

A Required College Wellness Course Changes Beliefs, Attitudes, and Behaviors Related to Physical Activity

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Abstract: We examined effects of a required college health and wellness course on students' physical activity (PA) attitudes and behaviors. A survey based on models of behavior change was emailed (September 2016 – May 2017) to all students at a liberal arts college. Of 408 students who responded, 217 had completed the course and 191 had not. Students who had taken the course reported more confidence in their ability to improve their physical fitness; found more encouragement from cues to action; and met recommended guidelines for weekly PA more than students who had not taken the course. Compared to males, females had less confidence in their ability to increase PA and improve fitness and overall health. Females perceived barriers to PA as more discouraging and cues to action as less encouraging. Data showed a required college health and wellness course altered students' PA attitudes and behaviors.

Key Words: Health belief model; precaution adoption process model; transtheoretical model; health education; college

1. Introduction

Current data shows the prevalence of obesity, as defined by body mass index (BMI), between 2011 and 2014 was 36.5 % among U.S. adults. During that same time period, the prevalence of obesity among U.S. pre-school children (2-5 years) was 8.9 %, school-aged children (6-11 years) was 17.5 %, and among adolescents (12-19 years) was 20.5 % [1-2]. Further, data collected from the 2016 Behavioral Risk Factor Surveillance System (BRFSS) showed that southern states had the highest prevalence of adult obesity (32.0 %), followed by the midwest (31.4 %), the northeast (26.9 %), and finally the west (26.0 %) [3]. These numbers are cause for concern considering that obesity-related conditions include heart disease, stroke, type 2 diabetes and certain

types of cancer, which are the leading causes of death in the United States [4]. Therefore, obesity prevention and interventions are a priority for national health organizations and communities [5-6]. While obesity has a complex etiology, lifestyle and behavior choices such as dietary intake, physical activity level, and sedentary behavior are common causes [7-8]. For this reason, obesity treatment and prevention are the focus of health education and healthy behavior change [4-5]. The purpose of this study was to assess the effects of a mandatory wellness course at a southern, liberal arts college on students' knowledge of healthy behaviors and on their confidence in making healthy behavioral changes.

Every student at a residential liberal arts

college is required to take a one-credit hour wellness course. The purpose of this wellness course is to help students understand and value the basic principles and benefits of wellness, specifically as it relates to physical activity. This course is a comprehensive experience relating to wellness topics including nutrition, healthy behaviors such as federal physical activity recommendations, and fitness self-testing. Course content calls attention to students' own fitness profiles and the negative health outcomes that could be prevented or managed through physical activity. Methods of instruction vary based on the professor, but each course includes in-class physical activity, interactive lectures, out of class reading, and use of internet. The required textbook for the course is American College of Sports Medicine (ACSM)'s *Complete Guide to Fitness & Wellness*, edited by Barbara Bushman. As part of the course, all students are required to create an activity schedule designed to meet their personal fitness goals and the ACSM's recommendations for physical activity (150 minutes/week of moderate intensity or 60 minutes/week of vigorous intensity physical activity) [3]. At the end of the course, students are expected to have knowledge about healthy habits for both physical activity and nutrition. Students are also expected to demonstrate an ability to generate and analyze their own basic fitness profile and the profiles of others, deduce appropriate lifestyle interventions, and implement healthy programs and activities into their own schedule and the schedule of others. The goal is for students to feel equipped to implement a lifetime of physical fitness and healthy behaviors, but does this course achieve these learning outcomes?

The purpose of this study was to determine if the one-credit hour wellness course, delivered over a seven-week period, adequately informs students about the benefits of physical activity and encourages them to improve their overall fitness and health. To assess the benefits of this mandatory wellness course, we compiled data about students' physical activity attitudes, beliefs, and practices through an online survey. This study is important for several reasons. First, participation in physical activity decreases sharply from adolescence to young

adulthood and this decrease contributes to adult obesity [9-12]. Second, knowing why college students do or do not engage in physical activity is an important step in increasing physical activity in this age group and could also potentially impact the obesity epidemic. Finally, this study provides evidence that college wellness courses are beneficial to students and can possibly have an impact on the nation's health.

2. Methods

This study was approved by the Berry College Institutional Review Board and all participants provided informed consent through an e-mailed survey. During the 2016-17 academic year (September-May), a voluntary online survey was emailed to all students at a southeastern liberal arts college. Using a 10 cm Likert scale that ranged from Low to High, questions aimed to quantify students' beliefs and behaviors regarding physical activity based on three models of behavior change: the Health Belief Model (HBM); the Precaution Adoption Process Model (PAPM); and the Transtheoretical Model (TTM) (Table 1). A description of the individual survey questions follows.

Survey questions 1-11 followed the HBM and as such, were written to determine the values and expectancy beliefs that guide students' physical activity behavior to reduce the threat of heart disease. The HBM suggests that people's beliefs about perceived susceptibility of a health condition (question 1), perceived severity of health condition (questions 2, 3), perceived benefits to action (questions 4, 5), perceived barriers to action (question 8), and self-efficacy (questions 9-11) explain engagement in health-promoting behavior. Cues to action (questions 7, 8) are also necessary for behavior readiness and action [13-15].

Survey questions 12-14 were based on the PAPM framework, which posits that people's engagement in healthy behaviors is based on risk perception and recognizes that people may be unaware of health risks or that they may be aware but decide not to act [16-17].

Table 1 - List of survey questions with models of behavior change identified.

Questions – Health Belief Model		Response
1	How much do you feel at risk for developing signs/symptoms of heart disease within the next five years?	0 (low) – 10 (high)
2	How severe do you feel the effects of heart disease are?	0 (low) – 10 (high)
3	How severe do you feel the effects of low physical fitness are?	0 (low) – 10 (high)
4	How would you rate the benefits of physical activity on your overall health?	0 (low) – 10 (high)
5	How would you rate the benefits of physical activity on your risk of heart disease?	0 (low) – 10 (high)
6	What are the barriers that prevent/discourage you from physical activity? With all of these things together, how would you rate the level of their overall prevention/discouragement?	Free response, 0 (low) – 10 (high)
7	What factors currently allow/encourage you to be physically active? Rate their overall level of encouragement.	Free response, 0 (low) – 10 (high)
8	What factors, if they were present or increased, would allow/encourage you to be more physically active than you currently are? How would you rate the strength of encouragement from these factors?	Free response, 0 (low) – 10 (high)
9	How confident are you in your ability to increase your weekly physical activity?	0 (low) – 10 (high)
10	How confident are you in your ability to improve your physical fitness?	0 (low) – 10 (high)
11	How confident are you in your ability to improve your overall health?	0 (low) – 10 (high)
Questions – Precaution Adoption Process Model		Response
12	Have you ever heard that 150 min/week of moderate or 60 min/week of vigorous physical activity reduces your risk of heart disease?	Yes/No
13	Do you currently do 150 min/week of moderate physical activity (breathing rate increased to where you can talk, but can't comfortably sing) or 60 min/week of vigorous physical activity (can't comfortably speak a complete sentence without stopping to breathe)?	Yes/No
Follow up question (if "No" response to question 13)		
14	Which of the following best describes your thoughts about completing 150 min/week of moderate physical activity or 60 min/week of vigorous physical activity? <ul style="list-style-type: none"> • I've never thought about achieving those levels of physical activity • I'm undecided about achieving those levels of physical activity • I've decided that I don't want to do that much physical activity each week • I've decided that I do want to do that much physical activity each week 	
Question – Transtheoretical Model		
15	Which statement best describes your current thoughts/actions related to physical activity and fitness? <ul style="list-style-type: none"> • I haven't really planned on making an effort to improve my physical fitness in the near future • I hope to make some changes that will improve my physical fitness sometime during this semester • I'm planning on making some changes to improve my physical fitness during the next few weeks (e.g. investigated some fitness classes, checked out the fitness facilities, etc) and/or I'm testing out what it might be like to make some changes • I've recently (less than 6 months) made some lifestyle changes in an effort to increase my physical activity levels and improve my physical fitness • I made some lifestyle changes several months ago to increase or maintain a high level of physical activity to improve or maintain a higher level of physical fitness 	

In this case, the healthy behavior is physical moderate-intensity or 60 minutes of vigorous-activity and the health risk is heart disease. intensity physical activity per week [3]. Answering Specifically, questions 12 and 13 asked students if no to question 12 put students in PAPM stage 1 they were aware of and met the Federal Physical (unaware) while answering yes to question 13 put Activity Guidelines for Americans of 150 minutes of students in stage 6 (action). Question 14 asked:

which of the following best describes your thoughts about completing 150 min/week of moderate physical activity or 60 min/week of vigorous physical activity? Selection choices were: I've never thought about achieving those levels of physical activity (stage 2); I'm undecided about achieving those levels of physical activity (stage 3); I've decided I don't want to do that much physical activity each week (stage 4); and I've decided I do want to do that much physical activity each week (stage 5).

Finally, question 15 aimed to identify the student's stage of behavior change based on the TTM, which postulates that people are in different stages of readiness to make health behavior changes and that people should receive interventions appropriate for their stage in the behavior change process [18-19]. Question 15 asked students to check the statement which best described their current thoughts/actions related to physical activity and fitness with the choices being: I haven't really planned on making an effort to improve my physical fitness in the near future (precontemplation stage); I hope to make some changes that will improve my physical fitness sometime during this semester (contemplation stage); I'm planning on making some changes to improve my physical fitness during the next few weeks (e.g. investigated some fitness classes, checked out the fitness facilities, etc.) and/or I'm testing out what it might be like to make some changes (preparation stage); I've recently (less than 6 months) made some lifestyle changes in an effort to increase my physical activity levels and improve my physical fitness (recent action stage); I made some lifestyle changes several months ago to increase or maintain a high level of physical activity to improve or maintain a higher level of physical fitness (action stage); and being physically active most days of the week is just part of my life, and it would be weird if I stopped being physically active for some reason (maintenance stage).

Data was analyzed using the R Statistical Software Package (R Core Development Team). Independent variables included wellness course completion (or current enrollment), gender, and student's school year (Freshman, Sophomore, Junior, Senior). Students' responses on questions 1-11 were

measured and reported to the nearest cm and then analyzed using ANOVAs. Questions 12- 15 were analyzed with chi squared tests. All data is reported as average \pm standard error of the means (SEM). For all statistical tests, alpha was set at 0.05.

3. Results

Subjects were full-time, traditional college students. There were 408 students who completed the online survey (19.9% of the student body). Of these, 93 were freshmen, 110 were sophomores, 111 were juniors, and 94 were seniors. There was no significant difference in the response rate between class year ($p = 0.36$). The respondents consisted of 125 males and 283 females ($p < 0.001$), a ratio which is statistically different from the overall campus community (69% female in the study vs. 61% on campus overall, $p < 0.001$). Of the students who responded, 217 had taken or were currently enrolled in the wellness course and 191 had not yet taken the course ($p = 0.20$).

Results of the online survey can be seen in Table 2. Data showed that students who had previously taken or were currently enrolled in the wellness course felt less at risk for developing signs/symptoms of heart disease within the next five years ($p = 0.02$). Both groups scored the severity of heart disease, the severity of low physical fitness, and the benefits or physical activity similarly (questions 2-5).

When asked to list the barriers that prevent/discourage physical activity, the most common responses were: "time" (mentioned 227 times); "busy" (mentioned 37 times); sickness or an injury (mentioned 37 times); and "motivation" (mentioned 36 times). Other barriers listed were "laziness", "being overweight/out of shape", being "intimidated", and being "tired." While the barriers listed were similar for all students, those who had taken or were currently enrolled in the course felt less overall discouragement from these factors ($p = 0.03$).

When asked to list factors that encouraged physical activity, the most common responses were: having access to a campus gym, activity classes,

Table 2 - Results of survey questions 1-11. * indicates significant difference from students that have taken or are currently enrolled in the wellness course. P < 0.05

Survey Questions		Taken or currently enrolled (n = 217)	Not taken (n = 191)	P-value
Question 1	How much do you feel at risk for developing signs/symptoms of heart disease within the next 5 years?	1.24 ± 0.11	1.54 ± 0.13 *	0.02
Question 2	How severe do you feel the effects of heart disease are?	8.12 ± 0.15	7.85 ± 0.16	0.36
Question 3	How severe do you feel the effects of low physical fitness are?	7.40 ± 0.14	6.91 ± 0.14	0.16
Question 4	How would you rate the benefits of physical activity on your overall health?	8.65 ± 0.10	8.45 ± 0.10	0.42
Question 5	How would you rate the benefits of physical activity on your risk of heart disease?	7.99 ± 0.13	7.73 ± 0.13	0.49
Question 6	What are the barriers that prevent/discourage you from physical activity? With all of these things together, how would you rate the level of their overall prevention/discouragement?	5.42 ± 0.18	5.81 ± 0.18 *	0.03
Question 7	What factors currently allow/encourage you to be physically active? Rate their overall level of encouragement.	7.67 ± 0.14	7.13 ± 0.15 *	0.01
Question 8	What factors, if they were present or increased, would allow/encourage you to be more physically active than you currently are? How would you rate the strength of encouragement from these factors?	6.94 ± 0.18	6.85 ± 0.16	0.88
Question 9	How confident are you in your ability to increase your weekly physical activity?	6.76 ± 0.15	6.03 ± 0.17 *	0.01
Question 10	How confident are you in your ability to improve your physical fitness?	7.45 ± 0.14	6.97 ± 0.16 *	0.03
Question 11	How confident are you in your ability to improve your overall health?	7.65 ± 0.13	7.37 ± 0.14	0.23

bike/hike trails, and good weather were, the most common responses were: “time” (mentioned 86 times); being an athlete or a member of a sports team (mentioned 84 times); “health” (mentioned 56 times); “friends” (mentioned 47 times); “time” (24 times); “stress” (16 times); “lose weight” (14 times); “motivation” (13 times); “body image/self-esteem” (12 times); “family” (mentioned 9 times); and “pets” (mentioned 3 times). Students who had previously taken or were currently enrolled in the wellness course rated these factors as providing more encouragement than students who had never taken the course (p = 0.01).

When asked to list the factors, if present or increased, that would allow/encourage the student to be more physically active than they currently

were, the most common responses were: “time” (mentioned 103 times); having a friend/buddy/workout partner/personal trainer (mentioned 57 times); and having a “better” (listed 24 times) gym, equipment, shape, cardiovascular fitness, and understanding of what to do, to name a few. Other encouraging factors listed were “goals” (6 times), “energy” (4 times), “healthier food, and “separate weight rooms for men and women”. Students who had previously taken or were currently enrolled in the wellness course as well as those who had never taken the course rated the strength of encouragement from these factors similarly (p = 0.88).

Importantly, students who had previously

taken or were currently enrolled in the wellness course felt more confident in their abilities to increase their weekly physical activity and improve their physical fitness when compared to students who had not taken the course ($p = 0.01$ and $p = 0.03$, respectively). There was no significant difference between the two groups when comparing their perceived benefits of physical activity on their overall health or confidence in their ability to improve their overall health ($p = 0.42$ and $p = 0.23$, respectively).

The answers to survey questions 12 and 13, which are based on the PAMM of behavior change, can be seen in Figure 1 and Figure 2.

More students who had taken or were currently enrolled in the wellness course were aware that 150 minutes/week of moderate or 60 minutes/week of vigorous physical activity could decrease their risk of heart disease ($p < 0.001$) and more were meeting recommended federal guidelines ($p < 0.001$) when compared to students who had not taken the course. Only students who answered 'no' to question 13 completed question 14, the answers to

which can be seen in Figure 3. Chi square testing found that the wellness course did not have a significant effect on PAMM results from question 14 (stages 2-5, $p = 0.95$) or on PAMM results overall ($p = 0.19$). The answers to survey question 15 can be seen in Figure 4. Chi square results found that the wellness course did not have a significant effect on TTM stage ($p = 0.72$).

When comparing males and females, females rated the discouragement from barriers to exercise significantly higher than males (question 6: 5.87 ± 0.15 vs. 4.99 ± 0.22 , $p < 0.001$). Females also reported lower ratings for the encouragement from encouraging factors (question 7: 7.25 ± 0.13 vs. 7.81 ± 0.17 , $p = 0.005$), lower confidence in their ability to increase their physical activity (question 9: 6.11 ± 0.14 vs. 7.07 ± 0.19 , $p < 0.001$), lower confidence in their ability to improve their physical fitness (question 10: 6.99 ± 0.13 vs. 7.73 ± 0.17 , $p < 0.001$), and lower confidence in their ability to improve their overall health (question 11: 7.39 ± 0.11 vs. 7.79 ± 0.17 , $p = 0.029$) than males.

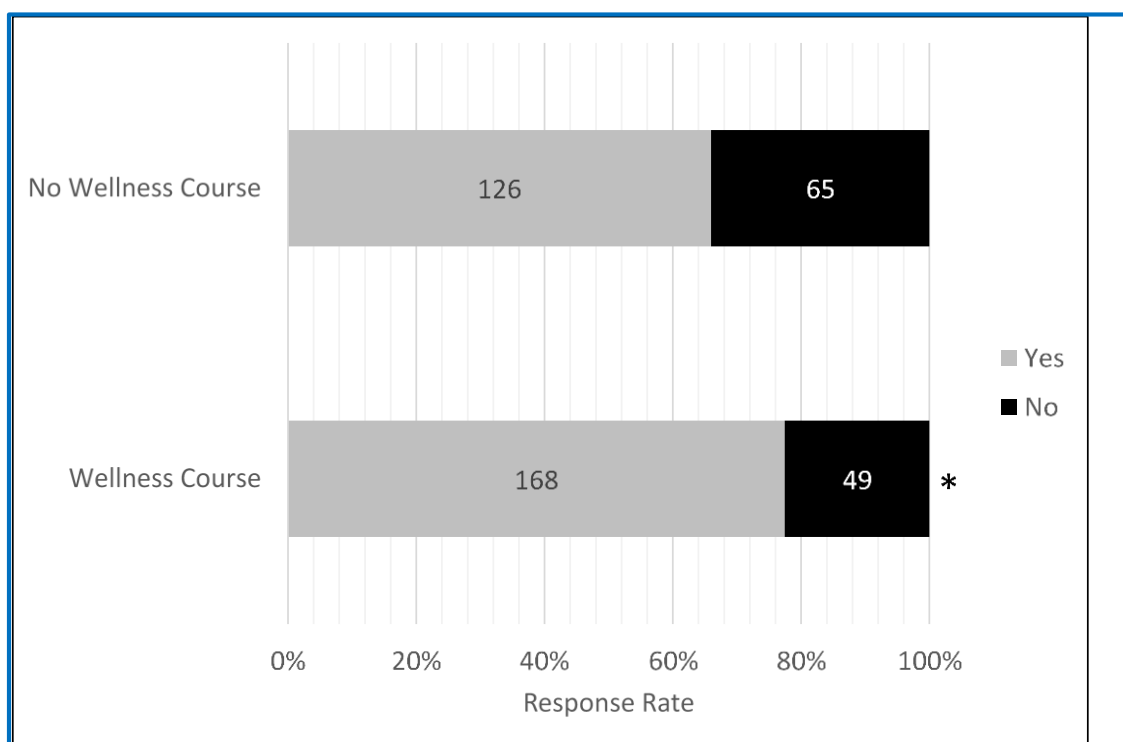


Figure 1 - Response rate to Question 12: “Have you ever heard that 150 min/week of moderate or 60 min/week of vigorous physical activity reduces your risk of heart disease?” Numbers in bars indicate student responses. * indicates significant difference from No Wellness Course. $p < 0.05$

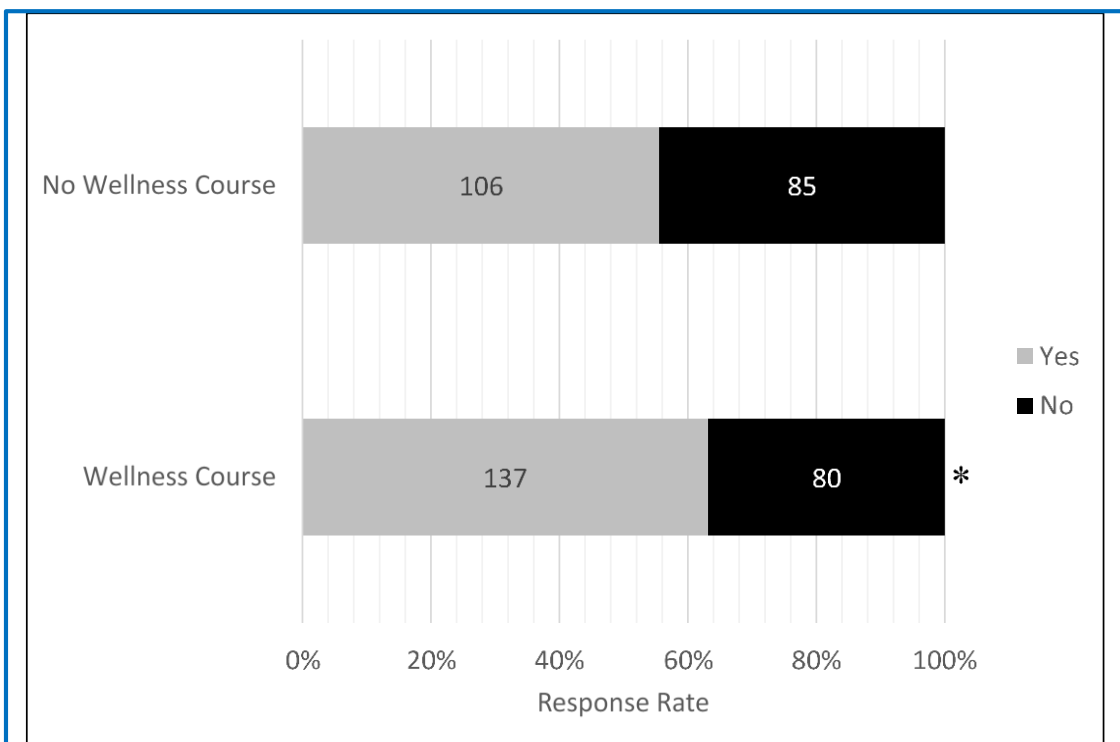


Figure 2 - Response rate to Question 13: “Do you currently do 150 min/week of moderate physical activity (breathing rate increased to where you can talk, but can’t comfortably sing) or 60 min/week of vigorous physical activity (can’t comfortably speak a complete sentence without stopping to breathe)? ” Numbers in bars indicate student responses. * indicates significant difference from No Wellness Course. $p < 0.05$

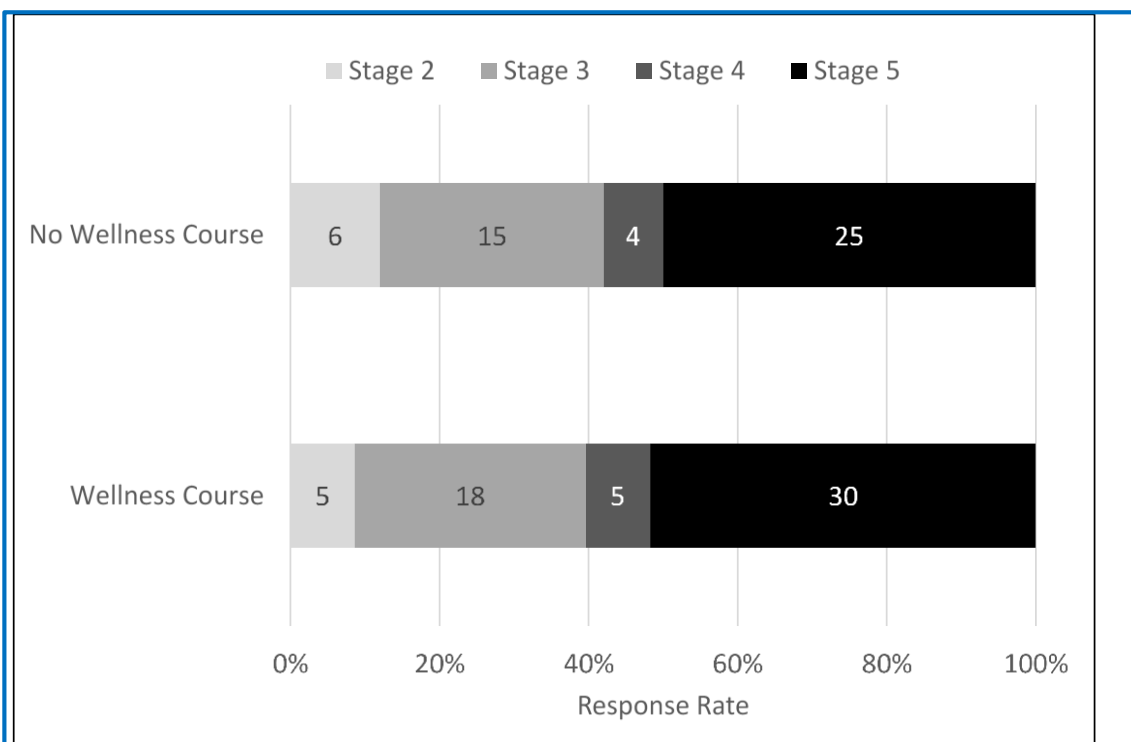
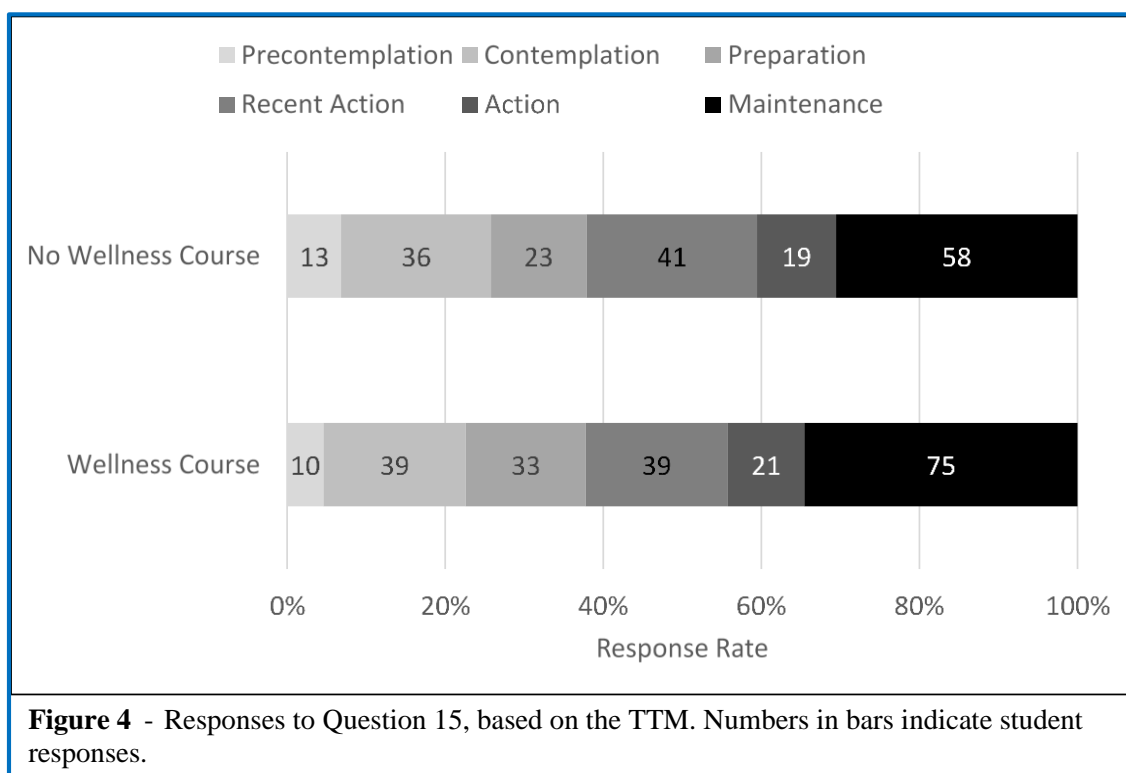


Figure 3 - Response rate to Question 14, based on the PAPM. Numbers in bars indicate student responses.



There was a significant effect of school year on the answer to question 3 regarding the severity of the effects of low physical fitness ($p = 0.03$), with seniors and juniors tending to believe the effects to be more severe than freshmen ($p = 0.052$ and $p = 0.061$, respectively). Also, sophomores rated confidence in their ability to improve fitness and their overall health higher than freshmen ($p = 0.03$ and $p = 0.01$, respectively).

Our results demonstrate the effectiveness of a required health and wellness course in college-curriculum as an intervention for healthy behavior change. Students who had taken or were enrolled in the wellness course had more confidence in their ability to improve their physical fitness and found more encouragement from motivating cues to be active. Further, more students who had taken or were enrolled in the course reported meeting the federal recommended guidelines for weekly physical activity when compared to students who had not yet taken the course. Taken together, this data suggests the wellness course increases physical activity when using both the HBM and PAM frameworks of

Behavior change.

According to the HBM, people's engagement in healthy behaviors is based on their beliefs about health problems, perceived benefits and barriers to action, self-efficacy, and the presence of cues to action [14-15]. Our data showed a required seven-week wellness course increased students' self-efficacy in regards to physical activity and fitness and students who had taken or were currently enrolled in the course found more encouragement from cues to be physically active than students who had not taken the course. Review of health behavior change programs shows self-efficacy and motivation are strong predictors of health behavior change [20-21]. Therefore, our findings suggest that the wellness course is beneficial to physical activity behavior change. All students, regardless of having taken the wellness course, scored the severity of low physical activity and the perceived benefits of physical activity on overall health and risk of heart disease similarly. A possible explanation for this is exposure to community-wide campaigns that promote physical activity, such as the Obama Administration's Let's Move! Campaign. While community-wide campaigns have not been consistently effective at promoting the recommended levels of physical activity, they have

been shown to increase awareness and knowledge of physical activity recommendations [22-25]. As such, external exposure to these campaigns could explain students' physical activity beliefs. Interestingly, students who had taken the wellness course felt they were less susceptible to heart disease than those who had not taken the course. However, within the HBM, belief by itself has been shown to be a poor predictor of health behavior change [20].

The PAPM, another model of behavioral change, differs from the HBM in that it emphasizes perceived health risks and includes a stage that allows people to be unaware of the risk or precaution (stage 1) [16]. Our survey results indicated fewer students who had taken the course were unaware of physical activity recommendations than students who had not taken the course. Importantly, more students who had taken or were currently enrolled in the wellness course reported meeting the federal guidelines for weekly activity level, putting them in the action stage of the PAPM, than students who had not yet taken the course. Our findings are consistent with other studies that have shown required college wellness courses increase students' time spent in physical activity and are effective interventions to promote physical activity behavior change [26-28].

When analyzing survey results by gender, females had less self-confidence in their abilities to increase their physical activity, improve their physical fitness, and improve their overall health. As mentioned previously, self-efficacy in conjunction with motivation are strong predictors for health behavior change, therefore, our findings could help explain why data from the 2007-2016 National Health and Nutrition Examination Survey showed males in all age categories (12-17 years, 18-24 years, and 25-29 years) reported engaging in moderate or vigorous physical activity more often and for more daily minutes than females did [9, 20-21]. While some reasons that girls, aged 13-15 years, gave for their decreased participation in sports and physical activity were common among both genders (for example, lack of time and competence), other reasons were more gender-specific, such as "feeling they were crossing specific gender boundaries when playing sports"[29, 30]. Our survey results were

similar in that students listed both gender-neutral and gender-specific barriers to physical activity. These, along with our results showing females rated these barriers as more discouraging and their cues to action as less encouraging than males provide insight into why female youth and young adults are less active than their male peers [9, 29, 10, 12].

Finally, we identified class year differences: freshmen had less confidence in their ability to improve their physical fitness and overall health than sophomores, but they also scored the effects of low physical activity as less severe than juniors and seniors. These findings could help explain why adolescents (aged 15-18 years) see the largest drop in physical activity when compared to other age groups [10]. A study following students through their last year of high school to their second year in college/university found that sedentary behaviors due to internet use and studying increased while sport participation and physical activity decreased [11]. These changes in behavior can and do lead to increases in body fat percentage and weight gains during the first semesters in college [11, 31]. However, young adults attending college report engaging in more moderate-to-vigorous physical activity than do their age-matched peers who are not attending college. Further, students living on campus were more likely to engage in physical activity than their peers attending college and living at home or not attending college [12]. Finally, a previous study found that for college freshmen only, as proximity to exercise facilities and equipment increased, the duration and intensity of physical activity also increased [32]. These findings, along with our survey data, suggest a mandatory college wellness course may be most effective when aimed at freshmen and sophomores. In fact, a previous study showed that a required, 15-week wellness course for freshmen increased time spent engaging in moderate-intensity physical activity [26].

This study has several limitations. First, the data collected is only a snapshot of one academic year. Therefore, it would be beneficial to repeat the survey every four years, after making changes to the wellness course as deemed necessary by the survey, to gauge how improvements make the course more

effective. It would also be helpful to have the subjects repeat the survey once they have graduated to document the long-term effect of the wellness course. [4] Another limitation of this study is that reported weekly physical activity cannot be verified.

4. Conclusions

While our results demonstrate the effectiveness of a required wellness course as a physical activity behavior change intervention, they also suggest ways in which the course could be more influential. First, our data suggest the course could be more effective if taken within the first two years of college, since large drops in physical activity occur during these years. For both males and females, prevalence of moderate or vigorous physical activity decreases significantly after adolescence and continues throughout adulthood. This decrease in physical activity contributes to obesity; young adults (18-24 years) had the lowest self-reported obesity (17.3%) compared to adults (45-54 years) with the highest prevalence (35.1%). Therefore, targeting the course to younger college students could have a larger effect on physical activity behavior, and, subsequently, obesity. Second, our data suggests gender-specific programming within the course may be beneficial for females. Introduction to gym and recreational facilities as well as more class time spent in physical activity could promote self-confidence and help erase gender boundaries that exist within certain physical activities and sports. Future research could test the application of these suggestions as well as determine the long-term impact this course has on students' physical activity habits. [5]

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