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Evaluating Students' Perceived Stress, Sleep Quality, and Physical Activity in Exercise Is Medicine® On Campus Student-led Health Consultation Program

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Abstract The American College of Sport Medicine created the Exercise is Medicine® (EIM) initiative to improve health through the promotion and prescription of physical activity. The EIM-On Campus (EIM-OC) initiative uses physical activity as a vital sign for promoting healthy behaviors among students and employees on a college campus. The EIM-OC initiative was launched at California State University, Monterey Bay (CSUMB) in Fall 2019. The purpose of this research project was to promote and evaluate college students' health behaviors associated with the implementation of the EIM-OC initiative at CSUMB. We hypothesized significant improvements in perceived stress, sleep quality, and total physical activity time among participants. The research design was pre-post and tracked participants in the EIM-OC semester long consultation program. Fifteen CSUMB students participated in the consultation program. The Perceived Stress Scale (PSS), Pittsburgh Sleep Quality Index (PSQI), and the Godin-Leisure Time Exercise Questionnaire (GLTEQ) were administered online through an intake form before and after the consultation program. Dependent t-tests were performed to assess for pre- and post-differences in perceived stress (PS), sleep quality (SQ), and total physical activity (PA) time. Significance was set at $\alpha = 0.05$. Participant's age was M=20.87, SD=3.34 years, with 60% being college junior status. There was a statistically significant improvement in students' perceived stress levels (t=2.659, df=14, p=.019) pre (M=16.47, SD=5.630) and post (M=11.53, SD=6.424) intervention. There was also a statistically significant improvement in sleep quality (t=.3166, df=14, p=.007) pre (M=6.80, SD=2.981) and post (M=5.07, SD=2.963) intervention. There were improvements in total physical activity time, although it was not significant. The results of this research project indicate that peer advisor consultation programs can be effective in improving college-aged students' perceived stress and sleep quality. These health behavior improvements are important contributors to college students' lifelong health behavior habits, quality of life, and academic performance.

Keywords: *Exercise Is Medicine® On Campus, stress, sleep, physical activity, health promotion, health education, student health, college students, peer mentors*

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1. Introduction

The college years are a period which can be filled with a great deal of stress [1]. The sources of stress may be related to a change in environment, workload, and responsibilities which students take on in the college setting. The necessity to adjust to an increase in academic workload and a demand of financial responsibility are both major contributors of stress. [1] Once this acclimation has been met, college students are then faced with a number of other stressors during the remainder of their college years.

Sources of stress in college aged individuals are consistent throughout studies with the most common stressors being identified as academic, financial, family, social, and daily hassle. [1,2,3] In a sample of 212 college students, 75% of

participants reported a moderate level of stress, 12% reported a high level of stress, and only 13% reported a low level of stress. [4] When examining stress and academic performance in college students, students' stress scores were identified as a statistically significant predictor of academic performance. [5] Stress can also have a negative effect on individuals perceived sleep quality (SQ) which in turn can affect academic performance. [5,6]

Literature suggests that college students who feel that they have support from their social network are more likely to meet the muscle-strengthening physical activity (PA) guidelines which supports their overall PA level and health. [7] Literature has also demonstrated the relationship between social support and success in college students. [8] It was found that college students who utilized the counseling center or the campus health center had a significantly higher cumulative GPA than those who did not use these resources. [8] This research indicates that a strong and supportive social network is beneficial to college students' overall health and college experience.

1.1. Perceived Stress

Perceived stress (PS) can be used to determine the degree to which situation(s) of one's life are appraised as "stressful". [9] As this construct is deemed "perceived" stress, it is heavily reliant on how stressful an individual believes their life is and it is composed of three categories: how unpredictable, uncontrollable, and overloaded individuals find their lives to be. [9] Unpredictability is associated with one's perception on how unclear their future may seem. In the college setting, this can relate to their uncertainty of how well they will perform academically or what their post-graduation plans will entail. The uncontrollable aspect relates to how unstable one's personal life is, including situations that cause impatience, annoyance, or slight anger. In the college setting this can relate to a student's inability to dictate their major's curriculum, or the moods and behaviors of their roommates who occupy the same living space. A feeling of overload ties into difficulties of life piling up and one's perceived ability to cope with general life and school responsibilities like the piling of assignments from multiple classes.

1.2. Sleep Quality

Sleep quality is another component that can be used to assess an individual's quality of life and health. Low sleep quality could negatively influence exam preparation and performance. Poor sleep quality in college aged individuals has been related to symptoms of depression and symptoms of anxiety. [10,11] Research shows that college students average seven hours of sleep per night, borderline or lower than the amount recommended by most health professionals. [12] Being that low sleep quality can be linked to low academic performance and negative mental health factors such as anxiety, and stress, it is important to have the means to optimize these health behaviors with coping strategies. A positive coping mechanism that was commonly identified by college students was physical activity. [2]

1.3. Physical Activity

Physical activity is a primary component of assessing health. Adults should aim to achieve 150 minutes of moderate intensity aerobic activity or 75 minutes of vigorous intensity aerobic activity per week. [13] Leisure time physical activity has been identified as a common coping mechanism among college students in an effort to positively manage stress and anxiety. [6] While college students cite regular exercise as a positive coping strategy, only 41.4% of college aged individuals are meeting the recommended physical activity guidelines. [2,14] Not only is their physical health being compromised by not engaging in sufficient amounts of activity, but their mental health is as well. [15,16]

Exercise is Medicine® (EIM) is a global health initiative launched by the American Medical Association and the American College of Sports Medicine in 2007. The initiative's mission is to have health care providers assess patients' physical activity (PA) levels at every clinic visit, leading to PA becoming a vital sign of health. A branch of Exercise is Medicine®, known as Exercise is Medicine® On Campus (EIM-OC), brought the same vision of using PA as a vital sign to the college campus setting. To promote PA, EIM-OC strives to provide activities and resources to encourage faculty, staff, and students to incorporate more movement into their day. Through the partnership of Student Health, Student Counseling, and Wellness Services, EIM-OC is able to assess if the PA guidelines are being met and facilitate positive ways to be more active. EIM-OC allowed for the establishment of peer-led consultations to target college students' health behaviors.

The Peer-led consultations served the purpose of providing the participants with a peer advisor, the tangible resources and knowledge to use S.M.A.R.T (specific, measurable, action based, realistic, time based) goals, identify facilitators, and troubleshoot barriers. The participants would be able to use these resources to improve their overall health behaviors, especially perceived stress, sleep quality, and physical activity. These consultations provided the education, social support, and accountability that the participants may have lacked in their personal lives as they attempted to make these health behavior changes.

The purpose of this research study was to evaluate the effects of a student led health behavior change consultation program on students' health behaviors. We hypothesized that students' perceived stress, sleep quality and physical activity levels would improve, and participants would gain the knowledge needed to achieve those health behavior changes.

2. Methods and Procedures

2.1. Procedures

This research study was approved by the university's committee for the protection of human subjects (IRB#55). Peer advisors were trained prior to the first meeting by a Kinesiology faculty member who is a health behavior and sport psychology professor and is also a certified Physical Activity and Public Health Specialist (PAPHS). The advisors were informed about their roles, responsibilities, and risk management procedures. A one-time 60-minute orientation was conducted to train and inform the peer advisors with information on S.M.A.R.T. goals, identifying facilitators and barriers, and using the I.D.E.A. (identify, develop, evaluate, analyze) approach to troubleshoot barriers; all tools that they then provided to

the participants during the consultations. Two follow-up training meetings were hosted for peer advisors throughout the study to reinforce the orientation material and address any concerns that peer advisors had about their consultations. Advisors were also required to have taken the 3-credit "Health Behavior Promotion" academic course to be eligible to serve as an advisor and participate in the study. Two EIM-OC student leaders who also served as peer advisors received extensive training to be of additional assistance to peer advisors. The extensive training entailed supplementary meetings with the Kinesiology faculty member to ensure mastery of S.M.A.R.T goals, identifying facilitators and barriers, the I.D.E.A approach, and logistics. Peer advisors were randomly assigned to student participants.

2.2. Participants

This research study was conducted through recruiting student participants (n=22) from a voluntary sample. Out of the 22 participants, 15 (68%) completed the pre- and post- battery of questionnaires. Peer advisors (n=11) were Kinesiology students who completed an upper division health behavior promotion course and participated in a peer advisor orientation and training session. The participants were CSUMB Kinesiology students who wanted to partake in the program to make a desired health change. Informed consent was obtained for all study participants.

2.3. Questionnaires

A one-time pre demographics questionnaire was utilized to record the different identifications of participants' age, gender, ethnicity, total household income, and year in school.

Pittsburgh Sleep Quality Index (PSQI) was used to measure the quality and patterns of sleep. [17] It differentiates "poor" from "good" sleep by measuring seven domains: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction over the last month. Scoring of the answers is based on a 0 to 3 scale, whereby 3 reflects the negative extreme on the Likert Scale. A global sum of "5" or greater indicates a "poor" sleeper. The PSQI has internal consistency and a reliability coefficient (Cronbach's alpha) of 0.83 for its seven components. Numerous studies using the PSQI in a variety of older adult populations internationally have supported high validity and reliability.

Perceived Stress Scale (PSS) is the most widely used psychological instrument for measuring the perception of stress. [9] It is used to measure the degree of which situations in a participant's life are perceived as stressful. The questions in the questionnaire have participants reflect upon their feelings and thoughts during the past month. Participants were asked to indicate by circling how often they felt or thought a certain way, 0 being "Never", and 4 being "Very Often". PSS shows correlations between perceived stress and stress measures, Self-Reported Health and Health Services Measures, Health Behavior Measures, Smoking Status, and Help Seeking Behavior. [9] PSS scores are obtained by reversing responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 =1 & 4 = 0) to the four positively stated items and then summing across all scale items.

The Godin-Leisure Time Exercise Questionnaire (GLTEQ) was used to determine how much time students were participating in various exercises for more than 15 minutes during their free time. [18] Questions had participants reflect upon a seven-day period where different frequencies such as "Strenuous Exercise" (Heart Beats Rapidly, "Moderate Exercise" (Not Exhausting), and "Mild/Light Exercise" (Minimal Effort) were assessed. Activity was scored by multiplying "Strenuous Exercise" by 9, "Moderate Exercise" by 5, "Mild/Light Exercise" by 3, and then summing across all scales to obtain a grand total score reported in "units". Scores were then scaled: Less than 14 units was interpreted as "Insufficiently Active/Sedentary", 14-23 units was interpreted as "Moderately Active", and 24 units or more was interpreted as "Active". The National Academy of Sport Science (NASM) Physical Activity Readiness Questionnaire (PAR-Q), and General & Medical Questionnaire was used to assess if participants needed to consult their physician or receive additional medical clearance before attempting to participate in the study.

2.4. Design

Participants were required to commit to three 30-minute face-to-face consultations throughout the semester which were held in a public space on campus. The first consultation consisted of advisors introducing themselves, explaining EIM-OC and discussing the purpose of the consultations. The initial meeting also required the participants to fill out the intake form composed of different questions from surveys mentioned in the *Questionnaire* section above. The participants were asked to identify a self-selected health behavior they wanted to target during the consultations. The advisors then informed the participants of EIM-OC and campus resources that could help them make their health behavior change possible. The second consultation utilized the resources and information discussed in the peer advisor trainings to help target the participant's self-selected health behavior goal. The final consultation was used to assess goal progress and discuss barriers that were identified by the participants. The participants were asked to take the intake form to compare to the beginning of the semester. The advisors had the option to continue to work on the health behavior change post-final consultation, after informing the faculty lead.

The study was a pre- and post-design and tracked student participants health behavior progression through an electronic survey composed of the questionnaires mentioned above. Data analyses were performed once the health consultations and post questionnaire were completed. If a participant dropped out prior to the post survey, their data was not included in the analysis.

2.5. Statistical Analysis

Dependent t-tests and paired samples t-tests were performed to determine the mean differences between the pre- and post- scores for the following variables:

perceived stress, sleep quality, and physical activity participation. All statistical analysis was done on SPSS version 25.

3. Results

Participant's average age was 20.87 ± 3.34 years, with 60% of participants being junior status. Student participants were identified as 61.9% female, 38.1% male. Of those participants, 47.6% were Hispanic, 38.1% White, 9.5% Asian/Pacific Islander, and 4.8% identified as "other". In relation to school standing, 57.1% of participants were junior status, 28.6% were sophomores, 9.5% were seniors, and 4.8% were 1st year students. The decrease of PS (t=2.659, df=14, p=.019, M=11.53, SD=6.424), and the increase of SQ (t=.3166, df=14, p=.007, M=5.07, SD=2.963) were both found to be statistically significant. See Figure 1 and Figure 2. There were no statistically significant differences between the pre- and post- scores of and PA, although an increase was observed (t= -.317, df=14, p=.756). See Figure 3.

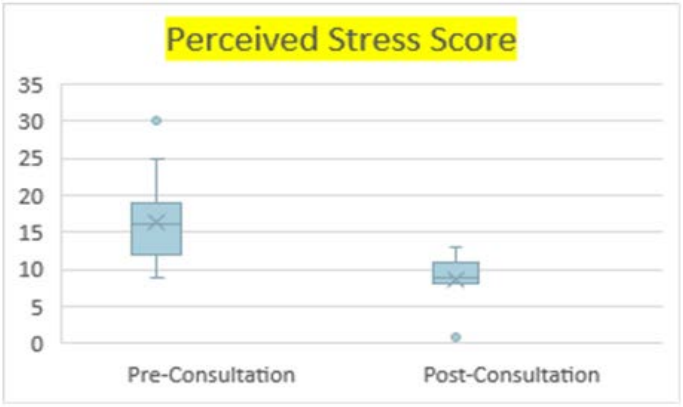

Figure 1. Paired Samples T-test for the Difference Between Pre- vs. Post Survey Answers for Perceived Stress. Whiskers indicate the minimum and maximum perceived stress scores. The mid-line represents the median, and the dots represent the outlying points. The beginning of each box indicates the lower quartile scores, whereas the end of each box represents the upper quartile points.

Figure 2. Paired Samples T-test for the Difference Between Pre- vs. Post Survey Answers for Sleep Quality. Whiskers indicate the minimum and maximum perceived stress scores. The mid-line represents the median, and the dots represent the outlying points. The beginning of each box indicates the lower quartile scores, whereas the end of each box represents the upper quartile points

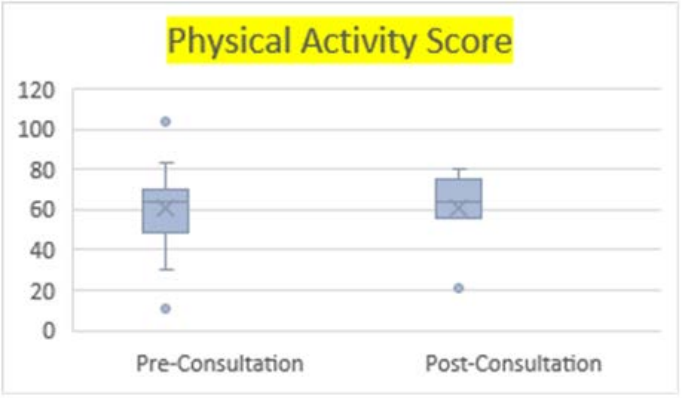

Figure 3. Paired Samples T-test for the Difference Between Pre- vs. Post Survey Answers for Physical Activity. Whiskers indicate the minimum and maximum perceived stress scores. The mid-line represents the median, and the dots represent the outlying points. The beginning of each box indicates the lower quartile scores, whereas the end of each box represents the upper quartile points

4. Discussion

The purpose of this study was to determine the impact a peer-led health consultation program had on college students' perceived stress, sleep quality and physical activity. Results demonstrated statistically significant improvements in perceived stress levels and sleep quality in the participants after the first semester of consultations. A significant change in perceived stress could be an outcome of the participants finding positive coping strategies and identifying possible sources of stress as a result of the peer-led consultations. Positive coping strategies for high levels of perceived stress include better sleep habits and an increase in physical activity levels. Although there was no statistical significance in physical activity levels, observations of an increase in total physical activity scores were made. A possible reason for an insignificant activity outcome might be that the participants were all kinesiology students and most scored highly in the physical activity scale at the beginning of the consultations. The results suggest that a student led consultation program on campus can lead to improvements in overall health behaviors in the university campus setting. This study's findings are consistent with results of other literature which examined the effects of a social support system on student health behaviors. Other findings similarly conclude that students who utilize a social support network, such as the counseling or health center, had significant improvements in meeting physical activity guidelines, lower stress levels, and overall college experience. [7,8] This study was one of few which focused on the effect of a student led consultation program for college aged individuals' overall health behaviors.

4.1. Limitations

As an inaugural pilot program, the study had limited resources that could only be offered to students in one department (Kinesiology) and thus was not made available to the entire campus. Given their major, kinesiology students may have previously been exposed to some of the program's knowledge and resources and could also be a preexisting determinant of why our participants were already physically active before participating in the consultation program. Limited resources contributed to a small sample size. Thus, the results may not be generalizable to the general college population due to the homogeneous and small sample size.

This study was intended to extend into the Spring 2020 semester and be offered to the entire student population. However, CSUMB was affected by COVID-19 and campus operations were moved online. Non-essential programs, like EIM-OC, were postponed indefinitely and thus the program could not be offered during the Spring 2020 semester.

4.2. Future Directions

This study provides evidence on how a peer-based health education program can support and improve college students' health behaviors. Previous literature does suggest that there is an association between health behaviors, like stress levels, and academic performance which was measured by GPA. [5,8] Future research should examine the relationships between a peer-based health education program, student health behaviors and academic performance. Additionally, replication of this research design can be applied at a larger scale in an effort to generalize to a larger college student population. Lastly, longitudinal research can investigate if a peer-based health education program is effective in college students' adherence to and maintenance of healthy behaviors throughout their lifespan.

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Statement of Competing Interests

The authors have no competing interests.

Abbreviation

EIM: Exercise is Medicine®, EIM-OC: Exercise is Medicine on Campus, CSUMB: California State University-Monterey Bay, PSS: Perceived Stress Scale, PSQI: Pittsburgh Sleep Quality Index, GLTEQ: Godin-Leisure Time Exercise Questionnaire, PS: Perceived stress, SQ: Sleep quality, PA: physical activity, S.M.A.R.T: specific, measurable, action based, realistic, time based, PAPHS: Physical Activity and Public Health Specialist, I.D.E.A.: identify, develop, evaluate, analyze

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