturbance symptoms
• Sleep quantity	
Purpose:	
To compare student-reported sleep outcomes before and after course using the Sleep Scale of the Medical Outcomes Study (MOS), an instrument that has been demonstrated empirically as valid and reliable	
4. SleepWell Online Course ***(Questions 24 - 31)***	
Items assessed:	
• Helpfulness of course materials	• Pace and enrollment size of course
• Most and least liked aspects of course	• Likelihood of recommending course to friend
• Topics that should be added to course	
Purpose:	
To evaluate the online course materials, student experience, and satisfaction with the course	

See **Appendix D** for the post-test survey that was used for the September cohort.

Six-week post-test

The URL to the long-term follow-up test was emailed to all participants 6 weeks after the last day of their respective course session. Participants were identified as all students registered for the session who logged into Blackboard at least once during the course period. It was estimated that the survey would take students approximately 15 minutes to complete. **Table 10** describes the sections within the 6-week post-test.

Table 10. ***SleepWell@Emory - Online*** **6-week Post-Test Sections (2012)**

1. Introduction	***(Questions 1 - 3)***
Items assessed:	
• Ongoing practice of techniques learned in course	• Belief course participation improved sleep
• Reasons for stopping practice of techniques learned in course	
Purpose:	
To identify behavioral strategies addressed in course that are practiced over time, to identify barriers to behavior change, to evaluate any change since post-test in overall helpfulness of course toward improving sleep	
2. Sleep Knowledge	***(Questions 4 - 17)***
Items assessed:	
• Knowledge of sleep hygiene topics	• Confidence in ability to improve sleep without medication
• Confidence in university's concern about personal wellbeing	• Confidence in ability to reduce stress
• Confidence in ability to work with others to create sleep environment	• Confidence course participation has improved academic performance
Purpose:	
To evaluate whether course learning objectives are maintained over time, to evaluate any change since post-test in sleep behavior change knowledge and beliefs and OHP's metric of demonstrating that the university is concerned about student wellbeing	
3. Sleep Scale	***(Questions 18 - 20)***
Items assessed:	
• Time to sleep onset	• Sleep disturbance symptoms
• Sleep quantity	
Purpose:	
To compare student-reported sleep outcomes before, immediately after, and 6-weeks after course using the Sleep Scale of the Medical Outcomes Study (MOS), an instrument that has been demonstrated empirically as valid and reliable	

4. SleepWell Online Course	***(Questions 21 - 26)***
Items assessed:	
• Most important topics covered in course	• Staying in touch with other participants
• Ongoing use of course materials	• Recommending course to friend
• Topics that should be added to course	
Purpose:	
To evaluate the online course materials, student experience, and satisfaction with the course (including any social connections that were maintained over time)	

See **Appendix E** for the 6-week post-test survey that was used for the September cohort.

Data Analysis

This evaluation will collect quantitative and qualitative data, which will be analyzed using different procedures. To facilitate statistical analyses, the raw data from the September and October cohorts will be combined into a single sample. Statistical analyses will be conducted on the survey results for quantifiable response types (e.g. multiple choice).

Where two measures are available for a single participant on the same question of the pre- and post-test surveys (e.g. caffeine use, sleep schedule consistency), a paired samples t-test will be performed to analyze differences in outcomes before and after the course. Where two measures are available for a single participant on the same question of the post-test and 6-week post-test (e.g. learning outcomes, MOS sleep scale outcomes), a paired samples t-test will be performed to determine whether any changes in outcomes occurred in the 6 weeks following the course. IBM SPSS Statistics will be used to perform all within-subjects paired t-tests, in which the means of students' responses will be compared to determine whether there is a statistically significant difference between the two time periods (Glantz, 2002). Descriptive statistics, including the number of responses available for analysis, the mean, and the number of students with the "correct" response on the learning outcomes will be determined using SPSS and

Microsoft Excel.

The investigator will calculate course participation and access rates. Throughout the course period, the investigator maintained a Microsoft Excel spreadsheet for each cohort. The spreadsheet was used to track the participation of each student in the core and optional course content activities. The investigator gathered the course tracking data by running Blackboard reports and through online observation.

Qualitative data from the surveys and gathered as part of the course observation and stakeholder interviews will be summarized by the investigator manually and analyzed for themes and relevant findings.

Limitations and Delimitations

A delimitation of the current study is the lack of comparison groups. Thus, it possible that some or all pre- to post-test differences in outcomes are due to factors other than participation in the course. The passage of time during the semester, simultaneous participation in other educational or extra-curricular activities, changes to social relationships, or the receipt of messages from other media may all have influenced course participants. This weakness is mitigated by the fact that two cohorts participated in the course during separate 5-week windows in the same semester. Findings from these two cohorts can be compared to one another, and data from both cohorts can be considered against the backdrop of the seven prior face-to-face cohorts.

The fact that the study protocol was not blind to the researcher or participants is another delimitation. Thus, there is a risk that expectation bias influenced the investigator when observing course activity and in making subjective notations about the level of content understanding that was reflected in participant online interactions. Similarly, social desirability bias may have led participants to over-report improved behaviors and beliefs on the post-tests.

To respect the privacy and autonomy of students to practice personal health behaviors, neither the instructor nor the investigator requested participant sleep diaries, action plans or any objective evidence of health behavior before, during, or after the course. This is a limitation of the study design and it complicates possible participant desirability bias. Again, these weaknesses will be mitigated by comparing the qualitative and quantitative data collected between the two online cohorts, and then collectively within the scope of the outcomes from the past traditional cohorts.

Another limitation is the use of a self-selected population. Consequently, students who registered for *SleepWell* may be different from the rest of the Emory student population. Those who register and withdraw also may be different from those who participate throughout the course. The self-selected nature of participation is consistent with the face-to-face model of the course and may reflect the most realistic recruitment strategy for *SleepWell* in the future. Nevertheless, this factor weakens the investigator's ability to anticipate how *SleepWell's* process and outcomes could differ if the recruitment strategy were to change. The advantage of conducting research in an uncontrolled, real-world setting is that it increases the likelihood that the intervention can be replicated with similar populations in the same setting. This is in line with OHP's goal to continue offering the information contained within *SleepWell* to Emory students in the most efficient and effective manner feasible.

The inability to test the process and outcomes of *SleepWell - Online* against a particular behavior change theory is another limitation. The initial *SleepWell* course design was based on empirical evidence (Zesiger, 2008) and consultation with college health promotion specialists who had experience implementing similar programs on their campuses (Brown et al., 2006; University of Florida Division of Student Affairs, 2012). The adaptation of their models and

materials for Emory was not grounded in a particular behavioral change theory. Thus, the constructs of one or multiple theories were not tested in the assessment of the traditional course's cohorts. Similarly, no behavioral change theories were identified during the design or development of the online course, which was based heavily on the traditional course and the intern's familiarity with adult learning principals. This evaluation will attempt to identify health behavior theories relevant to *SleepWell* and describe how their constructs relate to and might improve the course.

CHAPTER 4: RESULTS

Introduction

This chapter presents the findings of the *SleepWell – Online* course pilots that occurred during the Fall 2012 semester. Participant characteristics and rates of participation, as well as course delivery and assessment procedures are discussed. Outcomes data are organized by the evaluation question they address. The first five evaluation questions, which investigate participant and course outcomes, are answered in this chapter. Findings relevant to the sixth evaluation question, which considers possible modifications to *SleepWell – Online*, will also be introduced in this chapter.

Findings

Participation

The first *SleepWell – Online* course offering was scheduled to occur between September 12 and October 16 ("September cohort") and the second between October 17 and November 20 ("October cohort"). **Table 11** describes the characteristics of the students who registered for the September and October sessions, as well as the participation rates for each cohort. Participation was defined as accessing core course items in the weekly unit either during or after the designated dates for that week. Participation included doing any of the following: viewing the video or PDF presentations, posting to the discussion board or blog, making an entry in the knowledge check, or downloading a podcast. The numbers of students listed in the participation columns do not include students who withdrew from the course at any point during the course timeframe. Attrition refers to the percent of students who became "absent" online during a given time period, or whose participation in the weekly core content declined between two points in

time (e.g. there was a 24% decrease in the number of September cohort students who participated in Week 4 core content compared to Week 3).

As described in **Table 11**, the rates of registration for the online course (39 for September and 26 for October) were comparable to the two most recent cohorts of the traditional course (41 for Fall 2011 and 27 for Fall 2010) (see **Table 2**). Registrants for the online course were more evenly distributed across class year than registrants for the traditional course, which were predominantly first and second-year students due to the recruitment strategy of the sponsoring campus partners and those students more likely able to attend the course in person. Similar to the traditional course, the majority of online course participants were female. In the online course, 77% of September and 81% of October participants were female. In 4 out of 7 of the traditional course's cohorts, more than 75% of participants were female. The September cohort students ranged in age from 18 to 49 years (average 23 years); the October cohort students ranged from 18 to 28 years (average 20 years).

Rates of attrition were generally higher for the online course than the traditional course. The online course was designed to be two weeks longer than the face-to-face model (i.e. 5 versus 3 weeks), which may have contributed to the declines in participation during Weeks 4 and 5; however, a difference can be noted even in the first two weeks of both cohorts. Rates of attrition between the first two weeks of the online course were 19% for September and 38% for October, while drop-off during the first two weekly sessions of the traditional course ranged from 0 to 19%. For both *SleepWell* formats, there was a considerable gap between the number of students who expressed an interest in participating (as demonstrated through course registration) and the number who actually participated in the first session or first week's activities. Attrition between registration and Week 1 of the online course was 33% for September and 39% for October. Rates

of attrition between registration and Session 1 in the traditional course ranged from 11% to 54%. Overall loss of potential participants from the time of registration to the conclusion of the course was also higher for the online course. Attrition between registration and Week 5 was 95% for September and 89% for October online cohorts compared to attrition rates that ranged from 22% to 66% between registration and Session 3 in traditional cohorts. By far the lowest attrition between registration and course end (11%) was achieved during the condensed two-session cohort in the Spring 2010 offering of the traditional course (refer to **Tables 2** and **11** for additional details).

On the final day of the September session (October 16), the instructor sent an email to 9 students who had not logged into the course and who did not withdraw. She inquired whether the students wanted to be enrolled in the October session and whether any technical issues had prevented them from participating. No students reported technical issues. One student requested to be enrolled in the October session. Ultimately, this student logged into both the September and October sessions but did not access core content or participate in course activities in either session. Below is text from an email received by the instructor from one of the nine students who did not log into the September session:

> Sorry that I have not been able to participate more in the SleepWell online mini-course. It is not because of technical issues. It is just that I end up not having enough time as I thought I would have for this course. I am very sorry for not informing you this earlier and I am afraid that I will not be able to take the advantage of the second chance either. Thank you so much for you email and understanding!

Table 11. Attendance and Attrition for *SleepWell@Emory - Online* Cohorts (2012)

Cohort	Semester	Participation (n)						Attrition (%)						Registrants by Class Year[+] (%)					Registrants by Gender[++] (%)	
		Registered	Week 1	Week 2	Week 3	Week 4	Week 5	Registration & Week 1	Weeks 1 & 2	Weeks 2 & 3	Weeks 3 & 4	Weeks 4 & 5	Registration & Week 5	First-Year	Second-Year	Third-Year	Fourth-Year	Grad / Prof School	Male	Female
Sep	Fall 2012	39	26	21	17	13	2	33	19	19	24	85	95	13	13	28	18	23	23	77
Oct	Fall 2012	26	16	10	11	7	3	39	38	0	36	57	89	27	15	35	19	4	15	81

[+] One student from the September cohort selected class year "Other."
[++] Gender was not asked on the registration and pre-test survey; student genders were categorized by the investigator based on the full and "I prefer to be called" names that students entered on the survey. Percents do not equal 100 for the October cohort because gender could not be categorized using name for 2 students.

Withdrawals

Combined, a total of 8 students withdrew from the online course sessions. Each of these students voluntarily informed the instructor by email why they wanted to withdraw. **Table 12** summarizes the reasons provided. Six students felt they could not devote the time or effort needed to participate in the course due to the demands of their schedules and academic workload. These students conveyed to the instructor that they previously underestimated how busy their semester would be or that some additional,

unanticipated commitments arose for them. One student withdrew after deciding that the extra credit that one Emory College instructor was offering for *SleepWell* participation was not needed, and the other seemed to have registered for the course under the erroneous assumption that it was part of other required first-year courses. Additionally, during the course withdrawal email exchanges, 2 withdrawn students from the October session requested to meet with the instructor in a 1-hour individual counseling session to address their sleep concerns. Based on characteristics submitted on the registration survey (e.g. age and year in school), there were no differences observed between those students who withdrew from the course and those who did not.

Table 12. Reasons for Withdrawing from *SleepWell@Emory – Online* (2012)

Reason Provided	Time of Course Withdrawal & Students (n) Citing Reason						Total
	Prior to Start	Week 1	Week 2	Week 3	Week 4	Week 5	
School/work schedule busier than anticipated	Oct (1)	..	Sep (1)	Sep (1)	Oct (1)	..	4
Academic workload too demanding to accommodate more	..	Oct (1)	..	Sep (1)	..	..	2
Registered to earn extra credit that was no longer needed	Oct (1)	..	..	..	..	..	1
Registered under assumption course was required	..	..	..	Oct (1)	..	..	1

Course extension

Given the low rates of participation in the fourth and fifth weeks of the course in particular, the instructor decided to extend the active course window by 2 weeks to give students additional time to access course materials and post questions within the course discussion boards. When communicating the extension to students, the instructor encouraged them to download any materials they would like for future reference before the course was "closed" and they would no longer have access to the materials in Blackboard. The instructor extended the active course window for both the September and October cohorts by 2 weeks in order to maintain consistency in the outcomes measurement strategy, and because similarly low rates of participation were noted. In the September session, 14 students took advantage of this extension by logging in at least once during the additional 2 weeks. Eight students took advantage of the October course extension.

Assessment

Consistent with the recruitment process, links to the pre-test surveys for the September and October sessions were available to students at the start of the Fall 2012 semester. The post-tests and 6-week post-tests were distributed only to those students who logged into the course at least once and who did not withdraw from the course. The distribution timeline for the post-tests and 6-week post-tests was delayed 2 weeks as a result of the extended course window. **Table 13** displays the timeline for *SleepWell – Online* assessments and course content.

Table 13. Extended Timeline for *SleepWell@Emory – Online* Course Cohorts (2012 - 2013)

	September Cohort	October Cohort
Registration & Pre-Test	Submitted by Sep 5	Submitted by Oct 10
Course Week 1	Sep 12 – Sep 18	Oct 17 – Oct 23
Course Week 2	Sep 19 – Sep 25	Oct 24 – Oct 30
Course Week 3	Sep 26 – Oct 2	Oct 31 – Nov 6
Course Week 4	Oct 3 – Oct 9	Oct 7 – Nov 13
Course Week 5	Oct 10 – Oct 16	Nov 14 – Nov 20
Extended Course Access Period	Oct 17 – Oct 30	Nov 21 - Dec 4
Post-Test	Oct 31 – Nov 7	Dec 5 – Dec 11
6-Week Post-Test	Dec 5 – Dec 12	Jan 9 – Jan 16

A procedural error occurred during the administration of the post-test survey to the September cohort. On October 31, a link to the 6-week post-test was inadvertently sent to the participants of the September course. The error was discovered on November 1, after 9 students had submitted the 6-week post-test. The 6-week post-test contained some but not all of the questions on the post-test (see **Tables 9** and **10** for a comparison of survey content), so an abbreviated survey of only the post-test questions not contained on the 6-week post-test was created. The instructor emailed a link to the abbreviated post-test to the 9 students who had submitted the erroneous 6-week post-test; 8 of the 9 students completed the abbreviated test. The instructor de-activated the link to the original 6-week post-test that was sent in error and emailed a link to the correct post-test to the remaining September course participants along with an explanation of the error and request to complete the post-test.

Overall, completion rates for the post-tests and 6-week post-tests were low in both cohorts. A total of 65 students registered for *SleepWell – Online* (39 for September and 26 for October), 26 submitted a post-test (19 for September and 7 for October), and 12 submitted a 6-week post-test (9 for September and 3 for October). Post- and 6-week post-tests were sent to 31 students from

the September cohort, and 21 students from the October cohort. Of the September cohort who received the surveys, 61.3% completed the post-test and 29.0% completed the 6-week post-test. Of the October cohort, 33.3% completed the post-test and 14.3% completed the 6-week post-test. These rates reflect a very high loss to follow-up (particularly among the October cohort), which reduces the strength of the conclusions that can be drawn from the survey data and limits the generalizability of findings. The instructor and investigator observed that, not surprisingly, the participants who were most active in the course were also most likely to complete the post- and 6-week post-tests. Therefore, conclusions that are based on survey results may best reflect the experiences and insights of those students who were most motivated or able to participate in the online course.

Analysis

A total of 11 students (8 from the September cohort and 3 from the October cohort) could be matched on the pre-test, post-test, and 6-week post-test. One student from the September cohort could be matched on only the pre-test and 6-week post-test. A total of 15 students (11 from the September cohort and 4 from the October cohort) could be matched on the pre-test and post-test. Among those students who could be matched for two or three tests, there were numerous questions for which no response was provided and the responses left blank were not consistent within or between students. Given that the small sample size available reduces the power and reliability of any statistical analysis, the decision was made to analyze outcomes measures using descriptive statistics and qualitative analysis as available. Data from the assessments were aggregated and where appropriate, means were compared between tests and between cohorts.

Evaluation Question 1. Is *SleepWell - Online* effective at increasing students' sleep-related knowledge?

Participants were asked the same set of content-related questions in all three assessment instruments; only the order of questions varied among the surveys (see **Appendices C, D,** and **E** for the Knowledge section of each instrument). **Table 14** lists the raw scores on the knowledge assessment items for both cohorts. Among those who responded, the number of incorrect responses were maintained or decreased over time (from pre-test to post-test to 6-week post-test) for both the September and October cohorts, with the exception of two instances. On the grades and sleep question, 1 student responded incorrectly on the post-test (compared to none on the pre-test), and on the screens and sleep onset question, 1 student responded incorrectly on the 6-week post-test (compared to none on the post-test). Overall, these results suggest that participation in *SleepWell – Online* did increase students' sleep-related knowledge and that the knowledge gained was maintained at 6-weeks post-test. Given the very low response rate on the 6-week test (23% for September and 12% for October), these results must be interpreted with caution. On the pre-test, the knowledge questions may have primed the learner to notice when the answers were revelaed in course content, particularly for those questions that the student had uncertainty prior to the course. Additionally, students were able to refer to any course materials they downloaded from Blackboard when taking both post-tests. Both of these factors may have contributed to a higher percentage of correct resopnses, however they also support the goal of learning.

The yellow cells on **Table 14** highlight the tests on which more than 30% of the total respondents selected an incorrect answer. Three questions met this criteria: both questions that pertain to food and one question that pertains to caffeine. Diet, caffeine, and other substances

were covered in the Week 3 content. Compared to the other weeks, Week 3 contained the most presentations (a total of 31 minutes of presentation content versus 8 minutes in Week 1, 22 minutes in Week 2, 29 minutes in Week 4, and none in Week 5). While all of Week 3's content addressed things students may ingest, the content covered a range of different topics in detail. These results may suggest that the key concepts in Week 3 were more likely to be new information to students or counter their assumptions. It is less clear from these results alone whether students were disengaged by the level of detail, amount, or type of information covered in Week 3.

Table 14. Number and Percent of Students for Responses on *SleepWell@Emory – Online* Knowledge Assessment Items (2012 - 2013)

KNOWLEDGE							
QUESTION		SEPTEMBER			OCTOBER		
		PRE-TEST (n=39)	POST-TEST (n=19)	6-WEEK POST-TEST (n=9)	PRE-TEST (n=26)	POST-TEST (n=7)	6-WEEK POST-TEST (n=3)
Sleep quantity	Correct -- Incorrect -- *No response* --	37 (94.9%) 2 (5.1%) ..	14 (73.7%) 2 (5.1%) 3 *(15.8%)*	9 (100%)	21 (80.8%) 5 (19.2%) ..	5 (71.4%) 2 (28.6%) ..	2 (66.7%) .. 1 *(33.3%)*
Sleep variability and quality	Correct -- Incorrect -- *No response* --	37 (94.9%) 2 (5.1%) ..	14 (73.7%) 2 (5.1%) *3 (15.8%)*	8 (88.9%) 1 (11.1%) ..	25 (96.2%) 2 (3.9%) ..	7 (100%)	2 (66.7%) .. 1 *(33.3%)*
Health effects of poor sleep	Correct -- Incorrect -- *No response* --	39 (100%)	16 (84.2%) .. *3 (15.8%)*	9 (100%)	26 (100%)	7 (100%)	2 (66.7%) .. 1 *(33.3%)*
Grades and sleep	Correct -- Incorrect -- *No response* --	37 (94.9%) 2 (5.1%) ..	16 (84.2%) .. *3 (15.8%)*	9 (100%)	26 (100%)	5 (71.4%) 1 (14.3%) 1 (14.3%)	2 (66.7%) .. 1 *(33.3%)*
Screens and sleep onset	Correct -- Incorrect -- *No response* --	35 (89.7%) 4 (10.3%) ..	16 (84.2%) .. *3 (15.8%)*	8 (88.9%) 1 (11.1%) ..	23 (88.5%) 3 (11.5%) ..	5 (71.4%) 2 (28.6%) ..	2 (66.7%) .. 1 *(33.3%)*
Food for alertness	Correct -- Incorrect -- *No response* --	29 (74.4%) 10 (25.6%) ..	13 (68.4%) 3 (15.8%) *3 (15.8%)*	8 (88.9%) 1 (11.1%) ..	17 (65.4%) 9 (34.6%) ..	5 (71.4%) 2 (28.6%) ..	1 (33.3%) 1 (33.3%) 1 *(33.3%)*
Food for rest	Correct -- Incorrect -- *No response* --	20 (51.3%) 19 (48.7%) ..	10 (52.6%) 6 (31.6%) *3 (15.8%)*	7 (77.8%) 2 (22.2%) ..	13 (50%) 13 (50%) ..	4 (57.1%) 3 (42.9%) ..	2 (66.7%) .. 1 *(33.3%)*
Caffeine elimination	Correct -- Incorrect -- *No response* --	25 (64.1%) 14 (35.9%) ..	16 (84.2%) .. *3 (15.8%)*	9 (100%)	18 (69.2%) 8 (30.8%) ..	4 (57.1%) 3 (42.9%) ..	2 (66.7%) .. 1 *(33.3%)*
Alcohol at bedtime	Correct -- Incorrect -- *No response* --	33 (84.6%) 6 (15.4%) ..	15 (79%) 1 (5.3%) *3 (15.8%)*	9 (100%)	24 (92.3%) 2 (7.7%) ..	7 (100%)	2 (66.7%) .. 1 *(33.3%)*

Evaluation Question 2. Is *SleepWell - Online* effective at improving students' sleep-related behaviors?

Participants were asked questions about their sleep-related behaviors in all three assessment instruments. Questions about sleep schedule variability, caffeine and medication use were included only on the pre- and post-tests (see section 2 of the pre-test in **Appendix C** and section 1 of the post-test in **Appendix D**) and were not included on the 6-week post-test in order to limit the total number of questions asked. **Table 15** lists the raw scores on these behavioral assessment items for both cohorts. The percentage of students who reported sleep schedule variability declined from pre- to post-test in both cohorts. Combined, 15.4% fewer students indicated that their sleep varied by more than 2 hours per day (69.2% of the 65 pre-test respondents versus 53.8% of the 26 post-test respondents). Additionally, the proportion of students who did not know the answer to this question decreased in both cohorts, possibly indicating that course participation made students more aware of their sleep patterns.

As shown in **Table 15**, other behaviors favorable to sleep were reported for caffeine and medication use. In both cohorts, the percentage of students who reported no caffeine use increased and fewer students reported taking medications with the intent of benefiting sleep after the course. In terms of taking medication that may disrupt sleep, there was a pre- to post-test increase for the September cohort (1 student or 2.6% of respondents pre-test compared to 2 students or 10.5% of respondents post-test). If not selected in error, this difference could reflect a change in a student's medical condition during the semester or greater awareness about a medication that a student was using before the course. For the October cohort, there was a decrease in both the number and proportion of students who reported taking medication that may disrupt sleep (4 students or 15.4% of respondents pre-test compared to 1 student or 14.3% of

respondents post-test).

Table 15. Number and Percent of Students for Responses on *SleepWell@Emory – Online* Sleep Consistency and Substance Use Behavioral Assessment Items (2012)

BEHAVIOR – CONSISTENCY & SUBSTANCES							
QUESTION		SEPTEMBER			OCTOBER		
		PRE-TEST (n=39)	POST-TEST (n=19)	6-WEEK POST-TEST (n=9)	PRE-TEST (n=26)	POST-TEST (n=7)	6-WEEK POST-TEST (n=3)
Amount of sleep varies by >2 hours/day:	Yes -- No -- Don't know -- *No response* --	28 (71.8%) 5 (12.8%) 6 (15.4%) ..	10 (52.6%) 6 (31.6%) 2 (10.5%) *1 (5.3%)*	n/a	17 (65.4%) 7 (26.9%) 2 (7.7%) ..	4 (57.1%) 3 (42.9%)	n/a
Servings of caffeine per day:	None -- 1-3 servings -- 3-5 servings -- >5 servings -- *No response* --	19 (48.7%) 20 (51.3%)	11 (57.9%) 7 (36.8%) .. .. *1 (5.3%)*	n/a	13 (50%) 12 (46.2%) .. *1 (3.8%)* ..	4 (57.1%) 2 (28.6%) 1 (14.3%)	n/a
Take medications that may disrupt sleep:	Yes -- No -- Don't know -- *No response* --	1 (2.6%) 36 (92.3%) 2 (5.1%) ..	2 (10.5%) 14 (73.7%) 2 (10.5%) *1 (5.3%)*	n/a	4 (15.4%) 17 (65.4%) 5 (19.2%) ..	1 (14.3%) 4 (57.1%) 1 (14.3%) *1 (14.3%)*	n/a
Take medications with intent of benefiting sleep:	Yes -- No -- Don't know -- *No response* --	7 (17.9%) 30 (76.9%) 2 (5.1%) ..	3 (15.8%) 15 (79%) .. *1 (5.3%)*	n/a	3 (11.5%) 23 (88.5%)	.. 7 (100%)	n/a

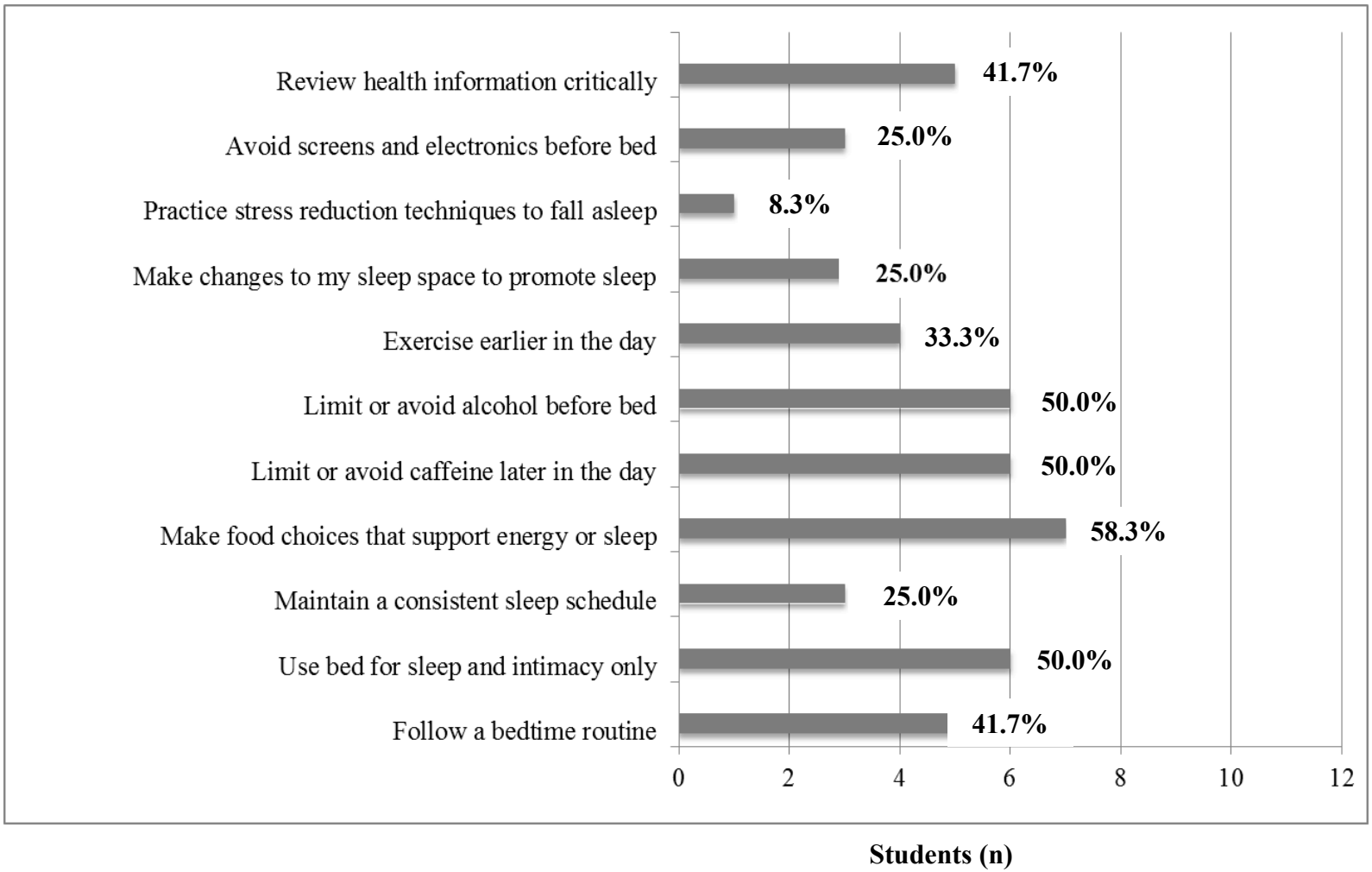
The questions contained in **Table 15** are important indicators of whether *SleepWell* met its behavioral outcome goal of improved sleep consistency and supports the longer-term impact goals of reducing reports of sleep-related academic impediments, daytime fatigue, and morning fatigue. Adding these three questions to the longer-term post-test should be considered if *SleepWell – Online* is assessed with similar instruments in the future. For this evaluation, information about sleep consistency and other behavioral practices targeted by the course were included in a single question on the 6-week post-test (see question 1 in **Appendix E**). **Figure 3** displays combined responses to the question "Which of the following *SleepWell* techniques do you still use?" from the September and October 6-week post-tests. The most frequently selected technique (by 58.3% of students) was to make food choices that promoted energy or sleep. Half of respondents selected avoiding or limiting alcohol before bed and caffeine later in the day. Like diet, information on these substances was covered during Week 3. These results further support the hypothesis that the key concepts in Week 3 are novel or surprising to students and that, with increased awareness, students are motivated or at least able to incorporate the course's recommendations in these areas. Half of respondents also indicated that they use their bed for sleep and intimacy only, a concept presented during Week 2 that supports creating a proper sleep environment and reducing distracting stimuli.

As shown in **Figure 3**, the least commonly selected option was practing stress reduction techniques to fall asleep, which only 1 student (8.3%) reported using 6-weeks after the course. Stress reduction was covered during Week 4, which had the lowest levels of participation of any of the presentation content weeks (see **Table 11**). It is unclear from this result alone whether the podcasts and presentation material in Week 4 were inadequate resources or whether the respondents prioritized using other *SleepWell* techniques based on their specific needs. Because

the action plans students were asked to complete during the course were not collected, it is not possible to know whether students identified practicing stress reduction techniques as a priority. When asked in the pre-test what they were hoping to improve about their sleep (see question 8 in **Appendix C)**, 16% of September cohort registrants and 13% of October cohort registrants identified "falling asleep." This response was third after sleep quality (47%) and consistency (23%) for September registrants and quality (39%) and quantity/schedule (39%) for October registrants.

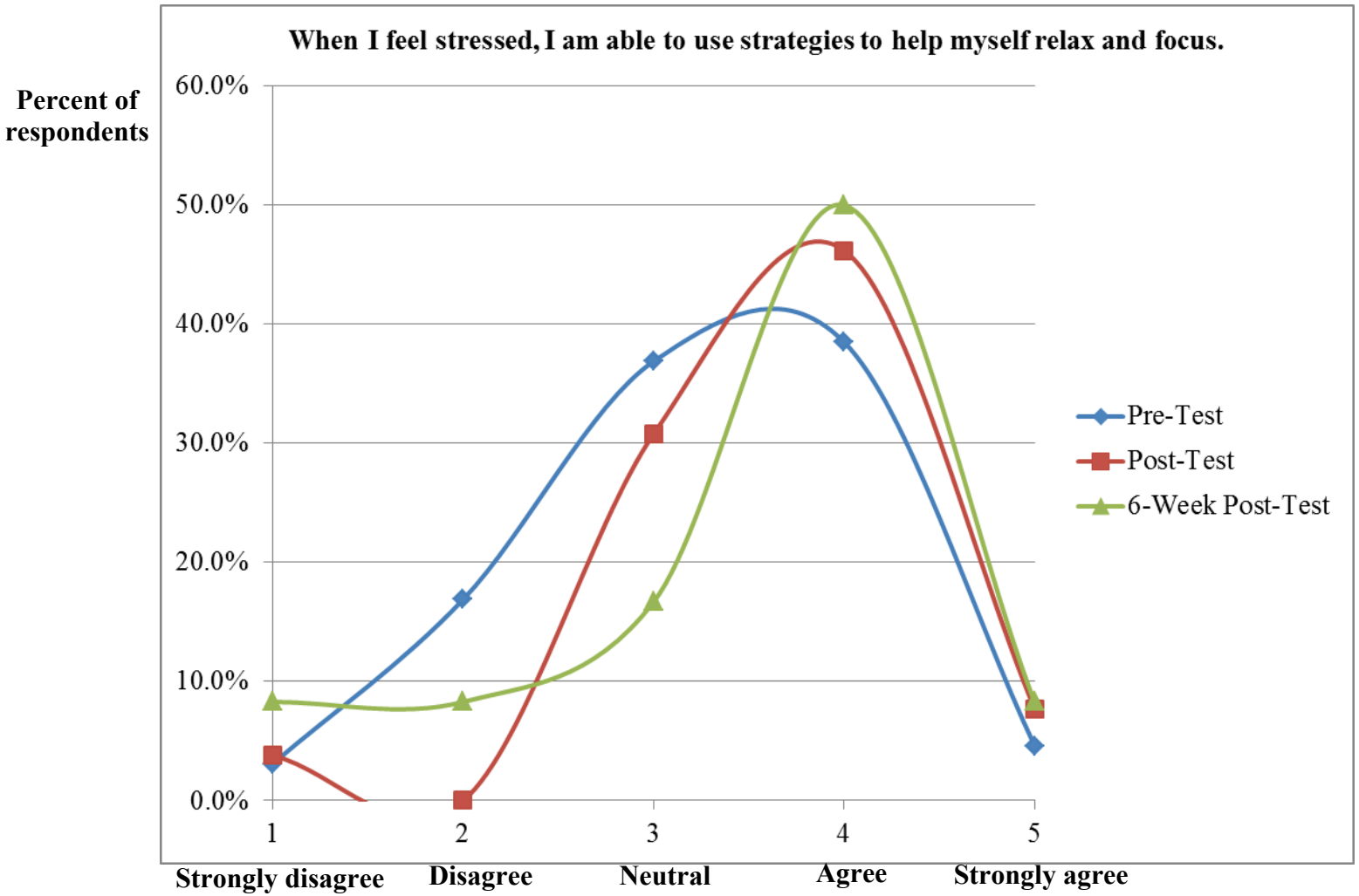
Figure 3. Combined Responses on *SleepWell@Emory – Online* 6-week Post-Test Behaviors Practiced Question (2012 - 2013)

Which of the following SleepWell techniques do you still use*? (Select all that apply.)*



Students were asked on all three assessments to indicate the degree to which they agree with the statement: “When I feel stressed, I am able to use strategies to help myself relax and focus.” **Figure 4** illustrates the combined responses to this question from the September and October cohorts. As a percent of overall respondents on each assessment, the proportion who agreed or strongly agreed to this statement increased over time. The percent of respondents who indicated they “Agreed” was 38.5% on the pre-test, 46.2% on the post-test, and 50.0% on the 6-week post-test. The percent of respondents who indicated they “Strongly agreed” was 4.6% on the pre-test, 7.7% on the post-test, and 8.3% on the 6-week post-test. While this trend in confidence in ability to use stress reduction techniques is promising, its strength is limited by the low response rate on the post-test and very low response rate on the 6-week post-test. Given that Emory University students identified stress as the top health-related impediment to academic success (see **Overview of the Problem** in **Chapter 1**), and the bidirectional association between stress and sleep, there is a need to explore additional approaches to providing stress reduction resources and education to students.

Figure 4. Combined Responses on *SleepWell@Emory – Online* Confidence in Use of Stress Reduction Strategies Question (2012 - 2013)



Identical questions from the Medical Outcomes Study (MOS) Sleep Scale were included in all three assessments (see **Appendices C, D,** and **E** for the Sleep Scale section of each instrument). The MOS Sleep Scale consists of 12 questions to measure 6 dimensions of sleep. Respondents were asked to consider the past 4 weeks and indicate how often they experienced problems with the following: initiation (time to fall asleep), quantity (nightly hours of sleep), maintenance (staying asleep), respiratory problems while sleeping, perceived sleep adequacy, and somnolence (drowsiness). **Appendix F** lists the raw data from the MOS Sleep Scale for both cohorts.

The investigator calculated scores according to the MOS Sleep Scale manual (Spritzer & Hays, 2003). In most cases, a lower score is desirable. Exceptions when a higher score is desirable are the score for Sleep Adequacy and the dichotomous Optimal Sleep score, which measures quantity. The investigator compared average scores from the pre-tests to the MOS means to determine how *SleepWell – Online* registrants scored compared to the MOS population. The cells shaded in yellow on **Table 16** highlight the most problematic sleep measures as indicated by registrants prior to starting the course. They are: Sleep Disturbance, Sleep Adequacy, Sleep Somnolence, Sleep Problems Index I and Index II (for both cohorts), and the Optimal Sleep score (for the September cohort only). Differences in average *SleepWell – Online* participant scores at pre-test, post-test, and 6-week post-test were then compared.

Table 16 displays the average MOS Sleep Scale scores and comparisons. Scores that were desirable (in relation to the MOS mean) at pre-test were maintained at post-test for participants on the following dimensions: Snoring, Sleep Short of Breath or Headache (for both cohorts), and Optimal Sleep (for October cohort). Pre- to post-test scores improved for both the September and October participants on the following dimensions: Sleep Disturbance, Sleep Adequacy, Sleep

Somnolence, and Sleep Problems Index I and Index II. No score averages declined from pre- to post-test. Results from the 6-week post-test were mixed, possibly indicating that some improvements in sleep problems achieved at the post-test were lost after 6 weeks. This possibility must be interpreted with caution given the very small sample size for the 6-week post-tests (n=9 for September and n=3 for October) and the effect that 1 or 2 students could have on the average scores. At 6 weeks, the average scores for Sleep Short of Breath or Headache (September cohort) and Snoring (October cohort) increased compared to both the pre-test and the post-test averages. For both cohorts, average scores for Optimal Sleep declined at 6 weeks compared to the pre-test and post-test averages. Based on MOS scoring, the optimal number of hours slept on average per night is 7 or 8 (scored with a value of "1"), while 6 or fewer hours and 9 or more hours are scored with a value of "0." The cells shaded in pink in **Table 16** highlight the sleep dimensions on which 6-week average scores were more problematic than either the pre-test or post-test scores.

Table 16. Average Scores on *SleepWell@Emory – Online* Medical Outcomes Study Sleep Scale Questions (2012 - 2013)

MOS SLEEP SCALE							
QUESTION		SEPTEMBER			OCTOBER		
		PRE-TEST (n=39)	POST-TEST (n=19)	6-WEEKS POST-TEST (n=9)	PRE-TEST (n=26)	POST-TEST (n=7)	6-WEEKS POST-TEST (n=3)
Sleep Disturbance SLPD4	MOS mean: 29.20 Desirable score: Lower	Avg score: 42.81 (n=35) Result: 13.60 above MOS mean *(undesirable)*	Avg score: 21.53 (n=15) Result: 21.28 below pre-test mean *(desirable)*	Avg score: 28.75 (n=8) Result: 7.22 above post-test mean *(undesirable)*; 14.06 below pre-test mean *(desirable)*	Avg score: 34.53 (n=24) Result: 5.33 above MOS mean *(undesirable)*	Avg score: 25.18 (n=7) Result: 9.35 below pre-test mean *(desirable)*	Avg score: 18.13 (n=2) Result: 7.05 below post-test mean *(desirable)*; 16.40 below pre-test mean *(desirable)*
Snoring SLPSNR1	MOS mean: 30.89 Desirable score: Lower	Avg score: 24.71 (n=34) Result: 6.18 below MOS mean *(desirable)*	Avg score: 18.67 (n=15) Result: 6.04 below pre-test mean *(desirable)*	Avg score: 17.50 (n=8) Result: 1.17 below post-test mean *(desirable)*; 7.21 below pre-test mean *(desirable)*	Avg score: 14.40 (n=25) Result: 16.49 below MOS mean *(desirable)*	Avg score: 5.71 (n=7) Result: 8.69 below pre-test mean *(desirable)*	Avg score: 20.00 (n=2) Result: 14.29 above post-test mean *(undesirable)*; 5.60 above pre-test mean *(undesirable)*

MOS SLEEP SCALE *(continued)*							
QUESTION		**SEPTEMBER**			**OCTOBER**		
		PRE-TEST (n=39)	**POST-TEST (n=19)**	**6-WEEKS POST-TEST (n=9)**	**PRE-TEST (n=26)**	**POST-TEST (n=7)**	**6-WEEKS POST-TEST (n=3)**
Sleep Short of Breath or Headache SLPSOB1	MOS mean: 13.29 Desirable score: Lower	Avg score: 12.57 (n=35) Result: .72 below MOS mean *(desirable)*	Avg score: 9.33 (n=15) Result: 3.24 below pre-test mean *(desirable)*	Avg score: 17.50 (n=8) Result: 8.17 above post-test mean *(undesirable)*; 4.93 above pre-test mean *(undesirable)*	Avg score: 12.31 (n=26) Result: .98 below MOS mean *(desirable)*	Avg score: 5.71 (n=7) Result: 6.60 below pre-test mean *(desirable)*	Avg score: 0.00 (n=2) Result: 5.71 below post-test mean *(desirable)*; 12.31 below pre-test mean *(desirable)*
Sleep Adequacy SLPA2	MOS mean: 60.67 Desirable score: Higher	Avg score: 38.06 (n=36) Result: 22.61 below MOS mean *(undesirable)*	Avg score: 50.67 (n=15) Result: 12.61 above pre-test mean *(desirable)*	Avg score: 45.00 (n=8) Result: 5.67 below post-test mean *(undesirable)*; 6.94 above pre-test mean *(desirable)*	Avg score: 33.08 (n=26) Result: 27.59 below MOS mean *(undesirable)*	Avg score: 52.86 (n=7) Result: 19.78 above pre-test mean *(desirable)*	Avg score: 90.00 (n=2) Result: 37.14 above post-test mean *(desirable)*; 56.92 above pre-test mean *(desirable)*
Sleep Somnolence SLPS3	MOS mean: 26.41 Desirable score: Lower	Avg score: 43.70 (n=36) Result: 17.29 above MOS mean *(undesirable)*	Avg score: 31.11 (n=15) Result: 12.59 below pre-test mean *(desirable)*	Avg score: 41.67 (n=8) Result: 10.56 above post-test mean *(undesirable)*; 2.03 below pre-test mean *(desirable)*	Avg score: 47.44 (n=26) Result: 21.03 above MOS mean *(undesirable)*	Avg score: 37.14 (n=7) Result: 10.30 below pre-test mean *(desirable)*	Avg score: 20.00 (n=2) Result: 17.14 below post-test mean (*desirable)*; 27.44 below pre-test mean (*desirable)*

MOS SLEEP SCALE *(continued)*							
QUESTION		**SEPTEMBER**			**OCTOBER**		
		PRE-TEST (n=39)	**POST-TEST (n=19)**	**6-WEEKS POST-TEST (n=9)**	**PRE-TEST (n=26)**	**POST-TEST (n=7)**	**6-WEEKS POST-TEST (n=3)**
Optimal Sleep (dichotomous) SLPOP1	MOS mean: .54 Desirable score: Higher (1.00)	Avg score: .54 (n=37) Result: same as MOS mean *(undesirable)*	Avg score: .75 (n=16) Result: .21 above pre-test mean *(desirable)*	Avg score: .44 (n=9) Result: .31 below post-test mean *(undesirable)*; .10 below pre-test mean *(undesirable)*	Avg score: .60 (n=25) Result: .06 above MOS mean (*desirable)*	Avg score: .86 (n=7) Result: .26 above pre-test mean *(desirable)*	Avg score: 0.00 (n=2) Result: .86 below post-test mean *(undesirable)*; .60 below pre-test mean *(undesirable)*
Sleep Problems Index I SLP6	MOS mean: 28.31 Desirable score: Lower	Avg score: 43.33 (n=35) Result: 15.02 above MOS mean *(undesirable)*	Avg score: 29.67 (n=15) Result: 13.66 below pre-test mean *(desirable)*	Avg score: 37.00 (n=8) Result: 7.33 above post-test mean *(undesirable)*; 6.33 below pre-test mean *(desirable)*	Avg score: 41.39 (n=24) Result: 13.08 above MOS mean *(undesirable)*	Avg score: 31.43 (n=7) Result: 9.96 below pre-test mean (*desirable)*	Avg score: 13.33 (n=2) Result: 18.10 below post-test mean *(desirable)*; 28.06 below pre-test mean *(desirable)*
Sleep Problems Index II SLP9	MOS mean: 29.15 Desirable score: Lower	Avg score: 43.54 (n=35) Result: 14.39 below MOS mean *(undesirable)*	Avg score: 27.79 (n=15) Result: 15.75 below pre-test mean (*desirable)*	Avg score: 37.67 (n=8) Result: 9.88 above post-test mean *(undesirable)*; 5.87 below pre-test mean *(desirable)*	Avg score: 43.50 (n=24) Result: 14.35 above MOS mean *(undesirable)*	Avg score: 31.19 (n=7) Result: 12.31 below pre-test mean *(desirable)*	Avg score: 15.83 (n=2) Result: 15.36 below post-test mean *(desirable)*; 27.67 below pre-test mean *(desirable)*

Evaluation Question 3. Do students experience longer-term (i.e. six weeks or more post-course) benefits from participating in *SleepWell - Online* ?

As illustrated in **Figure 2**, Blunden et al.'s model proposes that behavior change is most likely to occur when a student's knowledge, attitude, motivation, perceived control, and the subjective norms favorable to the health behavior are all present. In addition to a student's perceived ability to practice stress reduction techniques as needed (see **Figure 4)**, questions that assess other sleep behavior changing beliefs were included in all three assessment instruments.

Figure 5 summarizes combined responses from September and October cohorts to the statement: "I believe this course will have/has had a positive impact on my academic performance" on each of the three surveys. These results must be interpreted with the consideration that 11.5% of post-test respondents and 8.3% of 6-week post-test respondents did not supply an answer to this question. Of those who did provide an answer, a greater percentage of pre-test respondents agreed or strongly agreed (92.3%) with this statement compared to post-test (53.9%) or 6-week post-test (50.0%) respondents. Pre-test responses may have reflected widespread awareness of the connection between sleep and grades, as acknowledged by almost 97% of pre-test respondents answering this knowledge question correctly (see **Table 14**). The results in **Figure 5** may also reflect students' optimistic perceived control over their ability to make health promoting changes and a pre-course motivation to do so. Declining rates of agreement on the post-test and 6-week post-test, however, might reflect the very realistic challenges experienced by students attempting to change behavior amidst the demands of the academic semester and the even greater challenge of sustaining that change over time. Student responses to the academic performance question on the post-test in particular may reflect feelings of the course itself contributing to an already overwhelming academic workload.

Written feedback from students highlight the cyclical problem of academic pressure on sleep and their perception that the lower-priority *SleepWell* course could detract from their immediate academic performance. On the 6-week post-test, one student commented: "I didn't fully participate because I got busy, and at the same time I have been running low on sleep due to midterms, etc." Another student who withdrew from the September cohort explained to the instructor in an email:

> I was overly ambitious in thinking that I would be able to balance the sleep course with my current work load. Unless I start sacrificing sleeping hours to complete the course work (which would be counter productive), I'm just not able to complete any of the assignments while still keeping afloat in my studies.

In general, it can be concluded that students recognize the importance of sleep practices on academic success. Students appeared to be motivated to change sleep behaviors, at least in intention, as evidenced by the number of students who registered for *SleepWell – Online* at the start of the semester when the extent of future demands were not clear (i.e. all 40 slots for the September course filled within a week, although only 39 unique students had registered; see **Table 11** for additional details). Further, the pre-test's comparably high percentage of affirmative responses for the value of sleep enhancing behaviors on academics, indicate that students have a generally positive attitude towards sleep behavior change information and approaches. However, results also suggest that the *SleepWell – Online* intervention did not increase students' perceived control over their ability to improve academic performance through sleep behavior changes over time, nor did students notice an improvement in their academic performance that they attributed to the intervention immediately following or 6 weeks after the course.

Figure 5. Combined Responses on *SleepWell@Emory – Online* Confidence in Course's Ability to Improve Academic Performance Question (2012 - 2013)

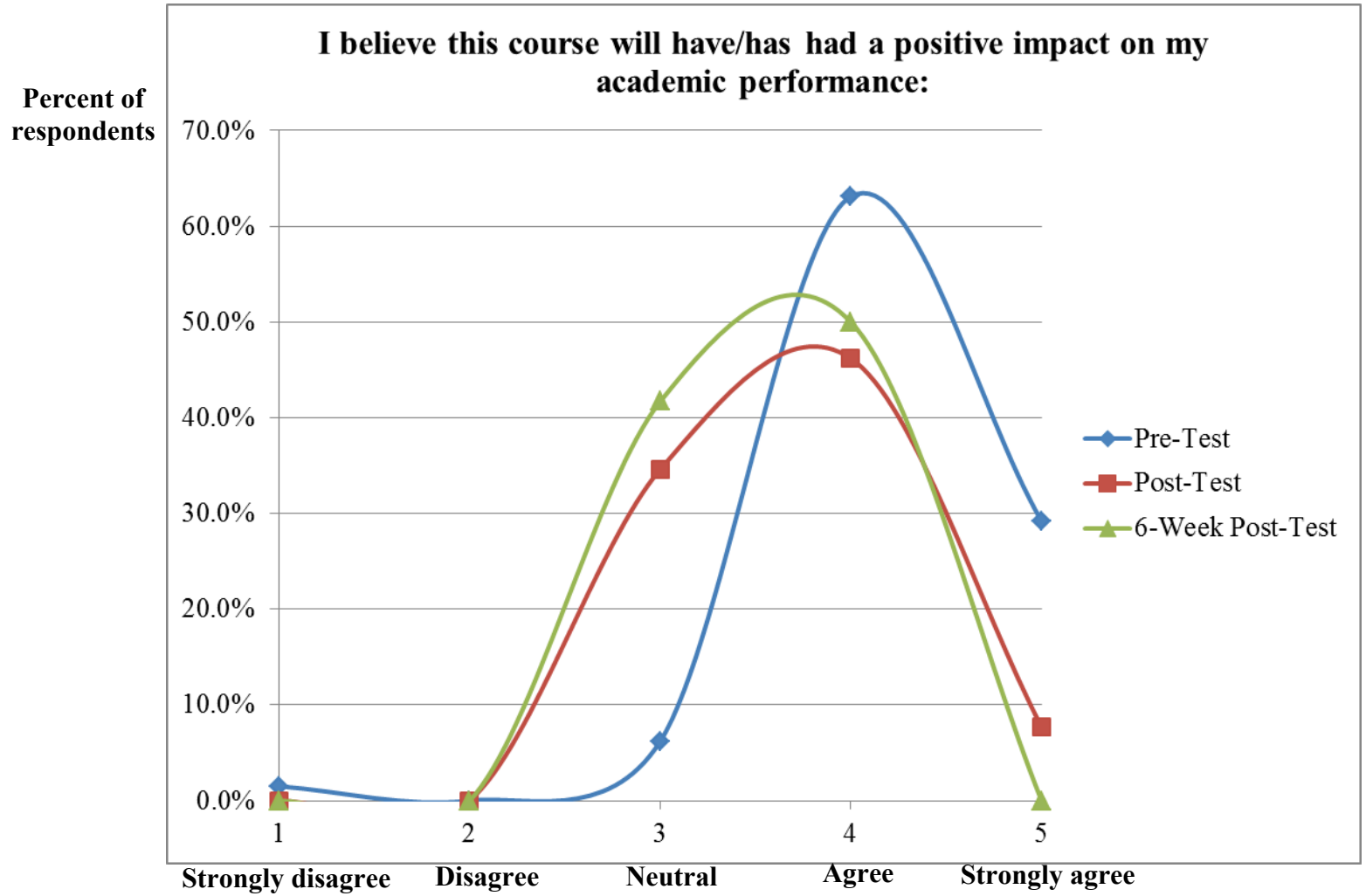
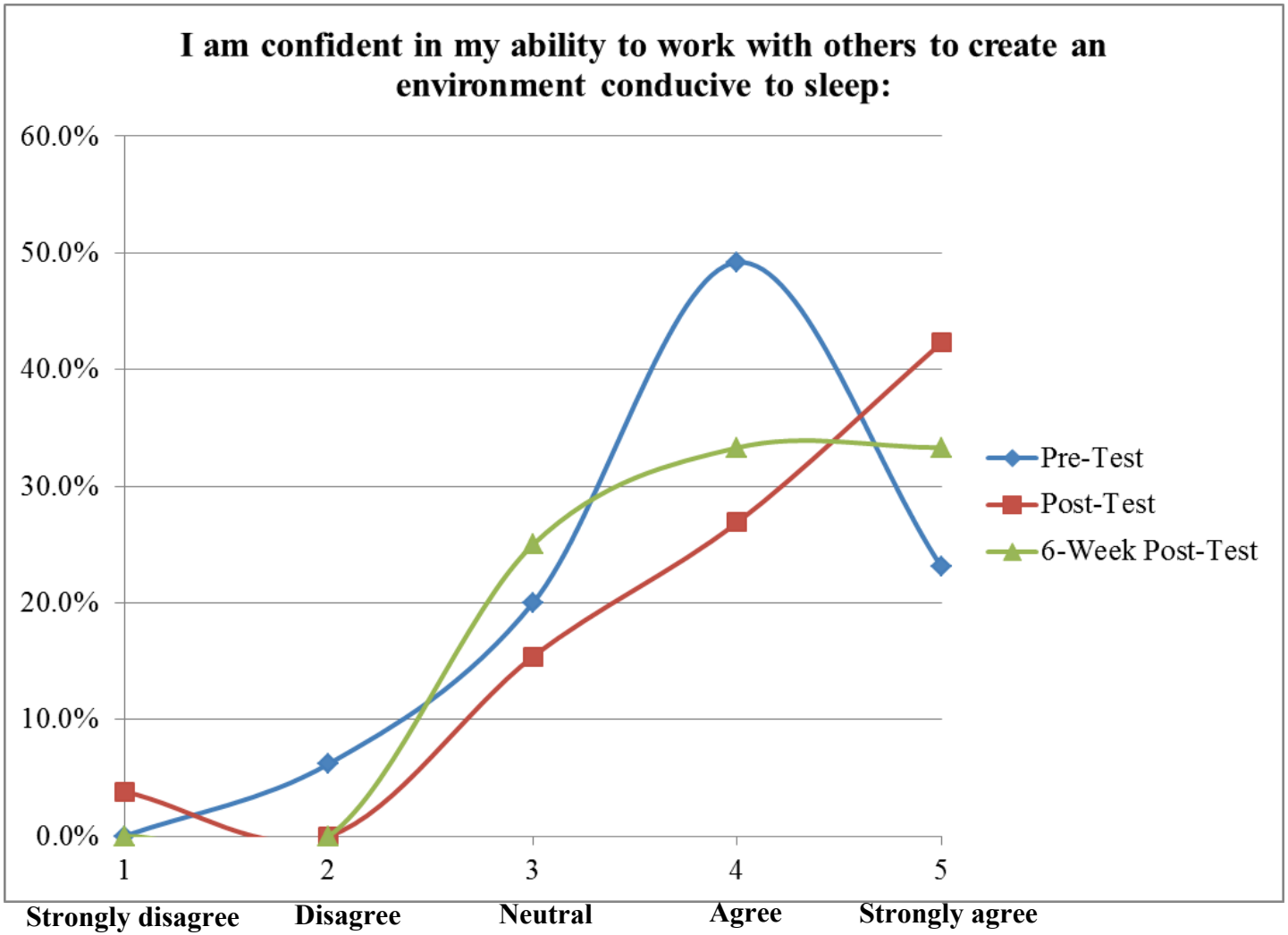


Figure 6 summarizes combined responses from September and October cohorts to the statement: "I am confident in my ability to work with others to create an environment conducive to sleep" on each of the three surveys. Similar to the statement on the course's academic impact, 1.5%, 11.5%, and 8.3% of respondents on the pre-test, post-test, and 6-week post-test respectively did not supply an answer to this question. Of those who did provide an answer, 72.3% of pre-test, 69.2% of post-test, and 66.6% of 6-week post-test respondents agreed or strongly agreed to this statement. While the overall rate of agreement declined by 5.7% between pre-test and 6-week post-test, the percentage of respondents who strongly agreed with this statement increased from 23.1% before the course to 42.3% immediately following the course. A post-course improvement was still noted 6 weeks later when 33.3% of respondents strongly agreed with this statement. It is interesting to note that the course did not explicitly cover techniques for working with roommates or bed partners (e.g. skills in negotiation or having difficult conversations, etc.); however, Week 2's content did address the sleep environment and specific suggestions for modifying external factors that can help or hinder sleep. These results may indicate that those students who participated in the course (or at least reviewed the Week 2 course content) felt capable of using that knowledge to affect their sleep environment and also perceived working with others to improve their sleep space normatively acceptable.

Figure 6. Combined Responses on *SleepWell@Emory – Online* Confidence in Ability to Work With Others to Create Sleep Promoting Environment Question (2012 - 2013)



Combined responses to the statement: "I have the ability to improve my sleep without medication" are represented in **Figure 7**. The percentage of respondents that agreed or strongly agreed with this statement steadily increased over time: 78.4% on the pre-test, 80.8% on the post-test, and 83.3% on the 6-week post-test. It must be noted that 11.5% of post-test and 16.7% of 6-week post-test respondents did not supply an answer to this question. Nevertheless, the general trend reflected by these results is promising and suggests that the information and skills gained through participation in *SleepWell* may increase students' perceived control over their sleep quality and quantity through the use of behavioral and environmental modifications rather than the use of sleep medication. Further, the "snap shot" of peer sleep practices shared during Week 1 of each cohort could have helped to shape norms and shift attitudes related to the use of medication as a standard or necessary tool for sleeping well.

Figure 7. Combined Responses on *SleepWell@Emory – Online* Confidence in Ability to Improve Sleep Without Medication Question (2012 - 2013)

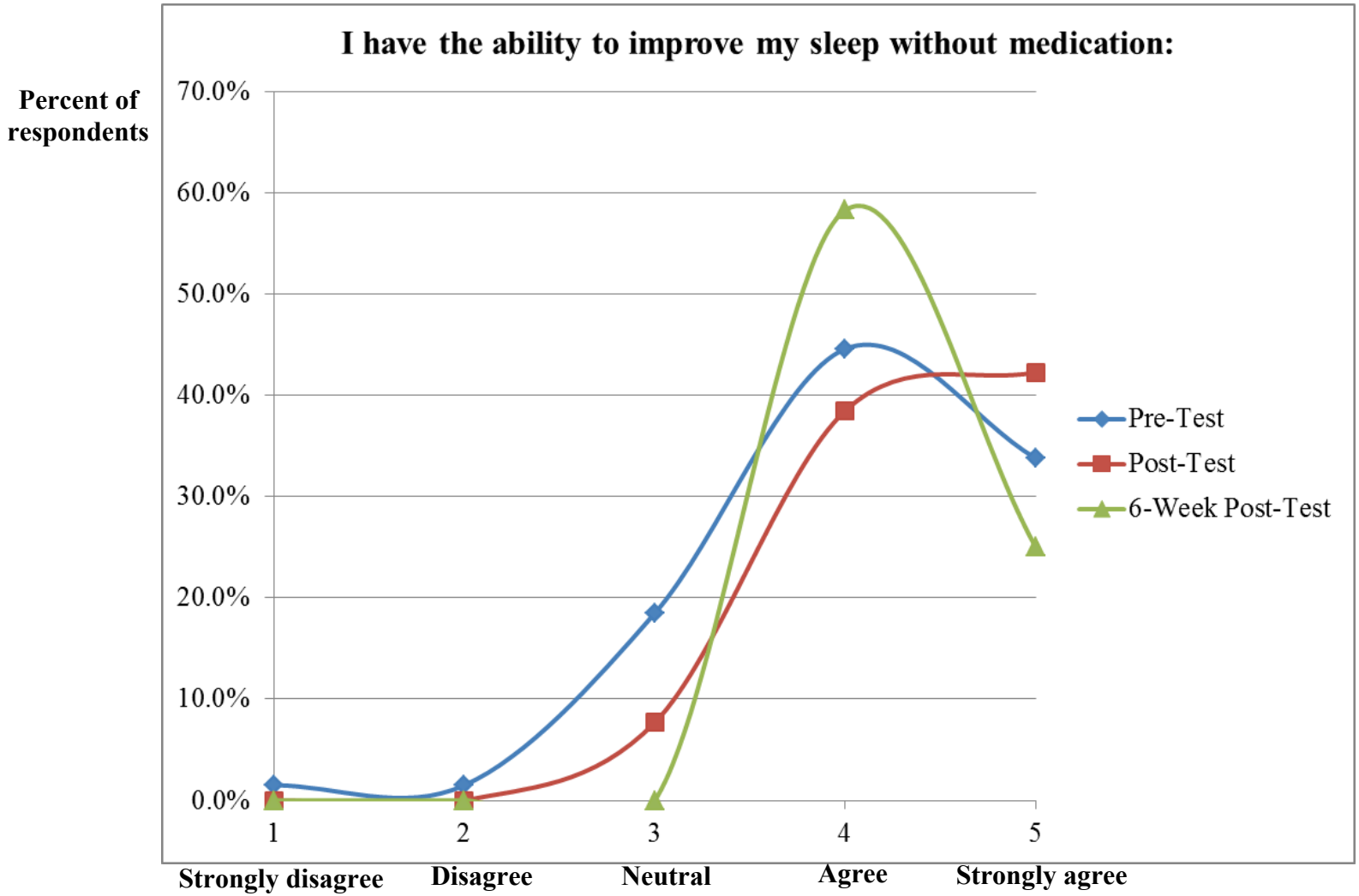
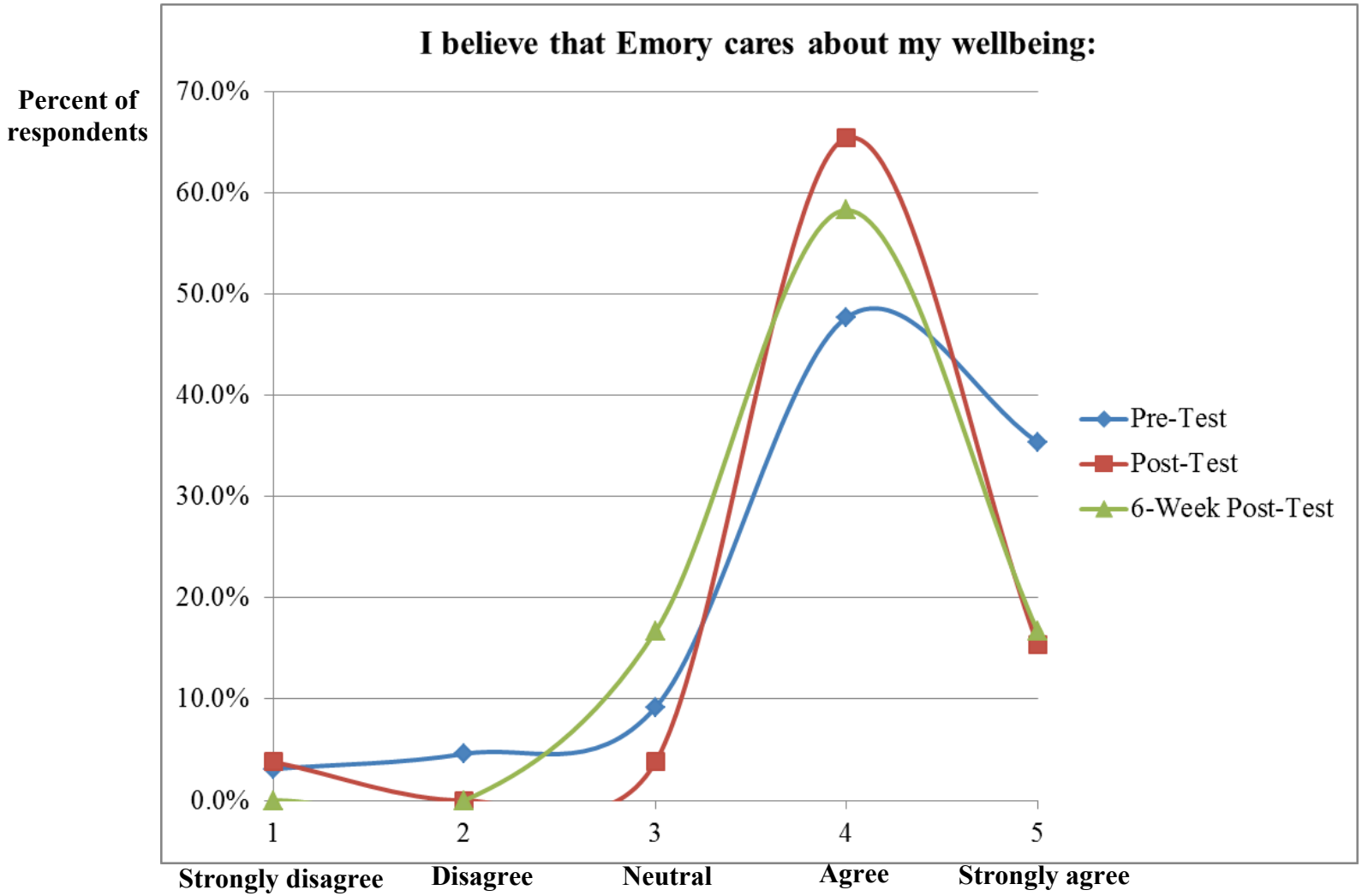


Figure 8 summarizes combined responses to the statement: "I believe that Emory cares about my wellbeing" on each of the three surveys. Of those who answered, 83.1% of pre-test, 80.8% of post-test, and 75.0% of 6-week post-test respondents agreed or strongly agreed with this statement. Overall, these results reflect a decrease in agreement of 8.1% between the pre-test and 6-week post-test. Similar to other belief-related assessment items, 11.5% of post-test and 8.3% of 6-week post-test respondents did not supply an answer to this question. This item was included on the *SleepWell – Online* assessments to help monitor progress on an overarching objective for all Office of Health Promotion programs. Because a wide range of variables may influence students' responses to this statement, it is not possible to determine the degree to which this course altered rates of agreement. One predictable factor is time. Students likely experienced more stressful school, work, and social events and challenges as the academic term progressed over 5, then 11 or more, weeks between assessment points (advanced registration and pre-test was completed by many students at the start of the semester, the post-test was completed immediately after the 5-week long course, and another post-test was completed 6 weeks after the conclusion of the course).

Figure 8. Combined Responses on *SleepWell@Emory – Online* Belief that Emory Cares About Wellbeing Question (2012 - 2013)



The post-test and 6-week post-test contained a single question intended to capture participants' opinions of whether *SleepWell – Online* helped them with their personal goals of sleep enhancement. As displayed in **Table 17**, the percentage of respondents who indicated that participating in the course helped them improve their sleep increased between the post-test (60.0%) and the 6-week post-test (66.7%). The verbatim comments submitted by the students who responded "Yes" to this question are also included in the table. All "Yes" respondents provided specific examples of changes in their awareness and/or habits that tie directly to course content. While the number of comments submitted is very low (i.e. 9 of the 15 "Yes" respondents on the post-test and 4 of the 8 "Yes" respondents on the 6-week post-test), the comments reflect an accurate understanding of course lessons and these students' ablity to transfer knowledge to behavior in order to realize benefits over a sustained period of time.

Table 17. Combined Responses on *SleepWell@Emory – Online* Course Efficacy Question (2012 - 2013)

COURSE EFFICACY			
QUESTION		**COMBINED COHORTS**	
		POST-TEST (n=25)	**6-WEEK POST-TEST (n=12)**
Did participating in this course help you improve your sleep?	Yes -- No -- Don't know --	15 (60.0%) 2 (8.0%) 8 (32.0%)	8 (66.7%) 0 4 (33.3%)
POST-TEST "Yes" COMMENTS	"I try to record and be aware of my sleep habits."		
	"I got to know the importance of sleep and factors that may have big impact on the quality and quantity of sleep. I take it much more seriously now!"		
	"I became more aware of how much I sleep and the quality of sleep. I am actively trying to improve my sleep schedule and give more value to sleep as a busy college student."		
	"It has brought to mind/reiterated the importance of avoiding certain things that will disrupt my sleep (afternoon naps, dark chocolate at night) and to do things that promote sleep (having a bedtime routine, writing down thoughts that are keeping me awake at night)"		
	"While it used to take 8 hours for me to be fully functional, by having a consistent schedule and following the tactics in this course I am quite happy getting 7 hours of quality sleep each night. I'm also working to integrate more of the principles in the course into my life all the time."		
	"I have a better understanding of what helps my sleep schedule… and what I can do better (i.e. having a sleep routine)"		
	"It would normally take me a very long time to fall asleep each night, and I would not get the proper amount of sleep even after going to bed very early. I wanted to see what could be the potential factors causing this to happen."		
	"I learned different techniques for improving my quality of sleep as well as ways to avoid disruptive sleep."		
	"learned ways to calm down before bed, avoid restlessness"		
6 POST-TEST "Yes" COMMENTS	"I definitely learned valuable techniques through the SleepWell course that I use today to help improve my sleep."		
	"I have more consistent sleep in College and I had a high school. That says it all."		
	"I have had very few sleepless nights because I am able to recognize now that a bedtime routine and good sleep environment are most important to help me sleep, and just "going to bed" is not enough"		
	"It helped me improve my sleep behaviors, and being conscious of what I do during the day that affects my sleep."		

Evaluation Question 4. What is the overall user satisfaction with *SleepWell – Online*'s course curriculum and delivery model?

The post-tests contained a section to assess participants' satisfaction with the online course and to measure the perceived utility of the course materials and design. **Table 18** summarizes students' perceptions of whether the items and activities in the course were helpful for increasing their sleep knowledge or skills. Course materials are listed in **Table 18** in order of most helpful to least helpful, based on post-test responses. The item rated "Helpful" by the most respondents was "Handouts." Handouts are concise documents on the following topics covered in Weeks 1 through 4: an overview of SHCS, a snapshot of sleep behaviors reported by students, tips for sleeping well, healthy meal and snack ideas, and tips for reducing stress. The item rated "Not Helpful" by the most respondents was the "Fact Finding Mission Discussion Board." This was both an individual activity and class discussion opportunity in Week 1, designed to provide students with practice discerning the quality and trustworthiness of online health information while exploring sleep-related questions of interest to them. In the September cohort, 35.5% of students (or 11 of the 31 students "present" at some point during the course) took part in this activity. In the October cohort, a mere 5.3% of students (or 4 of the 21 students "present" at some point) participated in this activity. The topic of media literacy, or being a critical healthcare consumer, was first added to the *SleepWell* curriculum in Fall 2009. The instructor did so in the interest of fostering students' critical thinking skills and conveying transparency with adult learners (Zesiger, 2010a).

Table 18. Combined Responses on *SleepWell@Emory – Online* Post-Test Perceived Utility of Course Materials Question (2012 - 2013)

COURSE MATERIALS				
QUESTION	**COMBINED - POST-TEST (n=25)**			
The following course elements were helpful for increasing my knowledge and/or skills:	HELPFUL	NOT HELPFUL	DID NOT USE	NO RESPONSE[+]
Handouts	17 (68%)	1 (4%)	2 (8%)	5 (20%)
SleepWell Action Plan	14 (56%)	1 (4%)	5 (20%)	5 (20%)
Time Management Resources	13 (52%)	0	7 (28%)	5 (20%)
Print versions of presentations	12 (48%)	0	8 (32%)	5 (20%)
Video presentations	12 (48%)	2 (8%)	6 (24%)	5 (20%)
Sleep Diary	12 (48%)	3 (12%)	4 (16%)	5 (20%)
Podcasts	9 (36%)	0	11 (44%)	5 (20%)
Consumption Counts knowledge check	9 (36%)	1 (4%)	10 (40%)	5 (20%)
Sleep Space photo & blog discussion	9 (36%)	4 (16%)	7 (28%)	5 (20%)
Weekly Discussion Boards	8 (32%)	4 (16%)	8 (32%)	5 (20%)
What's Next for Emory? discussion	7 (28%)	2 (8%)	11 (44%)	5 (20%)
What's Next for Me? discussion	7 (28%)	2 (8%)	11 (44%)	5 (20%)
Food for Focus, Food for Snooze blog entry	7 (28%)	2 (8%)	10 (40%)	6 (24%)
Fact Finding Mission discussion board	5 (20%)	5 (20%)	10 (40%)	5 (20%)
Pillowcase Design exercise & blog entry	4 (16%)	2 (8%)	14 (56%)	5 (20%)

[+]While this question was included on post-tests submitted by 18 students from the September cohort, only 13 responded to this category. In the October cohort, all 7 students responded to this category.

When asked on the 6-week post-test whether they had used any of the course materials since the course had ended, one-third (33.3%) of respondents answered "Yes." Of those who supplied comments for this question, 2 students identified the Sleep Diary and 2 students identified information on diet (1 specifically cited the Healty Meal and Snack Ideas handout while the other comment could have referred to presentation content and/or the handout) as the materials they referenced. In general, these longer-term findings are consistent with students' perceptions of which materials were helpful, as described in **Table 19**.

On the post-tests, students were asked what they liked most and least about the course. In

total, 15 students responded to the question about what they liked most and their responses are summarized in **Table 19**. Five of the comments referenced the general quality of the course (i.e. based in "research" and "evidence") or the relevancy of "information," "content," and "advice" contained in the course. Among the comments that mentioned a course item, five specifically referenced the Sleep Diary. One student stated: "Sleep diary - it's really eye-opening!" Several student comments mentioned course content on food and also on habits that hinder sleep. Two students identified the convenience of taking the course through Blackboard and the flexibility that it provided in their schedules. The abilty to discuss sleep challenges and collaborate on solutions online were also favored by two students. Interestingly, course discussion boards were identified by some students as their least favorite aspect (see **Table 20**).

Table 19. Combined Responses *SleepWell@Emory – Online* Post-Test Most Liked Aspects of Course Materials Question (2012)

COURSE MATERIALS	
COMBINED - POST-TEST (n=15)	
QUESTION:	What did you like MOST about the SleepWell Online course?
Good information and content/Advice supported by research *(general)*	5 (33.3%)
Sleep Diary	5 (33.3%)
Food information	2 (13.3%)
Habits that hinder sleep information	2 (13.3%)
Sleep space photo	1 (6.7%)
Print versions of presentations	1 (6.7%)
SleepWell Action Plan	1 (6.7%)
Convenience/Flexibility of Blackboard/Ability to work at own pace	2 (13.3%)
Ability to discuss with others/Build off peers' suggestions	2 (13.3%)
No grades	1 (6.7%)

In total, 14 students responded to the question about what they liked least and their responses are summarized in **Table 20**. Four of the comments referenced the general challenge of keeping up or a lack of time for the course. One student explained about the course activities: "it was

hard to set time apart to get these done (sometimes felt pressured). I was able to get more out of the class by having my own set of pace rather than on a weekly basis." Another student described the challenge of keeping up as "…it wasn't too much work, but it wasn't a priority above school work. I wasn't able to keep up with it and lost out on a good bit of information." Two students described the course as "too long," "cumbersome," and "time consuming." Five of the comments identified the discussion boards in general as their least favorite aspect of the course and one students specifically named the Fact Finding Mission discussion board. Three comments cited the blog activites in general as least likeable. More specifically, 3 students identified the challenge of participating in online assignmens that are based on collaboration when course participation rates are low. For example: "Some people did not fully participate in the course in a timely manner. It made it hard to respond off of blog posts/discussion posts."

Table 20. Combined Responses for *SleepWell@Emory – Online* Post-Test Least Liked Aspects of Course Materials Question (2012)

COURSE MATERIALS	
COMBINED - POST-TEST (n=14)	
QUESTION:	What did you like LEAST about the SleepWell Online course?
Difficult to keep up with course/Didn't have time for course *(general)*	4 (28.6%)
Too long/Cumbersome/Time consuming	2 (14.3%)
Homework	1 (7.1%)
Sleep Diary difficult to remember to record every day	1 (%7.1)
Discussion boards *(general)*	5 (35.7%)
Fact Finding Mission discussion board	1 (7.1%)
Blogs *(general)*	3 (21.4%)
Difficult to respond to discussions and blogs as expected because others didn't participate	3 (21.4%)
Pillowcase Design activity	1 (7.1%)

These findings on the most and least liked course elements are consistant with the perceptions expressed about the helpfulness of specific course materials described in **Table 18**.

Twenty-five students responded to four post-test questions that were aimed at providing

additional insight on the participants' experience in *SleepWell – Online*. These questions and their responses are listed in **Table 21**. The majority of students indicated that the pace of the course and the number of students in the course were "Just Right."

Seventy-two percent of participants responded that they would recommend the course to a friend, a question that may be viewed as a proxy measure for overall course satisfaction. Three students (or 12% of post-test respondents) indicated they would not recommend the course to a friend. Two of the "no" responses were from the October cohort and 1 of these students elaborated: "Maybe before or after the semester would be better. Most students are just too busy or at least that's how it was with me." On another post-test question, the same student stated: "I wasn't able to fully participate due to my workload, so I can't really comment on how the course was." In the face-to-face version of the course, feedback like this might not have been captured on post-test assessments because such students might have been absent from the final course session, where post-course feedback often was collected. Nevertheless, these findings do suggest that online students were less willing to recommend the course to friends than were traditional course students. Among the 7 face-to-face course cohorts, all respondents except for 1 student (from the Fall 2009 cohort) stated that they would recommend *SleepWell* to a friend (refer to **Table 6** for a summary of the traditional *SleepWell@Emory* course's outcomes). The 6-week post-tests for the online course asked respondents whether they had recommended *SleepWell - Online* to a friend. Five of 9 respondents from the September cohort and 1 of 3 respondents from the October cohort reported that they had recommended the course to a friend at some point in time. These results suggest that more than half of the students who participated in the online course would recommend it to others (i.e. between 50% who indicated they had at 6-weeks post-course and 72% who indicated they would immediately following the course).

Also included in **Table 21** are student responses to a question asking whether any information or skills should be added to *SleepWell – Online* to help improve sleep. Two of the comments pertain to related concepts covered in Week 4: "…more on stress management" and "How to unclutter, or refocus your mind." These suggestions further support the need for expanded stress management resources for students as they pertain to sleep and overall wellness. Additionally, a comment that was submitted for the "least liked" question (referenced in **Table 20** above) included a suggestion on something that should be added to the course: "Also, an overview of what is expected each week would be helpful - it took some effort to understand what was needed each week." The instructor and the course developer anticipated this need for a course "roadmap." They created a week-by-week schedule with dates of the key items for review and submission, which was included in the "General Questions About the Course" section of Blackboard and referenced during the first week's announcements from the instructor. The student's comment suggests that a document like this should be given more prominence in the course and possibly also emailed to students if a future online version of *SleepWell* is conducted.

Table 21. Combined Responses on *SleepWell@Emory – Online* Post-Test Participant Experience Questions (2012)

PARTICIPANT EXPERIENCE		
QUESTION	**COMBINED - POST-TEST (n=25)**	
The overall pace at which topics were covered in this course was:	Too Fast -- Just Right -- Too Slow -- *No response* --	3 (12%) 14 (56%) 3 (12%) 5 *(20%)*
The number of students in this course was:	Too Large -- Just Right -- Too Small -- *No response* --	0 18 (72%) 2 (8%) 5 *(20%)*
Would you recommend the SleepWell online course to a friend?	Yes -- No -- *No response* --	18 (72%) 3 (12%) *4 (16%)*
Is there information or are there skills that were not covered in SleepWell that could help you improve your sleep?	Yes -- No -- *No response* --	5 (20%) 15 (60%) *5 (20%)*
"Yes" COMMENTS	"I wish there was more on stress management."	
	"How to unclutter, or refocus your mind"	
	"Information about "night owls"/"night-people" on creating a schedule that fits their sleep behavior; recovering from a sleep schedule that has been thrown off"	
	"May have missed it but best sleep positions, how to sleep on an airplane or in a car."	
	"Other things that affect sleep; because I don't drink coffee nor"	

Evaluation Question 5. What are the strengths of *SleepWell – Online*'s course curriculum and its delivery model?

Quality of course information

As shown in **Table 19**, participants liked the information contained within the course and appreciated that the content was evidence-based and relevant to their needs. The Sleep Diary and SleepWell Action Plan tools were two course elements that students favored. The handouts in the

course were also highly rated by students as helpful for increasing their knowledge and skills (see **Table 18**). In general, the course materteials and tools were effective at increasing students' knowledge and awareness of habits (e.g. see comments in **Table 17**), which in turn encouraged improvements in behavior-supporting beliefs (e.g. see **Figure 7**) and certain habits for some students (e.g. see **Figure 3**). The course discussion boards and blog activites, however, overwhelming appear not to have benefited students' behavior or their perception of the course experience (e.g. see **Tables 18** and **20**). In fact, these course elements may have been perceived as "homework" and too time consuming (see **Table 20**) by students who were already overwhelmed with the demands of the academic semester. Fortunately, the course elements that students rated favorably can be re-used easily and the elements that were viewed as distractions can be discontinued, whether the course is offered again in Blackboard or through another electronic forum.

Adaptability of course materials

The *SleepWell – Online* materials were created as separate, stand-alone objects. The presentations, for example, have been modularized into seven 8 to 14-minute videos, rather than a single 75-minute video, and duplicated into static documents (see **Table 4**). The techniques in the audio podcasts also were described in the stress reduction presentation. Consequently, students may choose to review the course lesson information in a format that best meets their learning style, physical abilities, and technical resources. Further, the content is presented in such a way that it is not necessary for a student to review the *SleepWell – Online* materials in the established course sequence. A student who reviews only one or two modules located anywhere in the course will still receive a coherent lesson on the topic or topics they selected. Because the course materials were created outside of Blackboard and are provided to the user in common file

types (e.g. MS Word, PDF, YouTube videos), they can be delivered to students through any Emory approved website. Further, the online course materials can be paired selectively with other programs and communications (i.e. the "Diet and Sleep" materials could be used as part of a mini-course on nutrition, while a URL to the "What Affects Sleep?" presentation could be included in an electronic newsletter to students living in a dormitory).

Ability to expand audience reach

A strength of its current delivery model is the ability it affords OHP staff to offer multiple sessions per semester (as was accomplished during Fall 2012) or even multiple sessions simultaneously without requiring a physical space to host participants or doing so outside of the staff's standard working hours (as was necessary to accommodate students' schedules in the face-to-face model).

In its current format, the online course reached about the same number of students per session as did the traditional course. Registration for the traditional cohorts of *SleepWell@Emory* ranged from 17 to 41 students, and the number of students who attended the first course session ranged from 12 to 24 (refer to **Table 2**). Registration for the online course sessions ranged from 26 to 39, and the number who participated in the first week of content ranged from 16 to 26 (refer to **Table 11**). Given the portability of content and flexibility inherent in providing information online, there is considerable opportunity to expand the audience reach of *SleepWell – Online's* content using existing resources.

At the time of the 2011 NCHA at Emory, the majority of respondents indicated both interest in the course topic and a lack of awareness that OHP offered sleep resources. In the survey, more students indicated interest in receiving information from Emory on "sleep difficulties" (56.5%) than reported having received information on this health topic (44.3%). Of the items measured,

"sleep difficulties" represented the largest gap (12.2%) between interest in and reportedly having received information on the topic. When asked about knowledge of the resources offered by OHP, only 33.8% of respondents indicated awareness of "resources on improving sleep" (American College Health Association, 2011a; Office of Health Promotion, 2012a).

Efficiencies of time and cost

The staff time and cost associated with hosting a single cohort of the online course is less than that required for hosting a face-to-face cohort. The most substantial cost related to delivering the online course, or the traditional face-to-face version of *SleepWell* that was delivered in the past, is the cost of OHP staff time. The instructor allocated time over 8 weeks to instruct each cohort (i.e. registration activities and trends documents were completed during the week prior to the course and there were 5 weeks of course instruction followed by a 2-week extension). On average, the instructor estimated she spent 5 hours per week, for a total of 40 hours of her time per online course cohort. In general, the instructor estimated that 50 hours were required to instruct the traditional version of the course. The face-to-face course model included administrative personnel time to create participant folders and order supplies, guest instructors' time, and the instructor's time to prepare for the course, deliver it, and then document the evaluation report (H. Zesiger, personal communication, October17, 2012).

Additionally, the face-to-face model included the cost of supplies that were not used in the online format. The instructor estimated that the cost per student in the most recent traditional *SleepWell* cohort was 15 dollars or less per participant. The instructor gave participants of the pillowcase design activity blank pillowcases and iron-on transfers of their design. There were only 5 students between the cohorts who participated in this activity and the estimated cost of these supplies was less than 2 dollars per student (H. Zesiger, personal communication,

October17, 2012). While this activity was an enjoyable and memorable experience for students of the traditional course, the pillowcase activity in Blackboard was rated by online students as one of the least helpful items (see **Table 18**).

In light of these results, if the current model of *SleepWell – Online* relied less on a structured course timeframe and the content was limited only to those items found to be most beneficial and preferred by students, it would reduce further the OHP time and cost requirements.

Evaluation Question 6. What modifications, if any, should be made to *SleepWell – Online*'s course curriculum and delivery model prior to future offerings?

Feedback provided from some course participants creates a compelling case for altering the delivery model of *SleepWell – Online*. This feedback came from the additional comments boxes on the post-test and 6-week post-test assessments as well as emails sent to the instructor. **Table 22** lists the course improvement solutions provided by students.

Table 22. Combined Participant Suggestions for *SleepWell@Emory – Online* Course Improvement (2012 - 2013)

Summary of Course Improvement Solutions From Participants	
From:	Student Feedback:
Post-Tests	"The course is far too involved with too much time required each week. Streamline the scope of the course to reach more people with more of the material."
	"the course could be condensed to a more manageable but more information-dense 2-4 week course"
	"It'd be easier if we had some sort of sleeping diary online...? BB was hard to use for this course (posting things online) but good for getting the information."
	"It was a great program - participation was challenging as I enrolled in the beginning of the semester when I did not realize how large my work load would be. The information was incredibly useful, but it was challenging to keep up with assignments because of the Blackboard format and technical difficulties."
	"Maybe before or after the semester would be better. Most students are just too busy or at least that's how it was with me."
6-Week Post-Tests	"Good course I wish these materials could be available after the course"
	"I was not able to take advantage of the course as much as I would've liked to due to my intense course load. However, I did print everything out and I hope to review it in preparation for next semester"
Withdrawal Email to Instructor	"I was very excited and signed up for this course at the end of last semester but haven't been able to squeeze in the extra time to participate. I understand that I only get something out of the course if I put the time in and am disappointed that I feel unable to commit. I read through some of the objectives and it you have put a wonderful program together. I apologize for not being able to fully participate and was wondering if this is offered another semester or if it will stay on my blackboard courses to complete next semester?"
Week 5 Course Discussion	"I think that in general, Emory students are busy and try to fit as much into their schedules as possible, making sleeping well much more difficult to attain. I think that many students would benefit from simply knowing the facts, for example that limiting naps to 45 minutes or less does not mess up your circadian rhythms, and that you can't make up for sleep on the weekends. While I have enjoyed the Health 100 course that is required for all freshman, I don't believe there is enough emphasis on sleep. While sleep is mentioned briefly in one of the classes, I think an entire class period should be focused on sleep habits and strategies. It's so important for us to get good sleep; I know without enough sleep I'm barely able to function! I think other students feel this way too and would benefit from knowing more about how to improve their sleep."

Other Findings

Technology

There were minimal reports of technical problems by students. During the first week of the September course, 3 students posted questions to the general discussion board regarding technical issues they were experiencing. The issues were related to Blackboard navigation rather than the technology or course material. One student during the first week of the October course emailed the instructor with a similar Blackboard navigation issue. The instructor replied to the student and also posted an announcement regarding the solution to the October course. In the October post-test, 1 student commented that she was not able to view some videos. The instructor did not refer any *SleepWell* students to the help desk and was not aware of any help desk tickets generated as a result of the course (H. Zesiger, personal communication, October17, 2012).

Students generally seemed to be proficient using Blackboard to access course materials and participate in activities, although Blackboard may not be their preferred platform for online course participation. In the September post-test, 1 student commented that Blackboard was "hard to use for this course (posting things online) but good for getting the information." Another student described Blackboard as "convenient" but elaborated that the structure of the course affects ease of use: "the class has to be clean and linearly formatted for it to be most easily accessed" (graduate student, personal communication, February 25, 2013). In early 2013, the instructor attended an event in which she heard anecdotal feedback on current students' perceptions of Blackboard. Several fourth-year Emory students who have an interest in technology (and who had not participated in a *SleepWell* session) expressed the view that Blackboard is not user friendly and that many students do not feel comfortable using it. The

students were instead recommending technology that resembles social media applications (e.g. Facebook) for internet –based course needs, including contacting professors (H. Zesiger, personal communication, February 1, 2013). A master's degree student who participated in the September session of *SleepWell – Online* explained to the investigator: "I think Blackboard can be stressful for some students. I know I associate it with keeping on top of tasks that are all over the place" (graduate student, personal communication, February 25, 2013). A first-year student who participated in the October session expressed a different view during an interview with the investigator:

> I honestly think Blackboard is the best way to organize the course. Because other Emory students primarily use Blackboard for their academic courses, it's convenient to have the SleepWell course on the same website. If I had had the course on the OHP website or Learnlink, etc., I don't think I would have remembered as often as I did to complete the course materials. It was extremely simple and convenient to use Blackboard (undergraduate student, personal communication, February 22, 2013).

Social connectedness

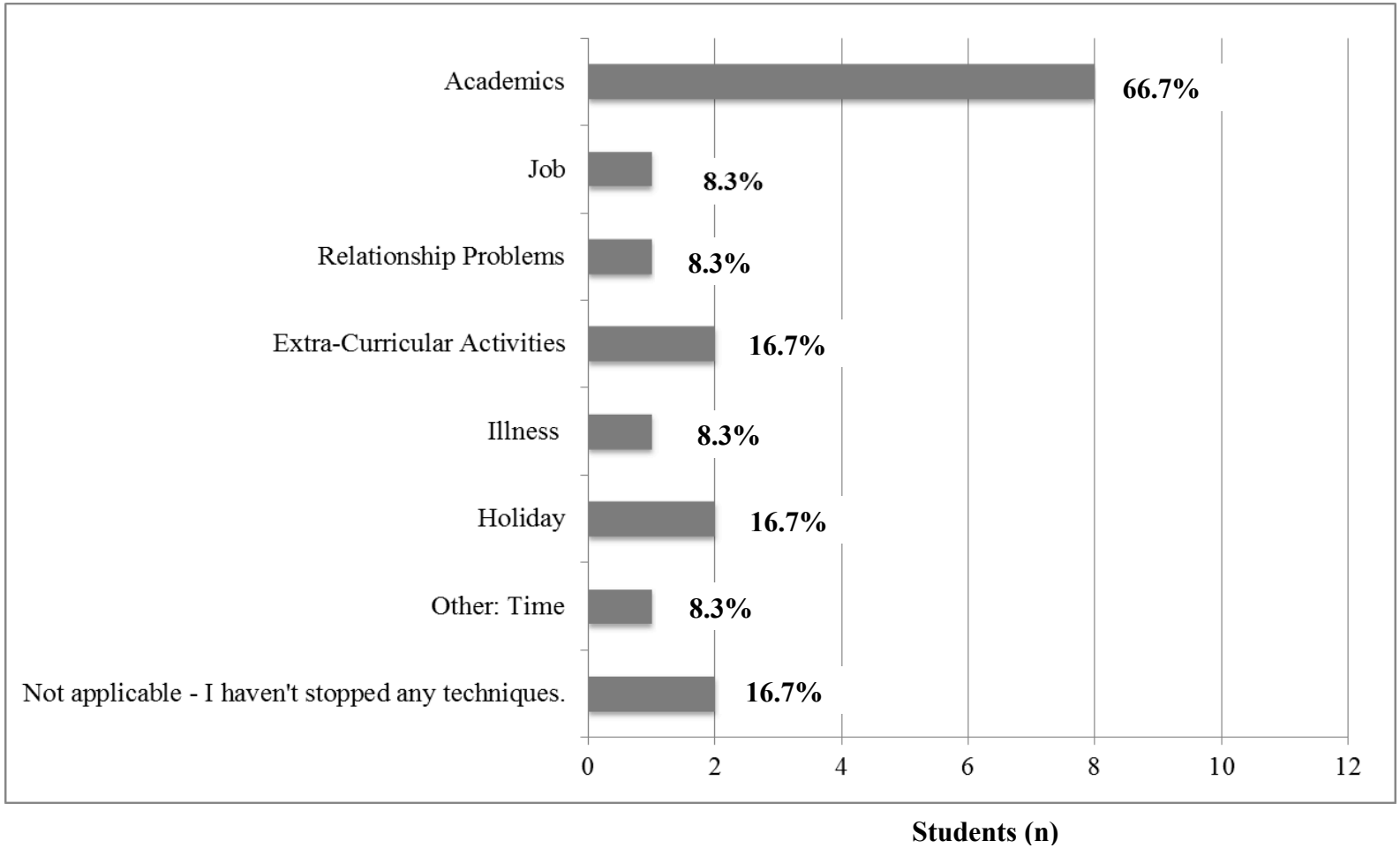
The instructor noted that aside from the 3 or 4 students who posted consistently in the online course, she felt much less connected to online students than she did in the face-to-face version of the course. Additionally, despite the abundance of online discussion spaces, there were fewer overall comments and questions posted by online compared to traditional students (H. Zesiger, personal communication, October17, 2012). This finding is consistent with participants' reports that the discussion boards were generally not helpful (see **Table 18**) and among their least favored course elements (see **Table 20**).

Barriers to behavior change

Students were asked on the 6-week post-test: "If you stopped using techniques that you started practicing as a result of *SleepWell*, what caused you to stop? (Select all that apply.)" Twelve students provided responses, which are displayed in **Figure 9**. Overwhelmingly, "Academics" was the most commonly selected reason for stopping a learned sleep enhancing behavior during the 6-weeks after the course. Almost 67% of respondents considered their studies to be a barrier to practicing good sleep habits. Despite the small sample size, this finding is particularly concerning given *SleepWell's* goal of reducing the prevalence of Emory students who identify sleep as an impediment to their academic success. Nevertheless, this finding is consistent with students' reasons for reduced or non-participation in the course itself, as evidenced by comments submitted by email to the instructor and on the post- and 6-week post-tests for both cohorts.

Figure 9. Combined Responses on *SleepWell@Emory – Online* 6-week Post-Test Reasons Stopped Practicing Course Behaviors Question (2012 - 2013)

What caused you to stop using techniques you practiced as a result of SleepWell*? (Select all that*



Summary

SleepWell – Online process and outcomes data were gathered through investigator observation, Blackboard course reports, communications with the instructor, and three online assessments (pre-test, post-test, and 6-week post-test surveys). Course participation rates and assessment completion rates declined over time. Nevertheless, findings indicate that participating in *SleepWell – Online* increased students' sleep knowledge and improved some key behaviors and beliefs both during and 6 weeks after the course. An area that warrants further attention is providing stress reduction resources either as part of *SleepWell* or through supporting initiatives at Emory. There was no correlation found between course participation and improved academic performance, and school-related demands were the primary reason for lack of course participation and for stopping a learned sleep enhancing behavior 6 weeks after the course. The course's educational materials, references, and tools were found to be helpful and relevant to students' needs. Survey results and other feedback from students advocated minimizing or eliminating course activities and making course materials available to a wider audience for an extended period of time.

CHAPTER 5: CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

This chapter will review the major findings of the *SleepWell@Emory – Online* evaluation and how this evaluation contributes to the body of evidence on psychoeducational sleep programs for college students. Recommendations for future sleep enhancement interventions for Emory University students will be described.

Summary of Findings

Overall, participation rates for the *SleepWell – Online* cohorts were similar to prior sessions of the traditional version, although attrition was generally higher for the 5-week online course compared to the 3-week or 2-week face-to-face course. In the September and October cohorts combined, 52 students logged into the course at least once and did not withdraw (out of 65 initial registrants). The online course attracted registrants that were more evenly distributed across class year and recruited more third-year, fourth-year, and graduate/professional students than did the traditional course. There were very few reports of technical issues and students seemed comfortable using Blackboard to access course materials. Nevertheless, the degree of interactivity between students and between most students and the instructor was very low. The instructor noted feeling more disconnected from students in the online version of the course than she had during the face-to face sessions and there were fewer questions asked about course information in the online cohorts. Most participants did not utilize the course discussion boards for dialogue with others and rates of participation in course activities (e.g. blog posts and course discussions) were low and continued to decline throughout the five weekly lessons. Overall, 22 students took advantage of the 2-week course extension in order to access materials (i.e. to review or download copies of handouts and print versions of presentations); however, there was

almost no participation in course activities or content-related questions posted after each cohort's original end date. Student responses on the time-series online assessment instruments provided valuable insight into the evaluation questions, but these data must be interpreted with caution given the low rates of survey completion among a small sample.

Knowledge

Results from the online surveys provided evidence that students' sleep knowledge increased after participating in the course and this knowledge was maintained 6 weeks later. Of the knowledge questions, those with the highest percentage of incorrect responses pertained to the Week 3 content on diet and caffeine. This may be a reflection of the timing of the information delivery (e.g. at a point in the course when participation dropped considerably) or that these questions reflected newer or seemingly more complex information for students. Behavioral data on the same assessments indicate that many students did make improvements in their dietary habits and caffeine use as a result of the lesson.

Behaviors

Post-test results indicate that participants reduced sleep schedule variability and use of caffeine and medication taken to benefit sleep. At 6-weeks post-course, almost 60% of respondents reported using the *SleepWell* techniques of choosing foods to promote energy or sleep, and 50% reported limiting or avoiding alcohol and caffeine, and using their bed for sleep and intimacy only. Few students reported practicing stress reduction techniques, yet the percent that reported feeling confident in their ability to use stress reduction techniques improved over time. Given that Emory students identified stress as their top health-related impediment to academic success on the fall 2011 National College Health Assessment (Office of Health Promotion, 2012b), this is a topic that warrants future exploration. Average scores from the

Medical Outcomes Survey (MOS) Sleep Scale were maintained or improved between pre- and post-test on all dimensions. Results from the 6-week post-test were mixed, possibly indicating that some improvements in sleep problems achieved at the post-test diminished with the passage of time.

Longer-term benefits

Assessment results indicate that students were aware of the importance of sleep on academic performance, but the course did not increase students' perceived control in their ability to influence their academic performance with sleep behavior changes, nor did students attribute any academic improvements experienced to their participation in the course at post-test and 6-week post-test. Student comments in emails to the instructor and on the assessments provided evidence that course participation expectations (i.e. completing activities within the lesson week) were perceived as obligations that contributed to already very demanding academic and other work schedules. Six weeks after the course, respondents selected "Academics" as the top impediment to stopping any sleep enhancing behaviors learned in the course. Survey results also reflected a decline in students' agreement that Emory cares about their wellbeing after the course and 6 weeks later, which may have been a reflection of the accumulated stressors experienced by students as the academic school year progressed.

Other sustained changes were beneficial. Participants were more likely to indicate that they felt capable working with others to create an environment conducive to sleep after the course and 6 weeks later than at pre-test. Results also indicated a trend toward confidence in ability to improve sleep without medication that increased over time. Promising evidence that students are able to transfer course knowledge into sustainable behavior changes was reflected by an increase

from post-test to 6-week post-test in the percentage of students indicating that participation in *SleepWell – Online* helped them improve their sleep.

Course satisfaction

Post-test survey results provided insight into participant impressions of the materials and design of *SleepWell – Online*. The course elements that were rated as "helpful" by the largest percentage of students were references and behavioral goal setting and tracking tools in document form. These included the weekly lesson handouts, the *SleepWell* Action Plan, the *Sleep Diary*, and the materials within the Time Management Resources folder that included both tip sheets and tools. A similarly large percentage of students also rated the print versions and video versions of presentations as "helpful." These items reflect the core course content that was adapted for online use from the face-to-face version of *SleepWell*, with the exception of the Time Management Resources. The time management materials were created by the Assistant Dean of Academic Advising and Support Programs at the Office for Undergraduate Education at Emory College. Ms. Zesiger requested these items from the Assistant Dean based on observations that she and her OHP staff members made while working with students who experienced various forms of stress, as well as those who were struggling to make sleep a priority in their schedule (H. Zesiger, personal communication, November 18, 2011). One advantage of online course delivery versus face-to-face is the fact that users can access additional resources if and when they choose. The time management materials were included in Week 4's Stress Management lesson as an optional addendum that more than half of participants considered beneficial.

Feedback on the post-test indicates that participants found the course content to be of high quality and liked that the information and behavior change suggestions were supported by research. Several of the elements that were most often rated as "helpful" (the Sleep Diary,

SleepWell Action Plan, and print versions of presentations) were also "most liked" by respondents. Multiple students favored the convenience of working online at their own pace offered by the course. Multiple students also liked having the ability to discuss behavior change strategies with others and consider the advice of peers. Providing opportunities for peer interaction and collaboration was a design goal for the online course; nevertheless, the interactive aspects were underutilized in both cohorts. Similarly, about 43% of students mentioned a discussion board as their "least liked" aspect of the course. Blog posts were intended to give students a space to express their individuality among the virtual group, exercise creativity, and interact with others; however, participant feedback suggests that these and other course activities were perceived as more work than fun. When considered collectively, results from the assessments and student emails to the instructor indicate that students felt they did not have time to participate in the course activities. Some students who expressed an interest in the course topics and even a motivation to change behavior withdrew from the course because they did not feel they could keep up with the "assignments." This is regrettable, since results indicated that students who reviewed the core lesson content (e.g. handouts and/or presentations) found them beneficial, and participants favorably mentioned topics covered in each of the core lesson weeks (Weeks 1 through 4). Overall, levels of satisfaction for the online course were less than that reported for the traditional *SleepWell*, but the majority of online students would recommend the course to a friend.

Course delivery model

The current *SleepWell – Online* curriculum and delivery model includes content that is highly adaptable to a variety of online deployment approaches. The convenience of accessing information at one's pace, the ubiquity of the internet, the high prevalence of sleep problems

among students, and the universality of sleep as an essential behavior all suggest that there is a large potential audience for an online sleep intervention at Emory. The portability and flexibility of *SleepWell – Online* materials suggest that OHP could reach an expanded population with streamlined content delivered in a less temporally structured manner, and doing so could require fewer OHP resources than the current model. There were few technical problems reported, although feedback from students is mixed regarding Blackboard as a preferred means of online course interaction. While *SleepWell – Online* was designed with the goal of facilitating social connectedness, it did not accomplish this for participants or the instructor. It is possible that a stigma associated with Blackboard (i.e. it is not user friendly or it represents academic courses and all of their demands) contaminated students' abilities to enjoy the online *SleepWell* experience.

Implications

Course content

The *SleepWell – Online* pilots lend support to Brown et al.'s (2006) finding that sleep hygiene guidelines and stimulus control instructions are effective intervention components for students. The psychoeducational framework established by Brown et al. provided the foundation for the core content presented during Weeks 2 through 4 of *SleepWell – Online*. Assessment results indicated that participants considered these materials helpful and used them to practice behavior changes during and after the course (see **Figure 3** and **Tables 18** and **19** for examples). Consistent with the traditional *SleepWell* course, the online pilots were successful at increasing participants' sleep-related knowledge and enhancing sleep behaviors, including improved sleep schedule consistency and Medical Outcomes Study Sleep Scale measures for the majority of participants (refer to **Tables 7**, **15**, and **16**). The *SleepWell – Online* course content is consistent

with the criteria Bubolz et al. (2009) recommended for inclusion in student sleep counseling sessions, suggesting that the content for effective individual coaching sessions and online group education are very similar (see **Table 4**).

With more intervention time and the advantage of an online delivery method, *SleepWell – Online* included content on more topics (e.g. being a critical consumer of health information, making sleep- or energy-enhancing food choices, practicing stress reduction techniques) and explored some topics in greater detail than *STEPS* could have (e.g. the physiology of sleep, the effects of alcohol and caffeine). *SleepWell – Online* participants reported using techniques described in the extended course content 6-weeks after the intervention (see **Figure 3**), suggesting that when the intervention parameters allow, it is beneficial for participants to receive a broader array of health-enhancing information as part of a sleep intervention. This conclusion is consistent with Vincent and Lewycky's (2009) finding that a 5-week online insomnia intervention that included cognitive behavioral therapy and relaxation training, in addition to sleep hygiene and stimulus control instructions, resulted in improved outcomes 4 weeks later.

Online intervention

While not as rigorous in study design or methods as published studies of online sleep interventions, this evaluation does support the findings that online sleep interventions can result in behavioral improvements for participants (Ritterband et al., 2009; Vincent & Lewycky, 2009) and that online sleep interventions are cost-effective and feasible means of providing health education to college students (Kloss et al., 2011; Trockel et al., 2011). Given the small sample size and low rate of participation in *SleepWell – Online's* Week 4 lesson on stress and sleep, this evaluation provides weak evidence in support of the suggestion that cognitive restructuring and mindfulness meditation techniques are well suited for online delivery to a college population

(Trockel et al., 2011). More than one-third of *SleepWell – Online* participants indicated that the podcasts on relaxation strategies were helpful; other information on cognitive restructuring and mindfulness was included in the handouts and presentations, which as a whole, were highly favored by participants (see **Table 18**). Nevertheless, more attention to this topic in *SleepWell - Online* may be needed given the very low percentage of participants who indicated they practiced stress reduction techniques to fall asleep 6 weeks after the course (**Figure 3**), and the magnitude of stress as an impediment to health and academic success (American College Health Association, 2011b; Office of Health Promotion, 2012b). This evaluation suggests that stress reduction information should be given prominence in online sleep interventions in order to be of greatest benefit to participants.

Course satisfaction

In general, the online course participants expressed less satisfaction with the course experience than did the traditional course cohorts. Online participants were less likely to state that they would recommend the course to a friend (72% post-test and 50% 6-week post-test, versus nearly 100% in the traditional cohorts' post-tests as shown in **Tables 6** and **7**). Online participants were also less likely to agree that the course helped them improve their sleep overall (60.0% at post-test and 66.7% at 6-week post-test, versus 69.2% to 85.7% of traditional cohorts at post-test). It is important to note that *SleepWell – Online* was not created in response to actual student requests, but rather OHP need and anticipated audience demand. This evaluation may indicate that although students experienced improved sleep-related outcomes, the online course lacked a less definable element of enjoyment or stress relief that may have been present in the face-to-face course, as those students discussed their sleep challenges in person and experienced a temporary reprieve from other demands by attending.

Knowledge

Based on the knowledge assessment items, almost all of the students in this evaluation recognized the wide-ranging health implications of poor sleep and the connection between grades and sleep. These results are contrary to the findings of Bubolz et al. (2009) and others (Pilcher & Walters, 1997) that college students may not be aware of the effect of disrupted sleep on their academic achievement.

Beliefs

The findings of this evaluation are consistent with prior assertions that, in addition to receiving information, adults need assistance accurately perceiving and gaining confidence in their ability to control sleep habits in order for an intervention to result in sustained behavior change (Morin et al., 1994). Participants' acceptance and use of the Sleep Diary and *SleepWell* Action Plan assisted in aligning their perceptions with actual behaviors (see **Tables 18** and **19**), while longer-term behavioral improvements may have been compromised by students' perceived lack of control over academic demands. In this study, the improvements found in sleep schedule consistency pre- and post-intervention (see **Table 15**) are likely related to use of the Sleep Diary and the information on variable sleep that was presented during Week 2. These findings suggest that *SleepWell – Online* made modest gains in addressing this outcome of considerable importance to college health educators (Brown et al., 2002) but more emphasis is needed to result in academic benefits.

This evaluation expands on Brown et al.'s (2006) conclusions by assessing perceived confidence in ability to work with others to create a sleep environment that is consistent with the guidelines and instructions presented. Compared to before the course, this study found that the percentage of participants who strongly agreed they were confident increased after the course

and remained elevated 6 weeks later. Students may feel that making improvements to their sleep space is normatively acceptable to those with whom they share the space (e.g. roommates, bed partners, family members). In prior evaluations of the face-to-face *SleepWell*, students living in campus housing facilities expressed frustration over noise and light levels in dormitories at night (Zesiger, 2010b, 2012). This may suggest that students' perceived their control over their sleep environment as proximal, both in terms of those with whom they are confident working (e.g. their roommate but not their neighbors) and how far their span of influence extends (e.g. to their dorm walls, but not the entire hallway).

This evaluation found that some beliefs that are broadly supportive of behavior change declined over time (e.g. that sleep practices can improve their academic performance and that Emory cares about their wellbeing) while other beliefs that are more closely associated with the course content on sleep hygiene, stimulus control, and stress reduction, improved over time (e.g. ability to improve sleep without medication, ability to practice stress reduction techniques, and to some extent, ability to work with others to create a sleep-conducive environment).

Sustained behavior change

In their *STEPS* study, Brown et al. (2006) found that changes in sleep hygiene practices lead to changes in overall sleep quality, which this evaluation supports. Brown et al. also hypothesized that larger changes would be noted over longer periods of time. *STEPS* and *SleepWell – Online* both used a 6-week post-test; however, because *STEPS* was a 30-minute presentation delivered once and *SleepWell – Online* was an ongoing intervention available to participants for 7 weeks, *SleepWell – Online* measured outcomes over a longer period time (e.g. 13 weeks after the online course began). In general, this evaluation found that improvements

made in sleep-related behaviors declined over a longer period of time but 6-week post-test measures were still improved over pre-test measures (see **Table 16**).

This study highlights that even students who are aware of the importance of sleep on academic performance, who have the knowledge of what changes to make to improve their sleep, and who express an intent and readiness to change habits can struggle with the subjective norms of college life and the attitude shifts that may come as a result of competing priorities. This evaluation did not examine the community or environmental-level influences on *SleepWell – Online* outcomes, but findings clearly illustrate that both participation in the course and practicing behavior changes were constrained by the academic demands students faced.

Recommendations

The findings of this evaluation provided a framework for enhancing *SleepWell – Online's* strengths and guidance on modifications that could improve future outcomes. The recommendations in this report were made while considering several Office of Health Promotion (OHP) requirements. At present, OHP is seeking approval to add a full-time Prevention Specialist to their team. In the absence of an additional staff member, OHP does not have the ability to deliver sessions of the traditional version of *SleepWell* and will be limited in the number of online course sessions they could host simultaneously (H. Zesiger, personal communication, February 21, 2013). Therefore, opportunities to improve the efficiency of session delivery were considered. Additionally, OHP has an ongoing goal to measure program outcomes (H. Zesiger, personal communication, February 21, 2013). Therefore, the recommendations aim to provide OHP with a means of distributing *SleepWell – Online* materials to students that facilitates the measurement of outcomes and ideally, that is adaptable to any changes in OHP's measurement strategy over time.

Findings were mixed on the use of Blackboard as the course delivery platform. At present, Blackboard is the only enterprise system known to the investigator that facilitates instruction and communication for all Emory students. Blackboard offers the flexibility of hosting multiple course sessions simultaneously or multiple versions of the same course, as well as adjusting course structures and contacting students as needed. Further, Blackboard provides real-time usage statistics for OHP and login requirements ensure that course participants are current Emory students. As a central repository for course materials, Blackboard facilitates the management of course content over time. Additionally, Blackboard's ability to maintain records of prior, closed sessions allows OHP to perform retrospective analysis and evaluation of some outputs and process measures.

Revise course timing

During the semester, students are challenged academically, physically, socially, and at times financially and professionally. This evaluation demonstrated that when offered during the academic semester, even an online *SleepWell* course competes with the scarce resources of students' time and effort. Use of an online delivery model attracted students from a diversity of class years, locations, and academic programs. Similarly, participants indicated that they appreciated the convenience of working at their own pace and within the times their schedules allowed. Both of these advantages should be leveraged in future offerings of *SleepWell - Online*.

Break for sleep

To assist students with the challenge of learning and practicing new health behaviors, the course should be offered during breaks between semesters and during the summer. Early January presents an opportunity to harness the momentum around New Year's resolutions. Students who are unable or disinterested in traveling for spring break could benefit from a condensed 1-week

version of *SleepWell – Online* that focused on the critical sleep strategies to sustain them through finals. A session in mid-May might catch students before they have shifted completely into summer activities and an early August course offering would assist students in migrating back into a school mindset and establishing habits that would serve them well throughout the year. For many students, a break affords more time to focus on self-care and is more forgiving of the discomfort involved in trying to modify behavior (e.g. reducing caffeine consumption) than is the academic semester. In this sense, learning and practicing behaviors during a *SleepWell-Online* break session would be like rehearsal for the semester performance. This timing strategy avoids completing with academic demands and serves as a primary prevention strategy against the decline in sleep habits that commonly occurs later in the semester (Hawkins & Shaw, 1992).

Open enrollment

An additional or alternative course timing option that was discussed by Ms. Zesiger and the investigator is a rolling admissions format. Blackboard provides an option to allow students to self-enroll in a course. Unlike the original online course that introduced new content each week, students of a rolling admissions course would have the ability to move through content in any sequence and as rapidly or as gradually as they chose (provided it was within the designated timeframe set by OHP for the course to be open). The open enrollment format could be used during the academic semester and/or a semester break. In order to encourage students to use the online materials (rather than registering for the course and then getting distracted by other commitments) and to make assessment possible, OHP should consider creating rolling enrollment sessions that are "open" only during defined windows of time. Blackboard provides a convenient means of emailing all or select participants, such that the instructor could notify students in advance of the course window closing. In the *SleepWell – Online* pilot sessions, there

was an increase in the number of students who logged into the course to download or review materials shortly after the instructor sent a similar email. Similarly, the instructor could send a more targeted welcome email to students who registered within the last week.

Refine curriculum

In general, students were highly satisfied with the content of *SleepWell – Online*, but there are opportunities to focus the course more around the interests of students. Blackboard allows the course instructor to have multiple versions of a course ready for use.

Open enrollment

A more targeted and less interactive version of the course may be more appropriate for sessions that are open to the general student population. **Table 23** lists a proposed outline for a self-enrollment version of *SleepWell – Online*. This version of the course includes the individual tracking and planning tools, handouts, presentation materials, and podcasts, but does not include the group activities or Blackboard-based individual assignments in the original online course design. Other modifications include the removal of the Health Behavior and Health Information presentation materials from the first week, a reorganization of the content in order to move stress reduction earlier in the sequence, and grouping of content by module rather than by week. The proposed modifications take into account participant feedback gathered during this evaluation, the goal to make *SleepWell – Online* accessible to as many Emory students as possible, OHP's interest in measuring key outcomes, and the need for an efficient means of instruction.

As shown in **Table 23**, the proposed design would locate the tracking and planning tools in a place of prominence in the course structure. Because these tools would be used throughout the course, it is recommended that they be housed in their own folder, rather than embedded within the modules. The elimination of course activities is intended to reduce any association students

may have with the work of an academic course. Further, care should be taken to avoid use of labels like "assignment" or "homework" when referring to materials in the course. While an important topic, Health Behavior and Health Information presentation materials were removed from this proposed design in order to focus the content more around sleep and its related behaviors. Students in the pilot sessions may have lost some of the motivation they started the course with if they perceived the presentation (which was the first they reviewed) as too closely resembling other courses that address scientific literacy or critical thinking skills in general, rather than actionable, sleep-specific information.

OHP could place the Health Behavior and Health Information presentation and any other resources that are indirectly supportive of the course learning objectives in an "Additional Resources" or "Want to Learn More?" folder within the online course structure. To minimize the number of items in each module, the presentation references documents in the original version of the online course (that list the sources for each presentation's content) could be relocated from the module folders and placed within a folder created for additional resources.

The sequence of the content has been modified so that stress now appears earlier, hopefully to increase students' use of these materials and to begin practicing stress reduction techniques earlier in their course process. Nevertheless, students would have the freedom to explore the content in any order or as often as they chose during the course window. To simplify course navigation, content folders should be titled descriptively (e.g. "Module 1: Sleep Basics").

In an open-enrollment model, the optional discussion boards that allow students to ask questions and make comments regarding course content could remain. Blackboard has a setting that allows the instructor to receive an email each time a new post is made to a discussion board, which would minimize the instructor's need to monitor the course while still being responsive to

participants. To encourage discussion and questions in the course, the instructor occasionally could post thought-provoking questions to the group or introduce a sleep-related issue that was currently a focus of interest or controversy in the media.

Table 23. Proposed Self-Enrollment *SleepWell@Emory - Online* Course Lesson Outline (2013)

Ongoing:	
Track, Plan and Practice	
• Keep a sleep diary for four weeks	*Individual activity (outside of Blackboard)*
• Create a behavioral action plan; Practice new behaviors described in the plan; Modify the plan as needed	*Individual activity (outside of Blackboard)*
Module 1:	
Sleep Basics	
• Introduction and ground rules statement	*Announcement*
• Pre-course survey	*Announcement and Link to Pre-Test in SurveyMonkey*
• Student Health and Counseling Services overview	*Informational handout*
• Sleep trends at Emory	*Informational handout*
• Sleep 101	*Video presentation (11 min.) or Printable presentation document*
Module 2:	
Role of Sleep in Academic, Athletic and Social Success	
• What affects sleep?	*Video presentation (11 min.) or Printable presentation document*
• Tips for sleeping well	*Informational handout*
Module 3:	
Stress and Sleep	
• Stress and sleep	*Video presentation (14 min.) or Printable presentation document*
• Tips for reducing stress at Emory	*Informational handout*
• Progressive muscle relaxation	*Audio podcast for practice (7 min.)*
• Body scan	*Audio podcast for practice (8 min.)*
• Time management resources	*Informational handouts and worksheets*

Module 4:	
Diet and Sleep	
• Diet and sleep	*Video presentation (10 min.)* *or Printable presentation document*
• Healthy meal and snack ideas	*Informational handout*
Stimulants, Depressants and Sleep	
• Caffeine and sleep	*Video presentation (12 min.)* *or Printable presentation document*
• Alcohol and sleep	*Video presentation (9 min.)* *or Printable presentation document*
Conclusion:	
• Post-course survey	*Link to Post-Test in SurveyMonkey*

Dedicated group

A template of the existing structured, 5-week *SleepWell – Online* already exists in Blackboard and could be used for a future session, if appropriate. Likewise, the current template could be copied and modified relatively easily to create an abbreviated version of *SleepWell – Online* if a group wanted to participate synchronously in a dedicated course within a reduced timeframe (The idea of a dedicated group session is discussed in ***Expand Partnerships*** below). Activities may be best conducted within dedicated group sessions. In this case, the Week 5 discussion questions could be customized to reflect what the organization can do to affect pro-sleep changes on campus (see **Table 4** for the *SleepWell@Emory - Online* lesson outline).

Streamline assessment

Blackboard provides the capability to track the number of course enrollments and logins by date, as well as generate usage reports by course content area. A simplified means of outcome assessment could be built into the open-enrollment course by asking students to complete a pre-course survey by linking them to the pre-test in SurveyMonkey from Blackboard. A link to a condensed post-course survey could be provided at the end of the course content, with the

request that students complete it after reviewing all modules (see **Table 23**). If desired, OHP could then elect to email longer-term follow-up outcomes surveys to course participants during the subsequent semester. Analysis of outcomes would be more complex and less consistent using this approach for the open enrollment format, given that the exact intervals between course registration, completion, and follow-up survey would be different for each participant. Nevertheless, aggregating the pre- and post-test surveys received by semester or academic year could still provide a gauge on student learning and behavior outcomes for the self-enrollment course. The dedicated group sessions might lend themselves more easily to established timelines and pre-, post-, and longer-term post-course assessment, if OHP desired.

Rates of post-course assessment completion were low for the *SleepWell – Online* pilots (refer to ***Assessment*** in **Chapter 4**), where links to surveys were emailed to participants. Placing a link to the survey directly in Blackboard may increase post-course completion rates slightly, particularly among a population motivated to self-enroll. If low rates of survey completion are a concern, OHP could increase the likelihood that participants submit surveys by offering a small post-course incentive (e.g. sleep mask) or opportunity to be entered into a contest to win a larger prize, at least during the initial year of offering the open-enrollment model.

While some outcomes included in this evaluation may not need detailed examination in the future (i.e. participants' feedback on specific course materials), other measures will still be important indicators of whether *SleepWell – Online* is accessible to students (e.g. number of students who accessed course materials) and enhancing their sleep knowledge (e.g. the connection between sleep and GPA, use of screens before bedtime), behaviors (e.g. whether sleep is variable, whether practice stress reduction techniques to fall asleep) and beliefs (e.g. confidence in creating sleep-conducive environment, agreement that can improve sleep without

medication). The Medical Outcomes Study (MOS) Sleep Scale was included in all three surveys used during this evaluation. Results from the scale can be time consuming to score. Moreover, some students skipped over the majority of MOS questions in the post-test and 6-week post-test, perhaps because of the nature or quantity of the questions. The MOS Sleep Scale could be a useful tool for individual sleep consultations and for students seen in a more clinical setting, but may be less relevant to OHP's need to measure the practices of a general student population. In future assessments, OHP may want to include multiple choice questions about typical length of time required to fall asleep, average number of hours slept per night, and frequency or length of naps, and place those questions in a section with the variable sleep question.

If OHP uses a longer-term follow-up survey with future online course participants, they should consider using questions that tie more directly to the impact measures described in this evaluation (see **Figure 2**). Asking former *SleepWell – Online* participants four questions that are part of the National College Health Assessment (NCHA) at Emory would provide an intermediate measure on whether the online course was making progress toward achieving campus-wide goals. Those questions assess self-reported sleep difficulties as an impediment to academic success, feeling tired during the day, experiencing sleepiness during daytime activities, and feeling rested upon waking in the morning. Results on these questions from *SleepWell* participants can then be averaged and compared to the most recent NCHA at Emory results.

Market strategically

OHP's process for advertising *SleepWell – Online* to students and referral contacts was described in **Chapter 3** (see **Population and Sample**) and additional suggestions are included elsewhere in this chapter (see ***Expand partnerships*** below). The marketing approach for future offerings of *SleepWell – Online* should correspond with the type and timing of the course OHP

plans to offer. If the break timing option is selected, the marketing campaign should build as the break approaches and materials branded around the season. Digital advertising methods, including OHP's Facebook page, Twitter account, and the *Student Health 101* e-newsletter distributed to all Emory undergraduate and graduate students, should be used extensively to maximize audience segments reached and to minimize marketing effort and cost.

Marketing campaigns could incorporate quotes from *SleepWell* alumni regarding the most important things they learned in the mini-course or why they think other students should participate in it. Social media can be used to generate initial interest in the problem of sleep difficulties on college campuses or the effects of insufficient sleep and then direct students to the self-enrollment version of the course.

Expand partnerships

With the minor modifications suggested above, *SleepWell – Online* fulfills Buboltz et al.'s (2009) first recommendation for universities to provide a variety of psychoeducational information on sleep and to make it widely available to students (see ***Evidence-supported recommendations for institutions*** in **Chapter 2**). The authors' second and third recommendations, to offer academic courses at times that accommodate sleep schedules and to strategically schedule extracurricular activities, require awareness of the problem and the support of campus leaders. Myriad issues critical to the wellbeing of students contend for leaders' attention. Sleep is one of the more foundational health issues that can affect many aspects of a student's performance and potential, both at the university and across the lifespan. One way of engaging leaders at every level of the university and gaining advocates for a culture that places a higher priority on sleep is to involve them as learners.

Student-led organizations

OHP could market *SleepWell – Online* specifically to leaders of student organizations. While individual students may benefit from participating in the online course outside of the academic semester, student organizations may be interested in holding a dedicated session as a group activity during the semester. Intramural sports teams, special interest groups, and leadership societies are examples of communities that may have an interest in participating in a dedicated session to support their goals. This approach returns to the original intent of delivering *SleepWell* among peers that reinforce the desired behaviors. Further, students' may find more enjoyment in the course activities (e.g. submit a photo of your bedtime snack) and discussions when they are interacting with a peer group with whom they already have a casual and face-to-face relationship. One such student group that may be interested in partnering is a holistic student wellness organization that currently has about 40 members.

Campus residences

Emory's Office of Residence Life and Housing was a strong supporter of the traditional cohorts of *SleepWell* (Zesiger, 2008, 2009, 2010a, 2010b, 2011). OHP has presented information from *SleepWell* during resident advisor (RA) orientation sessions, and residence halls periodically ask OHP to present a 1-hour version of *SleepWell* on-site to their residents (H. Zesiger, personal communication, December 3, 2012). These brief RA training and residence-based sessions have been more informational than educational for participants, and did not provide opportunities for skills practice or feedback. Given the success of Trockel et al.'s (2011) email-delivered sleep interventions conducted among members of an entire residence hall, and the role that community-based living environments play in students' sleep outcomes, OHP may want to propose a dedicated *SleepWell – Online* session for members of a residence hall.

Students who are living in a theme housing option during the academic year or participating in a summer housing option (Emory University, 2013c) may be good candidates for such a session.

Play Emory initiative

Play Emory is a "structured, supervised yet flexible active lifestyle program" that allows students to earn course credit through a variety of sources during the semester. The initiative is currently focused on physical education and fitness and open to undergraduate students (Emory University, 2013a). Program leadership has expressed a vision to expand the program so that it includes other wellness-related activities and eventually open the program to the entire campus. Various incentives beyond academic course credit are also being considered. Based on these plans for the future, there is tremendous potential for the *SleepWell* materials to be used by *Play Emory*, either in coordination with OHP or on their own, to reach a larger student population (H. Zesiger, personal communication, February 21, 2013). If *Play Emory* chooses to utilize the *SleepWell* materials and includes faculty and staff in their extended program, it could be an important step toward building a culture of wellness that not only helps Emory educators and administrators enhance their sleep, but also influences them to set scheduling and other expectations with students' sleep in mind.

Academic advisors

Emory College's Academic Advising and Support Programs in the Office for Undergraduate Education is another potential *SleepWell – Online* partner. Their Assistant Dean and Learning Specialist provided the time management resources that were included in *SleepWell – Online*. In the past, the Academic Advising office has displayed *SleepWell*-themed bulletin boards and general marketing materials received from OHP. In future semesters, the office could direct students to one of the general *SleepWell – Online* courses, as well as have *SleepWell* handouts

available to give to students who were not interested in the course or who needed more immediate assistance (H. Zesiger, personal communication, February 21, 2013).

Student health professionals

Similarly, the counselors and psychiatrists in Student Health and Counseling Services have served as points of referral for *SleepWell* in the past and could direct students to the online course, as well as distribute handouts as appropriate (H. Zesiger, personal communication, February 21, 2013).

Future considerations

Diffusion of knowledge and materials

A health educator and director of the Center for Healthful Living (CHL) at Emory's Oxford College participated as an observer in the September session of *SleepWell – Online*. She commented to the instructor that she learned a lot and was planning on using the course materials at an intervention at Oxford College (H. Zesiger, personal communication, October 17, 2012). The CHL director has adapted OHP's mini-course into a face-to-face intervention where students meet for 1-hour per week over 4 weeks, which at the time of this evaluation, appears to be successful (Oxford College of Emory University, 2013). This exemplifies a transfer of knowledge and resources to a university partner that enhances *SleepWell's* sustainability and increases the likelihood that the program will meet the needs of students when and where it is best for them. OHP should be applauded for its willingness to collaborate and should continue to consider thoughtful hand-offs of the program materials in the future.

Coordination with complementary programs

Based on expressed student need, OHP should continue to look for opportunities to expand student access to stress reduction resources and pair *SleepWell* materials with stress management

initiatives. The *Play Emory* partnership, for example, could yield a course that addresses sleep during the first half of a semester and stress management during the second (H. Zesiger, personal communication, February 21, 2013).

The Office of Undergraduate Education in conjunction with Campus Life provides first-year students with individualized support until they declare a major. *SleepWell – Online* could be an additional resource offered to students through the Pre-Major Advising Connections at Emory (PACE) program, which helps students acclimate to college life and identify paths for academic and personal growth (Emory University, 2013b). A first-year student who participated actively in the September cohort of *SleepWell – Online* suggested offering the course through the PACE program because of the interest some of her friends expressed for sleep improvement resources (undergraduate student, personal communication, February 22, 2013).

The Career Master of Public Health (CMPH) program at Emory may offer a unique opportunity to provide the sleep intervention to a geographically dispersed graduate and professional population who uses Blackboard extensively and who is accustomed to interacting online. The *SleepWell – Online* course could be offered during breaks between CMPH semesters either in the open enrollment or more structured (original) online course model. The mini-course would provide an opportunity for CMPH students across class years and concentrations to learn about a relevant health topic that is an area of concern for many, while practicing self-care strategies that could prepare them to better handle more stressful points during the semester.

Considerations for future research

Buboltz et al (2001) recommended that future research examine "good sleepers" (p. 134) to determine ways in which those students' lifestyles differ from those of poor sleepers. This is similar to the concept of positive deviance, in which intentional behaviors expressed by

individuals depart from the population norm in healthy or beneficial ways. The practices of those students who self-report being "good sleepers" (or who do not report sleep difficulties as an impediment to their academic success, feeling tired during the day, or experiencing sleepiness during daytime activities, and who wake feeling rested in the morning) could be explored in order to inform interventions for those students who do struggle with sleep (Patterson, Grenny, Maxfield, McMillan, & Switzler, 2008). This evaluation did not examine the characteristics of students who were already sleeping well at Emory. By gaining a better understanding of the behaviors and conditions that are most influential in enhancing students' sleep, OHP may be able to further refine their sleep intervention approaches.

Columbia University has a modern, informative, and easy to navigate section of their website dedicated to providing sleep information, resources and tools for students. Their Alice! Health Promotion department, part of Columbia Health, maintains the content, which is also accessible to faculty and staff. The sites' sleep e-cards (Columbia University, 2013) are a particularly creative and fast way to disseminate sleep facts and tips from peer-to-peer. With some technical and graphic design support, e-cards like these could be useful additions to OHP's online resource collection.

Summary

This evaluation contributes to the literature on psychoeducational sleep interventions for college students by providing further evidence that it can improve sleep-related knowledge, behaviors, and beliefs. Further, it demonstrated that an online sleep curriculum offered through a university's learning management system offers unique advantages for students and health promotion departments, but also presents challenges related to engaging and retaining an audience with competing priorities during the academic semester. By streamlining some of the

course's content and offering it to students during periods that afford more opportunities for rest and reflection, *SleepWell@Emory – Online* has the potential to expand its benefits to a larger population. Opportunities to build on existing relationships and establish new partnerships present exciting pathways for OHP to fulfill *SleepWell's* impact goals.

REFERENCES

Ajzen, I. (1985). From intention to action: a theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action Control: From Cognition to Behavior* (pp. 11-40). New York, NY: Springer-Verlag.

American College Health Association. (2011a). Institutional Data Report - Fall 2011 Emory University *American College Health Association-National College Health Assessment II*. Hanover, MD.

American College Health Association. (2011b). Reference Group Executive Summary Spring 2011 *American College Health Association-National College Health Assessment II*. Hanover, MD.

Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice-Hall.

Blunden, S. L., Chapman, J., & Rigney, G. A. (2012). Are sleep education programs successful? The case for improved and consistent research efforts. *Sleep Medicine Reviews, 16*, 355-370.

Brown, F. C., & Buboltz, W. C., Jr. (2002). Applying sleep research to university students: Recommendations for developing a student sleep education program. *Journal of College Student Development, 43*(3), 411-416.

Brown, F. C., Buboltz, W. C., Jr., & Soper, B. (2001). Prevalence of delayed sleep phase syndrome in university students. *College Student Journal, 35*(3), 472-476.

Brown, F. C., Buboltz, W. C., Jr., & Soper, B. (2002). Relationship of sleep hygiene awareness, sleep hygiene practices, and sleep quallity in university students. *Behavioral Medicine, 28*, 33-38.

Brown, F. C., Buboltz, W. C., Jr., & Soper, B. (2006). Development and evaluation of the sleep treatment and education program for students (STEPS). *Journal of American College Health, 54*(4), 231-237.

Buboltz, W. C., Jr., Jenkins, S. M., Soper, B., Woller, K., Johnson, P., & Faes, T. (2009). Sleep habits and patterns of college students: An expanded study. *Journal of College Counseling, 12*, 113-124.

Centers for Disease Control and Prevention. (1999). Framework for Program Evaluation in Public Health *Morbidity and Mortality Weekly Report* (Vol. 48, pp. 1-40). Atlanta, GA.

Centers for Disease Control and Prevention. (2012). Sleep and Sleep Disorders Retrieved December 7, 2012, from http://www.cdc.gov/sleep/index.htm

Columbia University. (2013). a!sleep: Helping You Enhance Your Bedtime Performance Retrieved February 24, 2013, from http://sleep.health.columbia.edu/

Emory University. (2012a). Facts & Figures Retrieved November 29, 2012, from http://www.emory.edu/home/about/factsfigures/index.html

Emory University. (2012b). Office of Health Promotion Retrieved November 9, 2012, from http://studenthealth.emory.edu/hp

Emory University. (2013a). Department of Health and Physical Education Retrieved February 22, 2013, from http://healthpe.emory.edu/home/academic/play-emory.html

Emory University. (2013b). Pre-Major Advising Connections at Emory (PACE) Retrieved February 24, 2013, from http://www.college.emory.edu/home/academic/advising/premajor/index.html

Emory University. (2013c). Residence Life and Housing Retrieved February 23, 2013, from http://www.emory.edu/HOUSING/index.html
Glantz, S. A. (2002). *Primer of Biostatistics* (5th ed.). New York, NY: McGraw-Hill.
Hawkins, J., & Shaw, P. (1992). Self-reported sleep quality in college students: A repeated measures approach. *Sleep, 15*, 545-549.
Hicks, R. A., Lucero-Gorman, K., Bautista, J., & Hicks, G. J. (1999). Ethnicity, sleep hygiene knowledge, and sleep hygiene practices. *Perceptual and Motor Skills, 88*, 1095-1096.
Kloss, J. D., Nash, C. O., Horsey, S. E., & Taylor, D. J. (2011). The delivery of behavioral sleep medicine to college students. *Journal of Adolescent Health, 48*, 553-561.
Morin, C. M., Culbert, J. P., & Schwartz, S. M. (1994). Nonpharmacological Interventions for Insomnia: A Meta-Analysis of Treatment Efficacy. *American Journal of Psychiatry, 151*(8), 1172-1180.
National Sleep Foundation (Producer). (2006, December 7, 2012). Sleep-Wake Cycle: Its Physiology and Impact on Health. Retrieved from http://www.sleepfoundation.org
Office of Health Promotion. (2012a). *2011 Emory University National College Health Assessment Summary*. Student Health and Counseling Services. Emory University. Atlanta, GA.
Office of Health Promotion. (2012b). *2011 NCHA Snapshot: Sleep at Emory*. Student Health and Counseling Services Emory University. Atlanta, GA.
Office of Health Promotion. (2012c). Office of Health Promotion Annual Report 2011-2012 (S. H. a. C. Services, Trans.). Atlanta, GA: Emory University.
Oxford College of Emory University. (2013, February 7, 2013). Sleep mini-course helps students grab some zzz's *Oxford News* Retrieved February 23, 2013, from http://oxford.emory.edu/news/detail.dot?inode=170264
Patterson, K., Grenny, J., Maxfield, D., McMillan, R., & Switzler, A. (2008). *Influencer: The power to change anything* (1 ed.). New York, NY: McGraw-Hill.
Pilcher, J. J., Ginter, D. R., & Sadowsky, B. (1997). Sleep quality versus sleep quantity: Relationships between sleep and measures of health, well being and sleepiness in college students. *Journal of Psychosomatic Research, 42*, 583-596.
Pilcher, J. J., & Walters, A. S. (1997). How sleep deprivation affects psychological variables related to college students' cognitive performance. *Journal of American College Health, 46*, 121-126.
RAND Corporation. (2012, February 7, 2012). Sleep Scale: RAND Medical Outcomes Study. *RAND Health* Retrieved November 17, 2012, from http://www.rand.org/health/surveys_tools/mos/mos_sleep.html
Ray, W. J. (1997). *Methods Toward a Science of Behavior and Experience* (5th ed.). Pacific Grove, CA: Brooks/Cole Publishing Company.
Ritterband, L. M., Thorndike, F. P., Gonder-Frederick, L. A., Magee, J. C., Bailey, E. T., Saylor, D. K., & Morin, C. M. (2009). Efficacy of an internet-based behavioral intervention for adults with insomnia. *Archives of General Psychiatry, 66*(7), 692-698.
Spritzer, K. L., & Hays, R. D. (2003). MOS Sleep Scale: A Manual for Use and Scoring, Version 1.0 (November ed.). Los Angeles, CA: RAND Corporation.
Trockel, M., Manber, R., Chang, V., Thurston, A., & Tailor, C. B. (2011). An e-mail delivered CBT for sleep-health program for college students: Effects on sleep quality and depression symptoms. *Journal of Clinical Sleep Medicine, 7*(3), 276-281.

University of Florida Division of Student Affairs. (2012). Sleeping in the Swamp: Sleep Improvement Program. *GatorWell Health Promotion Services* Retrieved November 12, 2012, from http://gatorwell.ufsa.ufl.edu/sleep-program.aspx

Vincent, N., & Lewycky, S. (2009). Logging on for better sleep: RCT of the effectiveness of online treatment for insomnia. *Sleep, 32*(6), 807-815.

Vreeland, B. (2012). An evidence-based practice of psychoeducation for schizophrena: A practical intervention for patients and their families. *Psychiatric Times, 29*(2).

W.K. Kellogg Foundation. (2004). Logic Model Development Guide (pp. 1-62). Battle Creek, MI.

Zesiger, H. (2008). *Development and Evaluation of the SleepWell@Emory Mini-Course*. Student Health and Counseling Services. Emory University. Atlanta, GA.

Zesiger, H. (2009). *Evaluation of the SleepWell@Emory Mini-Courses: Fall 2008*. Student Health and Counseling Services. Emory University. Atlanta, GA.

Zesiger, H. (2010a). *Evaluation of the SleepWell@Emory Mini-Course: Fall 2009 - a Second Restudy*. Student Health and Counseling Services. Emory University. Atlanta, GA.

Zesiger, H. (2010b). *Evaluation of the SleepWell@Emory Mini-Course: February 2010 - a Third Restudy*. Student Health and Counseling Services. Emory University. Atlanta, GA.

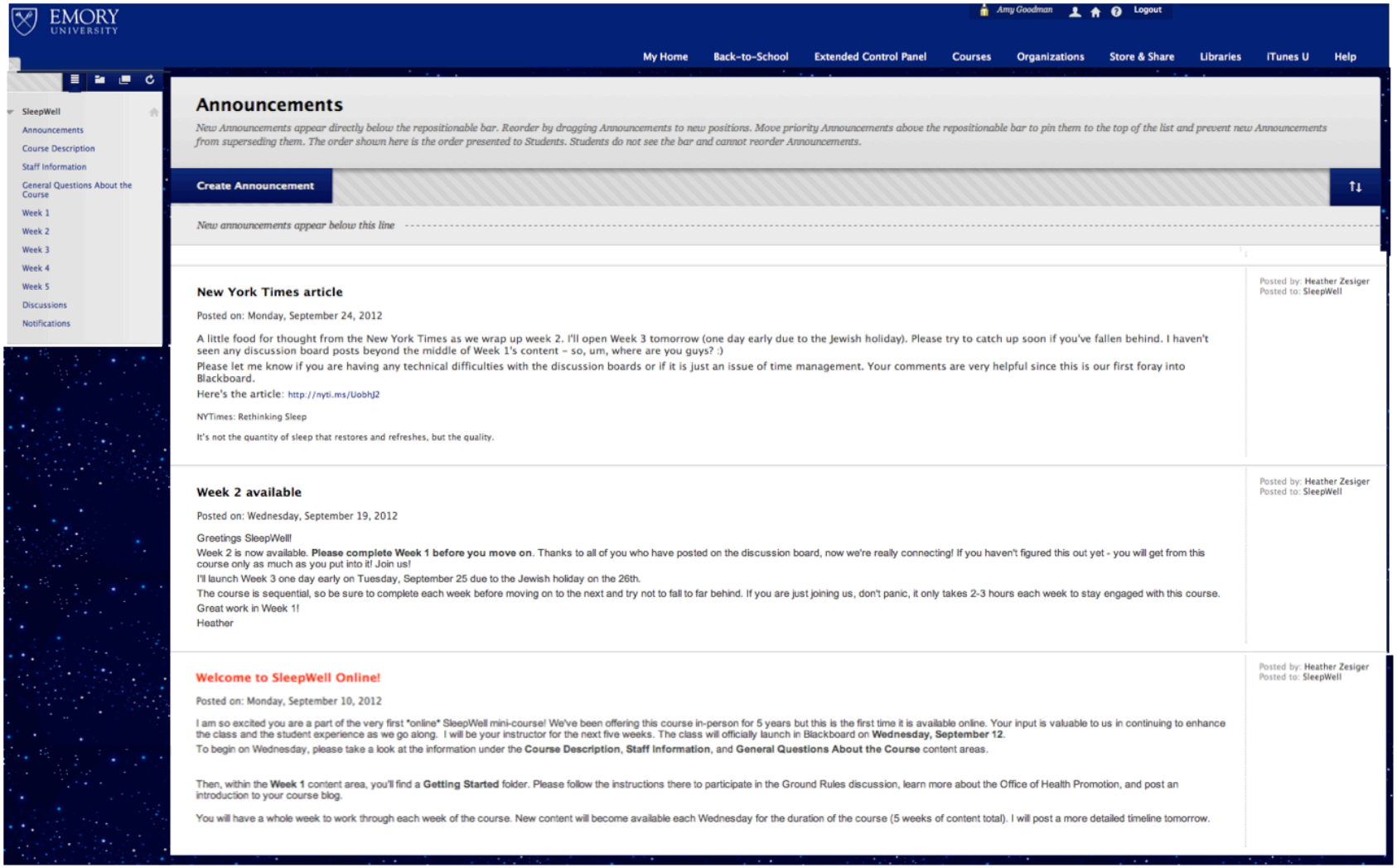
Zesiger, H. (2011). *SleepWell Mini-Course Report Fall 2010*. Student Health and Counseling Services. Emory University. Atlanta, GA.

Zesiger, H. (2012). *SleepWell Mini-Course Report Fall 2011*. Student Health and Counseling Services. Emory University. Atlanta, GA.

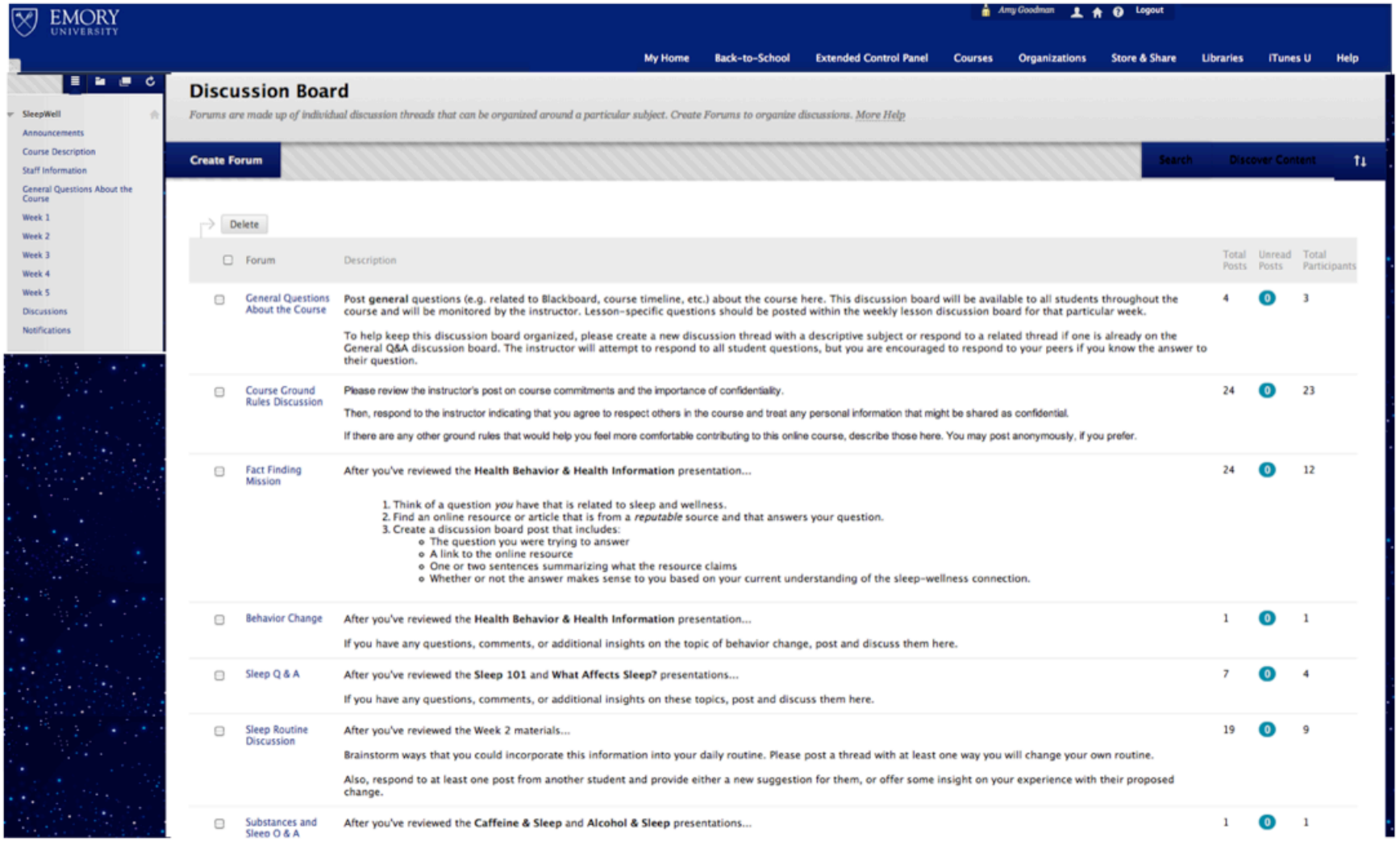
APPENDICES

Appendix A. Selected Course Screens from *SleepWell@Emory - Online* (2012)

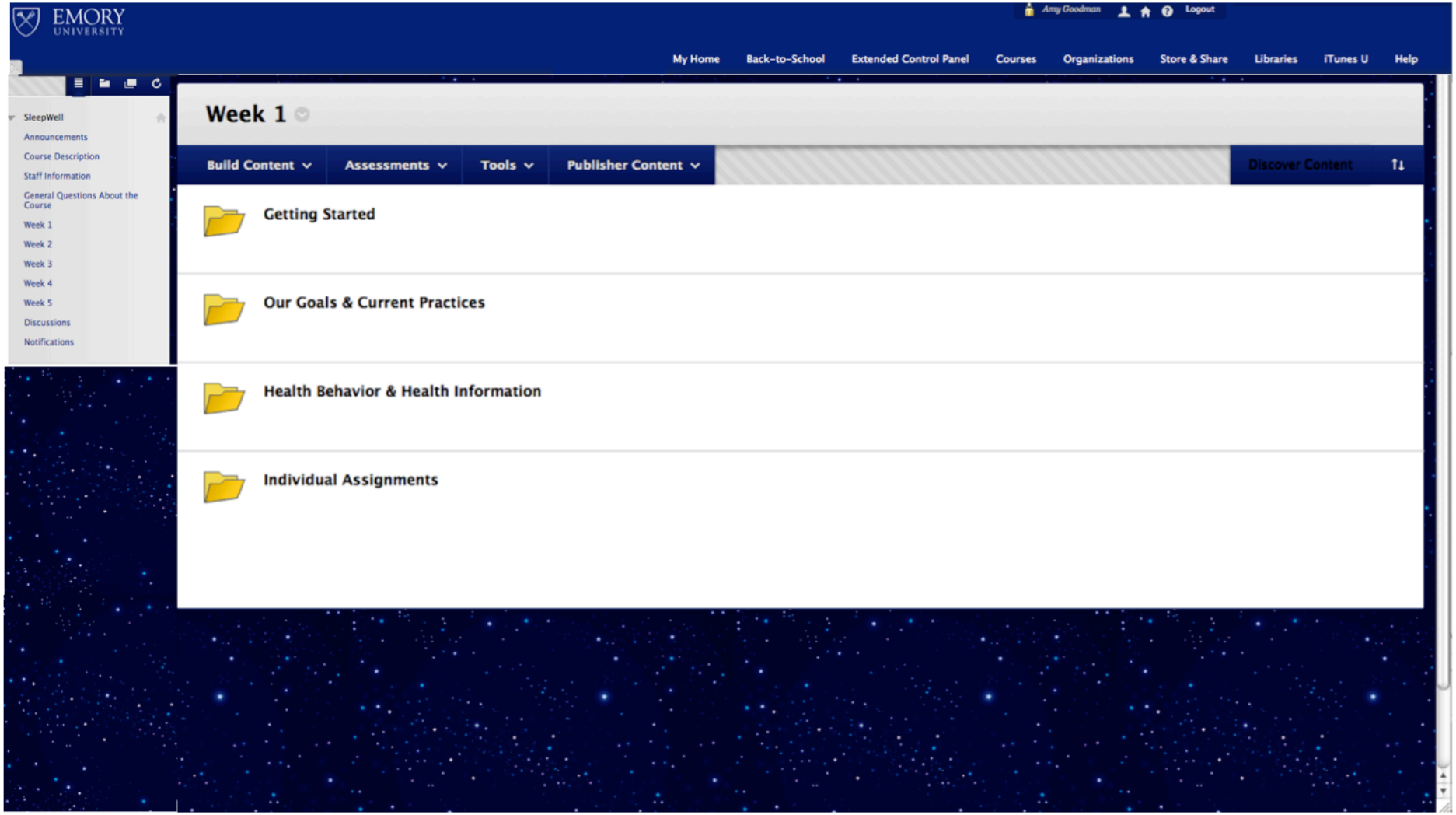
Sample Screen 1: Course Homepage with Announcements



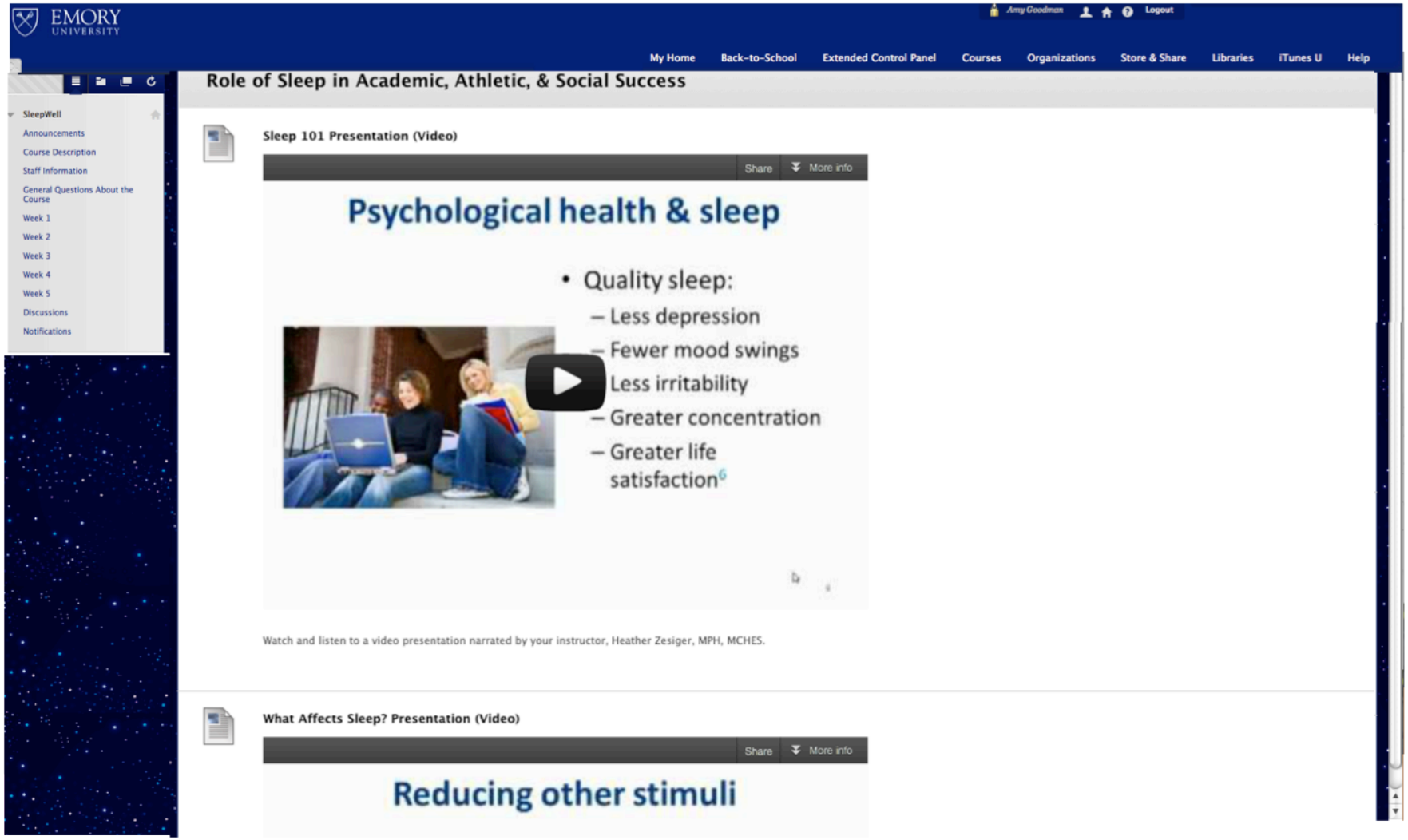
Sample Screen 2: Discussion Boards Linked to Weekly Lessons



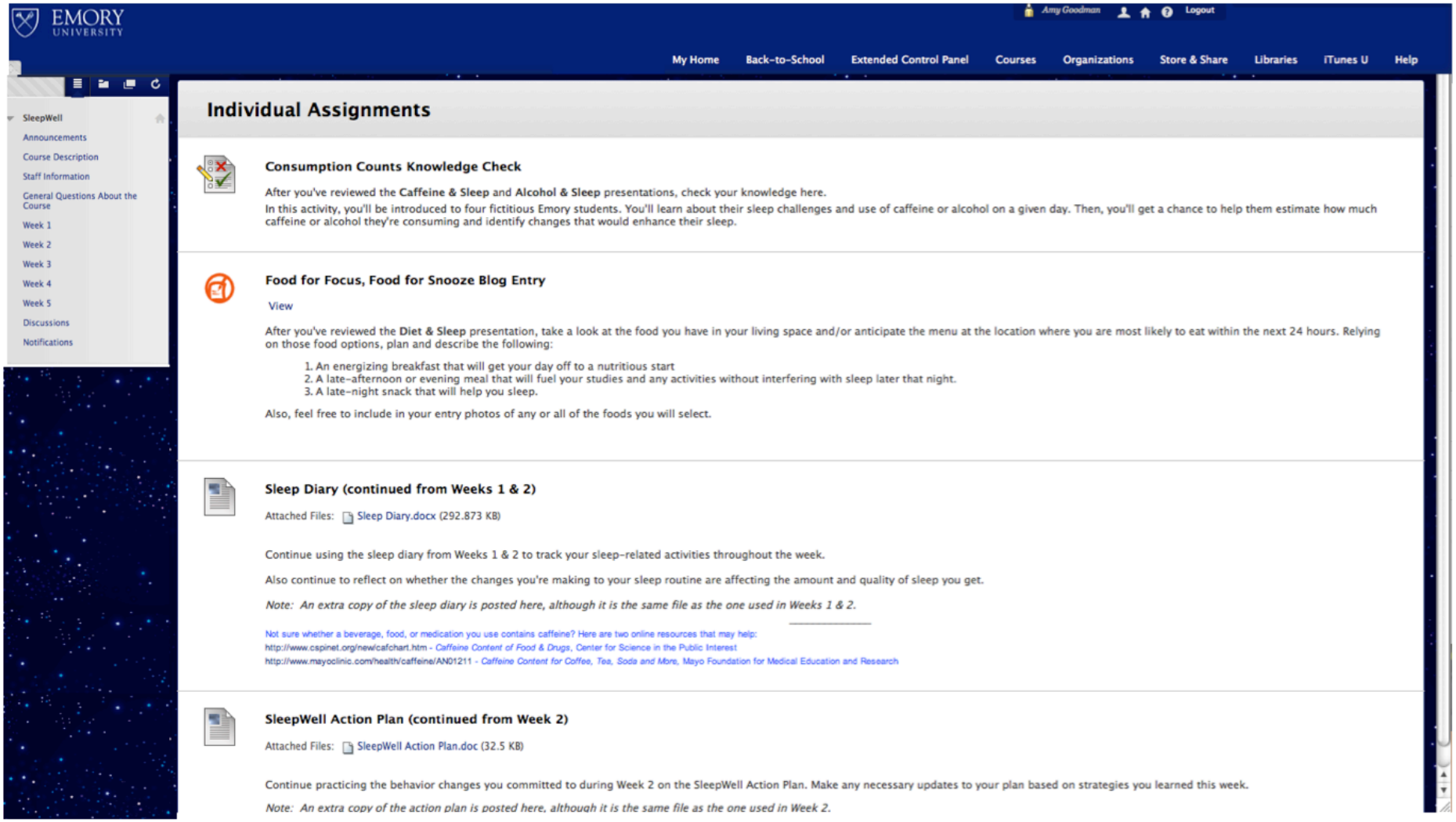
Sample Screen 3: Week 1 Main Lesson Page



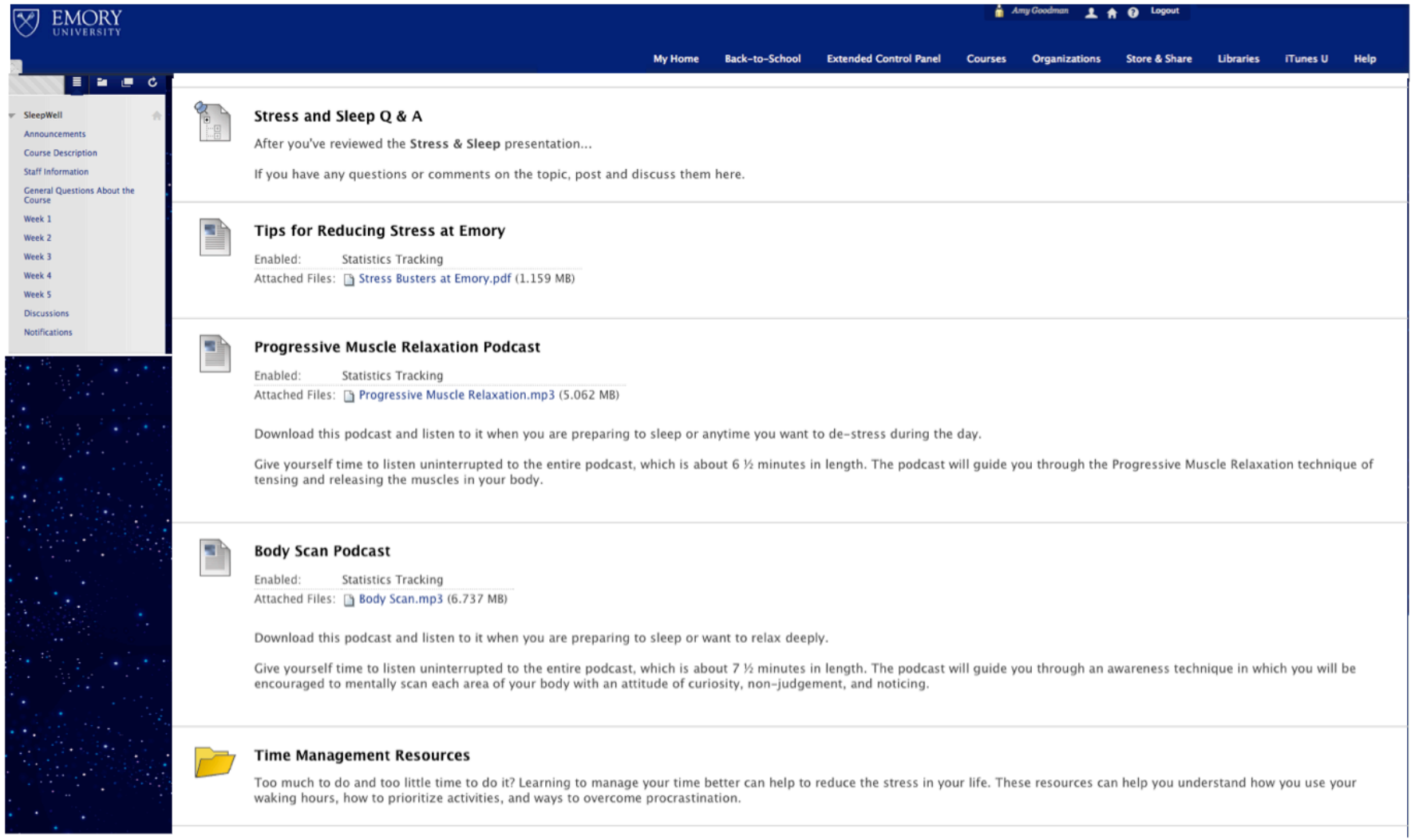
Sample Screen 4: Week 2 Video Presentations



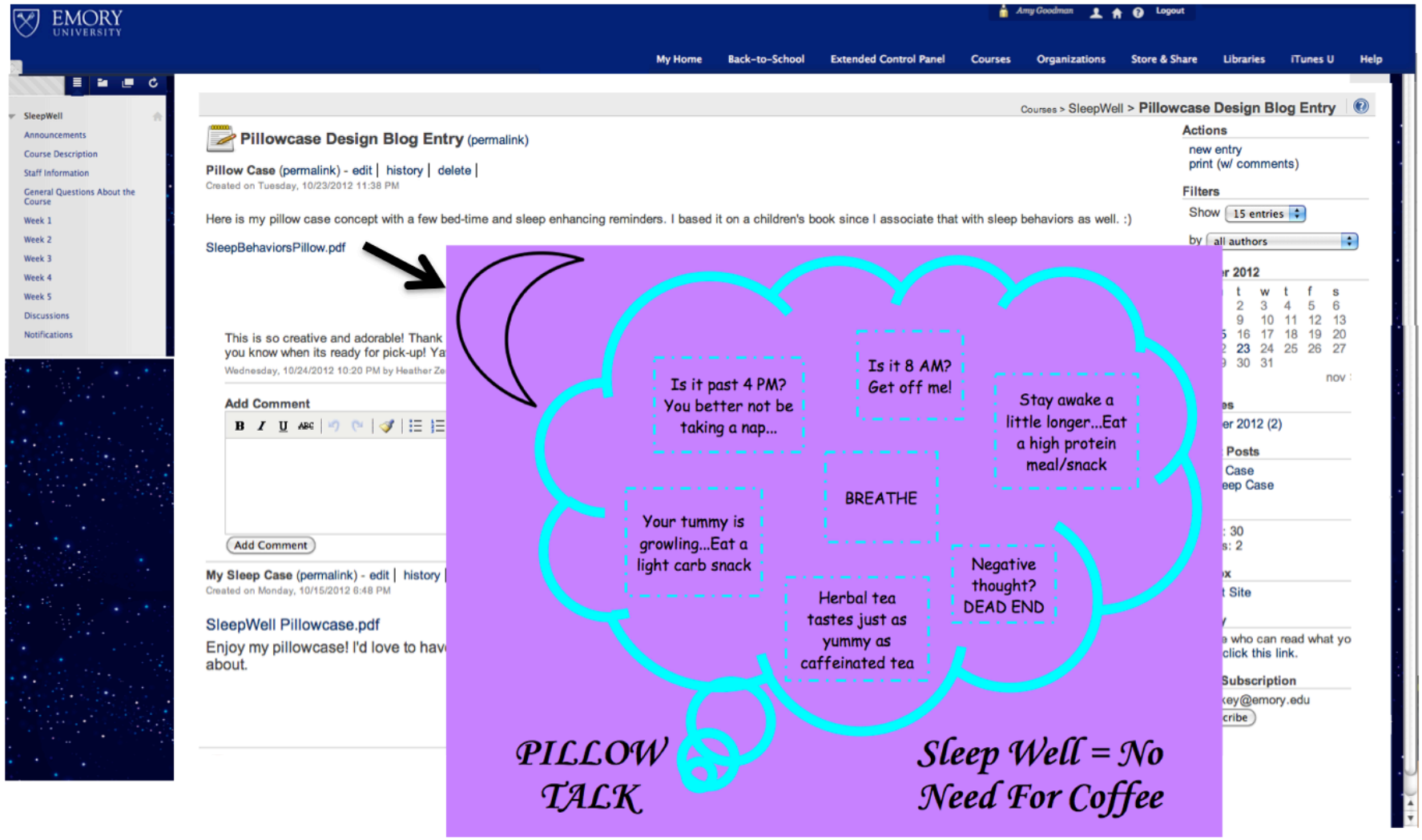
Sample Screen 5: Week 3 Individual Assignments Page



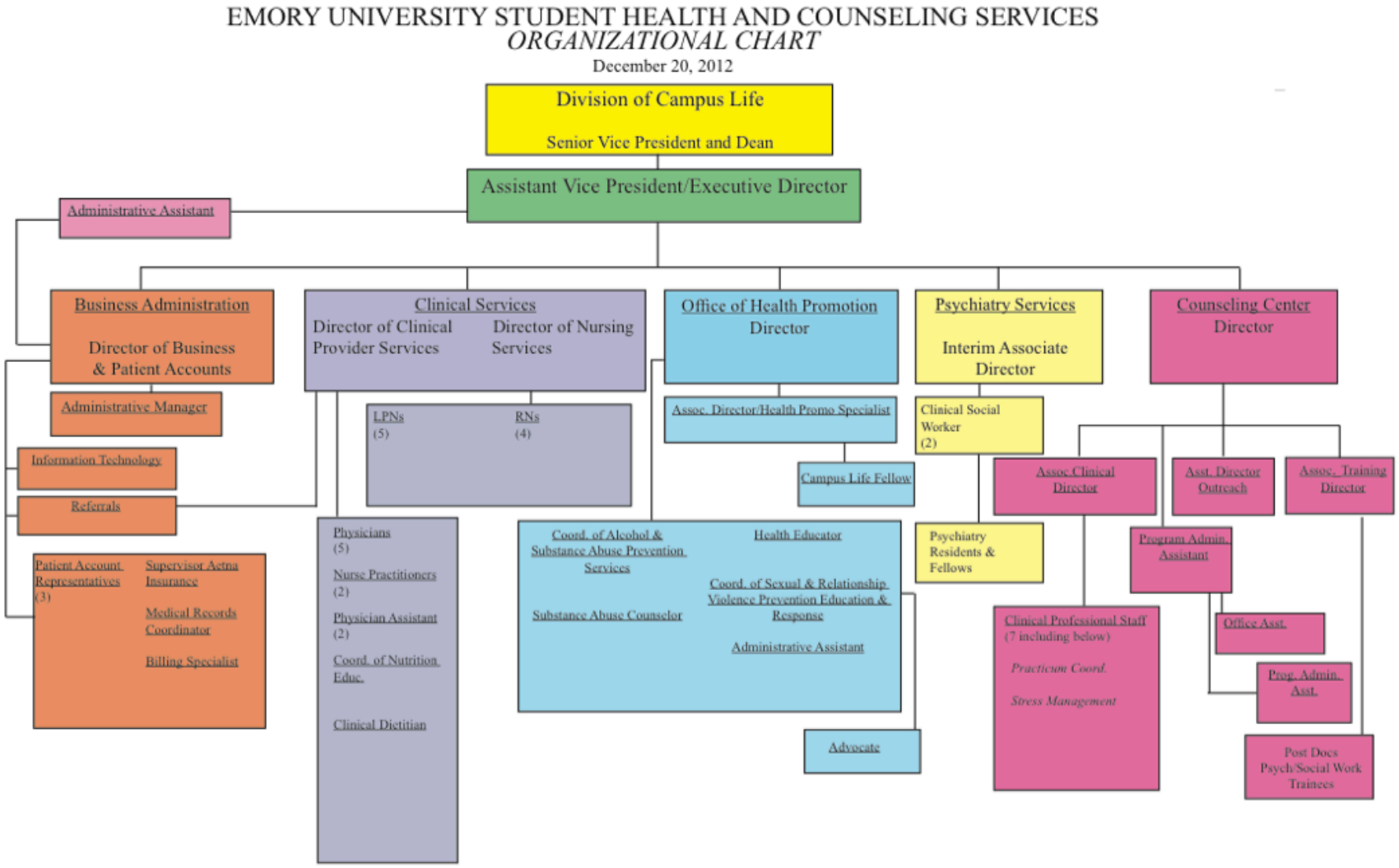
Sample Screen 6: Week 4 Content Page



Sample Screen 7: Week 5 Pillowcase Design Submission



Appendix B. Emory University Student Health and Counseling Services Organizational Chart (2013)



Appendix C. *SleepWell@Emory - Online* Registration and Pre-Test Survey (2012)

SleepWell Registration and Pre-Test September 2012

1. Registration

Thank you for your interest in SleepWell. This online mini-course is a voluntary, co-curricular enrichment experience offered to students through Blackboard and instructed by the Office of Health Promotion, Emory Student Health and Counseling Services. SleepWell is designed to help you improve your sleep quantity, consistency and sleep environment. **For maximum benefit, you must commit to reviewing course materials, participating in online discussions and learning activities, and practicing the skills assigned during the five-week course period.**

DATES: Wednesday, September 12 - Tuesday, October 16.

SleepWell's online format provides flexibility. All weekly activities may be done where and when it is best for you; however, you are encouraged to demonstrate respect for your classmates and the instructor by adhering to the mini-course's schedule.

If you become unable to participate, please notify the instructor immediately so we can give your spot to a student on the wait list.

This survey includes both your REGISTRATION and your PRE-TEST for the mini-course. It will take about 15 minutes to complete. Thank you for your time. If you have any questions, please contact Heather Zesiger, MPH, MCHES, Director, Office of Health Promotion, hzesige@emory.edu or 404-727-1736.

***1. Please fill out the following information to register.**

First & Last Name:

Email Address:

Cell Phone (optional)

2. I prefer to be called:

3. Emory Net ID: *(Example: hzesige)

***4. What is your birthdate?**

Please enter your birthdate MM / DD / YYYY

5. Class Year

6. How did you hear about this mini-course? (Select all that apply.)

- LL Announcements
- Flyer
- Play Emory Calendar
- Residence Life
- Faculty/Healthcare Referral
- Friend
- Facebook Post
- studenthealth.emory.edu Website
- bewellexcel.org Blog
- Be Well Excel Listserv
- Other

SleepWell Registration and Pre-Test September 2012

7. If you checked "other" above, please describe:

2. Pre-Test

Please fill out this short survey to help me prepare for the SleepWell mini-course. This is the pre-test. I'll send you the same survey as a post-test after the course. Your answers will be kept confidential. The results of the surveys will be used to evaluate how effective the mini-course is in improving sleep outcomes for participants. Your answers will not be used to diagnose or treat any medical conditions as that is outside the purview of this educational intervention. If you have any questions, please don't hesitate to contact the instructor, Heather Zesiger, MPH, MCHES at heather.zesiger@emory.edu or 404-727-1736.

Please complete this survey by Wednesday, September 5.

8. What are you hoping to improve about your sleep?

9. Does the amount of sleep you get vary by more than two hours day to day? (For example, if you usually sleep 6 hours on weeknights, do you sleep 9 hours on weekend nights?)

- ◯ Yes
- ◯ No
- ◯ I don't know

10. How many servings of caffeine do you have each day?

- ◯ None
- ◯ 1 to 3 servings
- ◯ 3 to 5 servings
- ◯ More than 5 servings

11. Do you take any medications (prescription, herbal, or over-the-counter) that may DISRUPT your sleep?

- ◯ Yes
- ◯ No
- ◯ I don't know

SleepWell Registration and Pre-Test September 2012

12. Do you take any medications (prescription, over-the-counter, herbal) with the intent of BENEFITING your sleep?

- ◯ Yes
- ◯ No
- ◯ I don't know

3. Sleep Knowledge

13. The amount of sleep required for optimum health varies by individual.

- ◯ True
- ◯ False

14. If an adult sleeps a sufficient number of hours each week, their sleep QUALITY is not affected by the time they go to bed or wake up each day.

- ◯ True
- ◯ False

15. Eating snacks that are high in simple carbohydrates (e.g. sugar) is an effective way to stay energized during long study sessions.

- ◯ True
- ◯ False

16. On average, it takes approximately 6 hours for an adult to eliminate one-half the caffeine he or she consumed.

- ◯ True
- ◯ False

17. Poor quality sleep is associated with slower reaction times, more depression, and decreased immune system responses.

- ◯ True
- ◯ False

18. Alcohol consumed at bedtime decreases the time needed to fall asleep and improves the quality of sleep throughout the night.

- ◯ True
- ◯ False

SleepWell Registration and Pre-Test September 2012

19. On average, students with higher GPAs sleep less than students with lower GPAs due to frequent late-night and all-night study sessions.

- ◯ True
- ◯ False

20. Eating a heavy meal that is higher in protein than carbohydrates calms the body and prepares it for deep sleep.

- ◯ True
- ◯ False

21. Watching a short video, sending a text message, or writing a paper on a laptop 20 minutes before going to bed can interfere with falling asleep.

- ◯ True
- ◯ False

22. I am confident in my ability to work with others (e.g. bed partner, roommate, neighbors, etc .) to create an environment that makes it easier for me to sleep.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

23. When I feel stressed, I am able to use strategies to help myself relax and focus.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

24. I have the ability to improve my sleep without medication.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

25. I believe this course will have a positive impact on my academic performance.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

26. I believe that Emory cares about my wellbeing.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

4. Sleep Scale

The following items come from the Sleep Scale of the Medical Outcomes Study (MOS).

Citation: Hays, RD & Stewart, AL (1992). Sleep Measures. In AL Stewart and JE Ware (eds.), Measuring functioning and well-being: The Medical Outcomes Study approach (pp. 235-259), Durham, NC: Duke University Press.

SleepWell Registration and Pre-Test September 2012

27. How long did it usually take you to fall asleep during the past 4 weeks?

- ◯ 0 to 15 minutes
- ◯ 16 to 30 minutes
- ◯ 31 to 45 minutes
- ◯ 46 to 60 minutes
- ◯ More than 60 minutes

28. On the average, how many hours did you sleep each night during the past 4 weeks?

Enter the number of hours per night:

SleepWell Registration and Pre-Test September 2012

29. How often during the past 4 weeks did you...

	All of the time	Most of the time	A Good Bit of the time	Some of the time	A Little of the time	None of the time
feel that your sleep was not quiet (moving restlessly, feeling tense, speaking, etc., while sleeping)?	◯	◯	◯	◯	◯	◯
get enough sleep to feel rested upon waking in the morning?	◯	◯	◯	◯	◯	◯
awaken short of breath or with a headache?	◯	◯	◯	◯	◯	◯
feel drowsy or sleepy during the day?	◯	◯	◯	◯	◯	◯
have trouble falling asleep?	◯	◯	◯	◯	◯	◯
awaken during your sleep time and have trouble falling asleep again?	◯	◯	◯	◯	◯	◯
have trouble staying awake during the day?	◯	◯	◯	◯	◯	◯
snore during your sleep?	◯	◯	◯	◯	◯	◯
take naps (5 minutes or longer) during the day?	◯	◯	◯	◯	◯	◯
get the amount of sleep you needed?	◯	◯	◯	◯	◯	◯

5. Thank You!

I look forward to seeing you on Blackboard starting Wednesday, September 12!

Appendix D. ***SleepWell@Emory - Online*** **Post-Test Survey (2012)**

SleepWell Post-Test September 2012

1. Introduction

Thank you for participating in SleepWell. Please complete this important survey to help us evaluate this online mini-course. The survey will take about 15 - 20 minutes to complete. Your answers will be kept confidential. The results of this survey will be compared to results of the course pre-test to determine how effective SleepWell Online is in improving sleep outcomes for participants. By completing this survey, you will help us to improve this mini-course and other health promotion programs.

Your answers will not be used to diagnose or treat any medical conditions as that is outside the purview of this educational intervention. If you have any questions, please don't hesitate to contact the instructor, Heather Zesiger, MPH, MCHES at heather.zesiger@emory.edu or 404-7271736.

Please complete this survey by Wednesday, November 7, 2012.

1. Does the amount of sleep you get vary by more than two hours day to day? (For example, if you usually sleep 6 hours on weeknights, do you sleep 9 hours on weekend nights?)

- ◯ Yes
- ◯ No
- ◯ I don't know

2. How many servings of caffeine do you have each day?

- ◯ None
- ◯ 1 to 3 servings
- ◯ 3 to 5 servings
- ◯ More than 5 servings

3. Do you take any medications (prescription, herbal, or over-the-counter) that may DISRUPT your sleep?

- ◯ Yes
- ◯ No
- ◯ I don't know

4. Do you take any medications (prescription, over-the-counter, herbal) with the intent of BENEFITING your sleep?

- ◯ Yes
- ◯ No
- ◯ I don't know

SleepWell Post-Test September 2012

5. Did participating in this course help you improve your sleep?

- ◯ Yes
- ◯ No
- ◯ I don't know

Please explain:

6. Do you intend to continue practicing strategies you learned in this course to enhance your sleep?

- ◯ Yes
- ◯ No
- ◯ I don't know

2. Sleep Knowledge

The questions in this section pertain to the topics addressed in SleepWell.

7. Eating snacks that are high in simple carbohydrates (e.g. sugar) is an effective way to stay energized during long study sessions.

- ◯ True
- ◯ False

8. Alcohol consumed at bedtime decreases the time needed to fall asleep and improves the quality of sleep throughout the night.

- ◯ True
- ◯ False

9. The amount of sleep required for optimum health varies by individual.

- ◯ True
- ◯ False

SleepWell Post-Test September 2012

10. Watching a short video, sending a text message, or writing a paper on a laptop 20 minutes before going to bed can interfere with falling asleep.

- ◯ True
- ◯ False

11. On average, students with higher GPAs sleep less than students with lower GPAs due to frequent late-night and all-night study sessions.

- ◯ True
- ◯ False

12. Eating a heavy meal that is higher in protein than carbohydrates calms the body and prepares it for deep sleep.

- ◯ True
- ◯ False

13. If an adult sleeps a sufficient number of hours each week, their sleep QUALITY is not affected by the time they go to bed or wake up each day.

- ◯ True
- ◯ False

14. Poor quality sleep is associated with slower reaction times, more depression, and decreased immune system responses.

- ◯ True
- ◯ False

15. On average, it takes approximately 6 hours for an adult to eliminate one-half the caffeine he or she consumed.

- ◯ True
- ◯ False

16. I believe that Emory cares about my wellbeing.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

17. I have the ability to improve my sleep without medication.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

SleepWell Post-Test September 2012

18. I am confident in my ability to work with others (e.g. bed partner, roommate, neighbors, etc.) to create an environment that makes it easier for me to sleep.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

19. When I feel stressed, I am able to use strategies to help myself relax and focus.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

20. This course has had a positive impact on my academic performance.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

3. Sleep Scale

The following items come from the Sleep Scale of the Medical Outcomes Study (MOS).

Citation: Hays, RD & Stewart, AL (1992). Sleep Measures. In AL Stewart and JE Ware (eds.), Measuring functioning and well-being: The Medical Outcomes Study approach (pp. 235-259), Durham, NC: Duke University Press.

21. How long did it usually take you to fall asleep during the past 4 weeks?

◯ 0 to 15 minutes
◯ 16 to 30 minutes
◯ 31 to 45 minutes
◯ 46 to 60 minutes
◯ More than 60 minutes

22. On average, how many hours did you sleep each night during the past 4 weeks?

Enter the number of hours per night:

SleepWell Post-Test September 2012

23. How often during the past 4 weeks did you...

	All of the time	Most of the time	A Good Bit of the time	Some of the time	A Little of the time	None of the time
feel that your sleep was not quiet (moving restlessly, feeling tense, speaking, etc., while sleeping)?	◯	◯	◯	◯	◯	◯
get enough sleep to feel rested upon waking in the morning?	◯	◯	◯	◯	◯	◯
awaken short of breath or with a headache?	◯	◯	◯	◯	◯	◯
feel drowsy or sleepy during the day?	◯	◯	◯	◯	◯	◯
have trouble falling asleep?	◯	◯	◯	◯	◯	◯
awaken during your sleep time and have trouble falling asleep again?	◯	◯	◯	◯	◯	◯
have trouble staying awake during the day?	◯	◯	◯	◯	◯	◯
snore during your sleep?	◯	◯	◯	◯	◯	◯
take naps (5 minutes or longer) during the day?	◯	◯	◯	◯	◯	◯
get the amount of sleep you needed?	◯	◯	◯	◯	◯	◯

4. SleepWell Online Course

The questions in this section pertain to the SleepWell Online course materials and your experience as a participant.

SleepWell Post-Test September 2012

24. The following course elements were helpful for increasing my knowledge and/or skills:

	Helpful	Not Helpful	I did not use
Video Presentations *(Health Behavior & Health Information, Sleep 101, What Affects Sleep?, Alcohol & Sleep, Caffeine & Sleep, Diet & Sleep, Stress & Sleep)*	◯	◯	◯
Print Versions of the Presentations *(Health Behavior & Health Information, Sleep 101, What Affects Sleep?, Alcohol & Sleep, Caffeine & Sleep, Diet & Sleep, Stress & Sleep)*	◯	◯	◯
Handouts *(Student Health & Counseling Services, Tips for Sleeping Well, Healthy Meal & Snack Ideas, Tips for Reducing Stress at Emory)*	◯	◯	◯
Time Management Resources	◯	◯	◯
Podcasts *(Progressive Muscle Relaxation, Body Scan)*	◯	◯	◯
Fact Finding Mission Discussion Board	◯	◯	◯
Weekly Discussion Boards *(optional - for questions and comments pertaining to the topics covered each week)*	◯	◯	◯
What's Next for Emory? Discussion	◯	◯	◯
What's Next for Me? Discussion	◯	◯	◯
Sleep Space Photo & Blog Discussion	◯	◯	◯
Consumption Counts Knowledge Check	◯	◯	◯
Food for Focus, Food for Snooze Blog Entry	◯	◯	◯
Pillowcase Design Exercise & Blog Entry	◯	◯	◯
Sleep Diary	◯	◯	◯
SleepWell Action Plan	◯	◯	◯

25. What did you like MOST about the SleepWell Online course?

26. What did you like LEAST about the SleepWell Online course?

SleepWell Post-Test September 2012

27. Is there information or are there skills that were not covered in SleepWell that could help you improve your sleep?

- ◯ Yes
- ◯ No

If "Yes," please specify:

28. The overall pace at which topics were covered in this course was:

- ◯ Too Slow
- ◯ Just Right
- ◯ Too Fast

29. The number of students in this course was:

- ◯ Too Small
- ◯ Just Right
- ◯ Too Large

30. Would you recommend the SleepWell online course to a friend?

- ◯ Yes
- ◯ No

31. Please feel free to add any additional comments here (e.g. about your course experience, the course materials, topics covered, the technology, the instructor, etc.):

5. Thank You!

Thank you for taking the time to complete this survey. We value your responses and wish you many nights of sleeping well!

Appendix E. ***SleepWell@Emory - Online*** **6-week Post-Test Survey (2012 - 2013)**

SleepWell 6 Week Post-Test September 2012

1. Introduction

You are receiving this survey because you participated in the SleepWell Online course earlier this semester. Please complete this brief survey to help us evaluate any long-term benefits of the course. This survey will take about 15 minutes to complete. Your answers will be kept confidential. The results of this survey will be compared to results of the pre-test and post-test for this course.

Your answers will not be used to diagnose or treat any medical conditions as that is outside the purview of this educational intervention. If you have any questions, please don't hesitate to contact the instructor, Heather Zesiger, MPH, MCHES at heather.zesiger@emory.edu or 404-7271736.

Please complete this survey by Tuesday, December 11, 2012.

1. Which of the following SleepWell techniques do you still use? *(Select all that apply.)*

- ☐ Follow a bedtime routine
- ☐ Use bed for sleep and intimacy only
- ☐ Maintain a consistent sleep schedule
- ☐ Make food choices that support energy or sleep
- ☐ Limit or avoid caffeine later in the day
- ☐ Limit or avoid alcohol before bed
- ☐ Exercise earlier in the day
- ☐ Make changes to my sleep space to promote sleep
- ☐ Practice stress reduction techniques to fall asleep
- ☐ Avoid screens and electronics before bed
- ☐ Review health information critically
- ☐ Other (please specify):

2. If you stopped using techniques that you started practicing as a result of SleepWell, what caused you to stop? *(Select all that apply.)*

- ☐ Academics
- ☐ Job
- ☐ Relationship Problems
- ☐ Extra-Curricular Activities
- ☐ Illness
- ☐ Holiday
- ☐ Not applicable - I haven't stopped any techniques.
- ☐ Other reason (please specify):

SleepWell 6 Week Post-Test September 2012

3. Overall, did participating in SleepWell help you improve your sleep?

- ◯ Yes
- ◯ No
- ◯ I don't know

Please explain:

2. Sleep Knowledge

The questions in this section pertain to the topics addressed in SleepWell.

4. Poor quality sleep is associated with slower reaction times, more depression, and decreased immune system responses.

- ◯ True
- ◯ False

5. On average, students with higher GPAs sleep less than students with lower GPAs due to frequent late-night and all-night study sessions.

- ◯ True
- ◯ False

6. If an adult sleeps a sufficient number of hours each week, their sleep QUALITY is not affected by the time they go to bed or wake up each day.

- ◯ True
- ◯ False

7. Alcohol consumed at bedtime decreases the time needed to fall asleep and improves the quality of sleep throughout the night.

- ◯ True
- ◯ False

8. The amount of sleep required for optimum health varies by individual.

- ◯ True
- ◯ False

SleepWell 6 Week Post-Test September 2012

9. On average, it takes approximately 6 hours for an adult to eliminate one-half the caffeine he or she consumed.

- ◯ True
- ◯ False

10. Watching a short video, sending a text message, or writing a paper on a laptop 20 minutes before going to bed can interfere with falling asleep.

- ◯ True
- ◯ False

11. Eating snacks that are high in simple carbohydrates (e.g. sugar) is an effective way to stay energized during long study sessions.

- ◯ True
- ◯ False

12. Eating a heavy meal that is higher in protein than carbohydrates calms the body and prepares it for deep sleep.

- ◯ True
- ◯ False

13. When I feel stressed, I am able to use strategies to help myself relax and focus.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

14. This course has had a positive impact on my academic performance.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

15. I believe that Emory cares about my wellbeing.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

16. I am confident in my ability to work with others (e.g. bed partner, roommate, neighbors, etc.) to create an environment that makes it easier for me to sleep.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

17. I have the ability to improve my sleep without medication.

◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

3. Sleep Scale

SleepWell 6 Week Post-Test September 2012

The following items come from the Sleep Scale of the Medical Outcomes Study (MOS).

Citation: Hays, RD & Stewart, AL (1992). Sleep Measures. In AL Stewart and JE Ware (eds.), Measuring functioning and well-being: The Medical Outcomes Study approach (pp. 235-259), Durham, NC: Duke University Press.

18. How long did it usually take you to fall asleep during the past 4 weeks?

- ◯ 0 to 15 minutes
- ◯ 16 to 30 minutes
- ◯ 31 to 45 minutes
- ◯ 46 to 60 minutes
- ◯ More than 60 minutes

19. On average, how many hours did you sleep each night during the past 4 weeks?

Enter the number of hours per night:

SleepWell 6 Week Post-Test September 2012

20. How often during the past 4 weeks did you...

	All of the time	Most of the time	A Good Bit of the time	Some of the time	A Little of the time	None of the time
feel that your sleep was not quiet (moving restlessly, feeling tense, speaking, etc., while sleeping)?	◯	◯	◯	◯	◯	◯
get enough sleep to feel rested upon waking in the morning?	◯	◯	◯	◯	◯	◯
awaken short of breath or with a headache?	◯	◯	◯	◯	◯	◯
feel drowsy or sleepy during the day?	◯	◯	◯	◯	◯	◯
have trouble falling asleep?	◯	◯	◯	◯	◯	◯
awaken during your sleep time and have trouble falling asleep again?	◯	◯	◯	◯	◯	◯
have trouble staying awake during the day?	◯	◯	◯	◯	◯	◯
snore during your sleep?	◯	◯	◯	◯	◯	◯
take naps (5 minutes or longer) during the day?	◯	◯	◯	◯	◯	◯
get the amount of sleep you needed?	◯	◯	◯	◯	◯	◯

4. SleepWell Online Course

The following questions pertain to the SleepWell course materials and your experience as a participant.

21. What are the three most important skills or facts that you learned from SleepWell?

1.)

2.)

3.)

SleepWell 6 Week Post-Test September 2012

22. Have you used or referenced any of the SleepWell course materials (e.g. handout, Sleep Diary, etc.) since the course ended?

- ◯ Yes
- ◯ No

If "Yes," please indicate which materials:

23. Is there information or are there skills that were not covered in SleepWell that could help you improve your sleep long-term?

- ◯ Yes
- ◯ No

If "Yes," please specify:

24. Have you stayed in contact with any co-particpants of SleepWell?

- ◯ Yes
- ◯ No

25. Have you recommended the SleepWell online course to a friend?

- ◯ Yes
- ◯ No

26. Please feel free to add any additional comments here:

5. Thank You!

Thank you for taking the time to complete this survey.

If you would like further assistance improving your sleep, please don't hesitate to contact the SleepWell instructor, Heather Zesiger, MPH, MCHES at heather.zesiger@emory.edu or 404-7271736.

Appendix F. Responses on *SleepWell@Emory - Online* Medical Outcomes Survey (MOS) Sleep Scale Questions (2012 - 2013)

BEHAVIOR - MOS SLEEP SCALE							
QUESTION		**SEPTEMBER**			**OCTOBER**		
		PRE-TEST (n=39)	**POST-TEST (n=19)**	**6-WEEK POST-TEST (n=9)**	**PRE-TEST (n=26)**	**POST-TEST (n=7)**	**6-WEEK POST-TEST (n=3)**
Time to sleep onset (during last 4 weeks):	0-15 min -- 16-30 min -- 31-45 min -- 46-60 min -- >60 min -- *No response --*	11 (28.2%) 10 (25.6%) 7 (17.9%) 5 (12.8%) 5 (12.8%) *1 (2.6%)*	9 (47.4%) 5 (26.3%) 1 (5.3%) 1 (5.3%) .. *3 (15.8%)*	4 (44.4%) 3 (33.3%) .. 2 (22.2%)	8 (30.8%) 7 (26.9%) 5 (19.2%) 3 (11.5%) 3 (11.5%) ..	3 (42.9%) 3 (42.9%) 1 (14.3%)	1 (33.3%) 1 (33.3%) .. .. .. *1 (33.3%)*
Avg. number of hours slept per night (during last 4 weeks):	3 -- 4 -- 5 -- 6 -- 7 -- 8 -- 9 -- 10 -- 11 -- *No response --*	.. .. 1 (2.6%) 14 (35.9%) 13 (33.3%) 7 (18%) 1 (2.6%) 1 (2.6%) .. *2 (5.1%)*	.. 1 (5.3%) .. 3 (15.8%) 10 (52.6%) 2 (10.5%) .. .. .. *3 (15.8%)*	1 (11.1%) .. 1 (11.1%) 3 (33.3%) 3 (33.3%) 1 (11.1%)	.. .. 2 (7.7%) 8 (30.8%) 7 (26.9%) 8 (30.8%) .. .. .. *1 (3.9%)*	.. .. .. 1 (14.3%) 3 (42.9%) 3 (42.9%)	.. .. 1 (33.3%) .. 1 (33.3%) *1 (33.3%)*
How often during the past 4 weeks did you…							
feel that your sleep was not quiet (moving restlessly, feeling tense, speaking, etc., while sleeping)?	All of the time -- Most of the time -- A good bit of the time -- Some of the time -- A little of the time -- None of the time -- *No response --*	2 (5.1%) 11 (28.2%) 5 (12.8%) 6 (15.4%) 9 (23.1%) 3 (7.7%) *3 (7.7%)*	.. .. 1 (5.3%) 2 (10.5%) 10 (52.6%) 2 (10.5%) *4 (21.1%)*	1 (11.1%) .. 2 (22.2%) .. 3 (33.3%) 2 (44.4%) *1 (11.1%)*	2 (7.7%) 3 (11.5%) 7 (26.9%) 4 (15.4%) 5 (19.2%) 5 (19.2%) ..	.. .. 1 (14.3%) 2 (28.6%) 3 (42.9%) 1 (14.3%) ..	.. .. 2 (66.7%) .. *1 (33.3%)*

BEHAVIOR - MOS SLEEP SCALE *(continued)*							
QUESTION		**SEPTEMBER**			**OCTOBER**		
		PRE-TEST (n=39)	**POST-TEST (n=19)**	**6-WEEK POST-TEST (n=9)**	**PRE-TEST (n=26)**	**POST-TEST (n=7)**	**6-WEEK POST-TEST (n=3)**
How often during the past 4 weeks did you…							
get enough sleep to feel rested upon waking in the morning?	All of the time --	..	..	..	..	..	1 (33.3%)
	Most of the time --	3 (7.7%)	3 (15.8%)	1 (11.1%)	..	2 (28.6%)	1 (33.3%)
	A good bit of the time --	2 (5.1%)	3 (15.8%)	2 (22.2%)	3 (11.5%)	1 (14.3%)	..
	Some of the time --	18 (46.2%)	8 (42.1%)	3 (33.3%)	9 (34.6%)	3 (42.9%)	..
	A little of the time --	11 (28.2%)	1 (5.3%)	1 (11.1%)	14 (53.9%)	..	..
	None of the time --	2 (5.1%)	..	1 (11.1%)	..	1 (14.3%)	..
	No response --	*3 (7.7%)*	*4 (21.1%)*	*1 (11.1%)*	..	..	*1 (33.3%)*
awaken short of breath or with a headache?	All of the time --	..	..	..	..	..	..
	Most of the time --	..	..	1 (11.1%)	1 (3.9%)	..	..
	A good bit of the time --	2 (5.1%)	1 (5.3%)	..	2 (7.7%)	..	..
	Some of the time --	4 (10.3%)	1 (5.3%)	1 (11.1%)	2 (7.7%)	1 (14.3%)	..
	A little of the time --	8 (20.5%)	2 (10.5%)	1 (11.1%)	2 (7.7%)	..	..
	None of the time --	21 (53.9%)	11 (57.9%)	4 (44.4%)	19 (73.1%)	6 (85.7%)	2 (66.7%)
	No response --	*4 (9.8%)*	*4 (21.1%)*	*2 (22.2%)*	..	..	*1 (33.3%)*
feel drowsy or sleepy during the day?	All of the time --	1 (2.6%)	..	1 (11.1%)	5 (19.2%)	..	..
	Most of the time --	11 (28.2%)	2 (10.5%)	1 (11.1%)	7 (26.9%)	..	..
	A good bit of the time --	14 (35.9%)	3 (15.8%)	4 (44.4%)	7 (26.9%)	3 (42.9%)	..
	Some of the time --	9 (23.1%)	4 (21.1%)	..	4 (15.4%)	3 (42.9%)	1 (33.3%)
	A little of the time --	1 (2.6%)	6 (31.6%)	2 (22.2%)	3 (11.5%)	1 (14.3%)	1 (33.3%)
	None of the time --	..	..	..	..	..	..
	No response --	3 (7.7%)	4 (21.1%)	1 (11.1%)	..	..	1 (33.3%)
have trouble falling asleep?	All of the time --	3 (7.7%)	..	..	2 (7.7%)	..	..
	Most of the time --	8 (20.5%)	..	1 (11.1%)	1 (3.9%)	..	..
	A good bit of the time --	4 (10.3%)	2 (10.5%)	1 (11.1%)	2 (7.7%)	2 (28.6%)	..
	Some of the time --	7 (18%)	5 (26.3%)	2 (22.2%)	7 (26.9%)	1 (14.3%)	..
	A little of the time --	10 (25.6%)	5 (26.3%)	3 (33.3%)	8 (30.8%)	4 (57.1%)	2 (66.7%)
	None of the time --	4 (10.3%)	3 (15.8%)	1 (11.1%)	4 (15.4%)	..	..
	No response --	3 (7.7%)	4 (21.1%)	1 (11.1x%)	2 (7.7%)	..	1 (33.3%)

BEHAVIOR - MOS SLEEP SCALE *(continued)*							
QUESTION		**SEPTEMBER**			**OCTOBER**		
		PRE-TEST (n=39)	**POST-TEST (n=19)**	**6 –WEEK POST-TEST (n=9)**	**PRE-TEST (n=26)**	**POST-TEST (n=7)**	**6-WEEK POST-TEST (n=3)**
How often during the past 4 weeks did you…							
awaken during your sleep time and have trouble falling asleep again?	All of the time --	..	..	..	1 (3.9%)	..	..
	Most of the time --	4 (10.3%)	..	..	3 (11.5%)	..	..
	A good bit of the time --	9 (23.1%)	1 (5.3%)	..	1 (3.9%)	1 (14.3%)	..
	Some of the time --	8 (20.5%)	4 (21.1%)	3 (33.3%)	4 (15.4%)	1 (14.3%)	..
	A little of the time --	5 (12.8%)	3 (15.8%)	2 (22.2%)	5 (19.2%)	2 (28.6%)	2 (66.7%)
	None of the time --	10 (25.6%)	6 (31.6%)	3 (33.3%)	12 (46.2%)	3 (42.9%)	..
	No response --	*3 (7.7%)*	*5 (26.3%)*	*1 (11.1%)*	..	..	*1 (33.3%)*
have trouble staying awake during the day?	All of the time --	..	..	1 (11.1%)	2 (7.7%)	..	..
	Most of the time --	4 (10.3%)	1 (5.3%)	..	4 (15.4%)	..	..
	A good bit of the time --	6 (15.4%)	..	..	6 (23.1%)	2 (28.6%)	..
	Some of the time --	13 (33.3%)	3 (15.8%)	2 (22.2%)	3 (11.5%)	2 (28.6%)	..
	A little of the time --	12 (30.8%)	9 (47.4%)	5 (55.6%)	7 (26.9%)	2 (28.6%)	2 (66.7%)
	None of the time --	1 (2.6%)	1 (5.3%)	..	4 (15.4%)	1 (14.3%)	..
	No response --	*3 (7.7%)*	*5 (26.3%)*	*1 (11.1%)*	..	..	*1 (33.3%)*
snore during your sleep?	All of the time --	2 (5.1%)	..	..	..	..	..
	Most of the time --	3 (7.7%)	1 (5.3%)	..	1 (3.9%)	..	..
	A good bit of the time --	2 (5.1%)	1 (5.3%)	1 (11.1%)	..	..	..
	Some of the time --	1 (2.6%)	2 (10.5%)	..	4 (15.4%)	1 (14.3%)	1 (33.3%)
	A little of the time --	12 (30.8%)	3 (15.8%)	4 (44.4%)	6 (23.1%)	..	..
	None of the time --	14 (35.9%)	8 (42.1%)	3 (33.3%)	14 (53.9%)	6 (85.7%)	1 (33.3%)
	No response --	*5 (12.8%)*	*4 (21.1%)*	*1 (11.1%)*	*1 (3.9%)*	..	*1 (33.3%)*
take naps (5 minutes or longer) during the day?	All of the time --	..	..	..	3 (11.5%)	..	..
	Most of the time --	3 (7.7%)	1 (5.3%)	1 (11.1%)	4 (15.4%)	..	..
	A good bit of the time --	6 (15.4%)	..	1 (11.1%)	..	2 (28.6%)	..
	Some of the time --	7 (18%)	5 (26.3%)	2 (22.2%)	4 (15.4%)	1 (14.3%)	..
	A little of the time --	10 (25.6%)	5 (26.3%)	2 (22.2%)	4 (15.4%)	3 (42.9%)	1 (33.3%)
	None of the time --	10 (25.6%)	4 (21.1%)	2 (22.2%)	11 (42.3%)	1 (14.3%)	1 (33.3%)
	No response --	3 (7.7%)	4 (21.1%)	1 (11.1%)	..	..	1 (33.3%)

BEHAVIOR - MOS SLEEP SCALE *(continued)*							
QUESTION		**SEPTEMBER**			**OCTOBER**		
		PRE-TEST (n=39)	**POST-TEST (n=19)**	**6-WEEK POST-TEST (n=9)**	**PRE-TEST (n=26)**	**POST-TEST (n=7)**	**6-WEEK POST-TEST (n=3)**
How often during the past 4 weeks did you…							
get the amount of sleep you needed?	All of the time --	..	..	..	..	..	1 (33.3%)
	Most of the time --	1 (2.6%)	1 (5.3%)	2 (22.2%)	1 (3.9%)	2 (28.6%)	1 (33.3%)
	A good bit of the time --	7 (18%)	7 (36.8%)	3 (33.3%)	4 (15.4%)	2 (28.6%)	..
	Some of the time --	15 (38.5%)	6 (31.6%)	..	10 (38.5%)	3 (42.9%)	..
	A little of the time --	12 (30.8%)	1 (5.3%)	2 (22.2%)	9 (34.6%)	..	..
	None of the time --	1 (2.6%)	..	1 (11.1%)	2 (7.7%)	..	..
	No response --	*3 (7.7%)*	*4 (21.1%)*	*1 (11.1%)*	..	..	*1 (33.3%)*