Original Research

The Effects of a Lifetime Physical Fitness (LPF) Course on College Students' Health Behaviors

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ABSTRACT

International Journal of Exercise Science 9(2): 136-148, 2016. The purpose of this study was to examine motivational constructs and the effect of physical activity engagement on health behaviors in college students who were required to take a 15-week lifetime physical fitness (LPF) course for graduation. A total of fifty-eight first and second year college students aged between 17 and 23 years (M=18.72; SD=1.09). Paper and pencil questionnaires were anonymously administered at the beginning and at the end of the 15-week long spring 2012 semester. Analysis of the differences between the beginning and the end of the semester was completed. Physical activity behaviors and Behavioral Regulations variables did not change across time ($p > .05$). Appearance (d = -0.34, p = .013) and fitness (d = -0.37, p = .006) reasons for participating in physical activity and all Theory of Planned Behavior variables decreased over time (d = -0.32 to -0.41, $p < .05$). Changes in attitude toward physical activity negatively predicted changes in alcohol consumption (r = -.261 to -.357). This study sustains the already existing literature that supports the positive impact of LPF courses offered to college students.

KEY WORDS: College students, physical activity, nutrition, drinking, smoking habits

INTRODUCTION

College students are prone to weight gain, obesity, and to the development of unhealthy behaviors (e.g., physical inactivity, poor diet, and alcohol misuse) (33, 30, 47). For instance, the American College Health Association (ACHA) reported that one in every three students (34.3%) is either overweight or obese in the United States (5). Previously, researchers found that health risks developed during adolescence often continue into adulthood (22, 35). Therefore, this period of life is potentially dangerous in terms of obesity development (22), making early interventions critical in preventing chronic diseases (12,18).

Among the emerging adult population between 18 and 24 years old, a large portion are enrolled in postsecondary institutions (46) and the numbers are continuing to grow (38). As young adults enter this period (6, 34), the amount of health-related challenges increases (23). For example, although the majority of college students engage in 30 minutes of moderate (74.8%)

or vigorous physical activity (PA) (59.4%)(4) one or more days a week, only 50.6% of this population meets the recommended amount of moderate to vigorous PA (MVPA). These findings were complemented by other studies showing that one third of the college student population is engaged in sedentary behavior even though the majority meets the guidelines for PA (41).

The student population also seems to engage in other unhealthy habits (4). For instance, research shows that only 36.9% of college students have 3 or more servings of fruit or vegetables (4). A wide majority of these students (82.2%) reported consuming alcohol (15); among them, about a fifth (20.5%) were frequent drinkers (an average of three or more occasions per week), and over a third (43.9%) experienced episodes of binge drinking (≥5 men; ≥4 women - in one setting) (15). Furthermore tobacco use seems to be high in college students (55). In fact, about one third of college students (31.6%) reported smoking cigarettes (4), with 14.5% of them smoking 3 or more times per week and 26.1% had smoked most days of the previous 30 days (15). This extensive consumption of alcohol and tobacco products in college students has been linked to multiple negative consequences, ranging from health and psychosocial problems to engagement in high-risk behaviors to possible death (15, 52).

Due to the increasing number of young adults enrolled in higher education institutions along with their alarming increasing involvement in unhealthy behaviors, the ACHA started sponsoring the "Healthy Campus 2010: Making It Happen" (3) campaign, which encourages institutions to make health objectives a priority (3). Moreover, several studies provide evidences of potential psychological (53) and physical benefits (54) of PA on students while others point out the need for offering courses focused on health-related fitness knowledge, skills and values (46, 13, 48) to help students adopt healthy lifestyles (29). Despite these efforts, the effect of PA on and its connection with other (un)healthy habits, such as tobacco and alcohol consumptions and nutrition, is still unclear (17, 28, 49, 50).

In response to this campaign and studies, multiple institutions developed lifetime physical fitness (LFP) courses focused to increase students' awareness in terms of health (11, 26, 29). Although more research is needed to investigate how mandatory LPF courses can enhance students' health behaviors, there is evidence of their potential positive influence on students' knowledge and awareness of healthy behaviors (1, 10, 11, 16, 39).

Following a strong call for a more theoretically sound approach to research (8), this study aims to understand the possible relationship between the students' participation in a mandatory 15-week LPF course and their engagement in the health behaviors, from the integrated perspective of the Theory of Planned Behavior (TPB) and the Self Determination Theory (SDT).

According to the TPB (2) an individual's intention is the most proximal predictor of health-related behavior, mediating the effect of three sets of belief-based perceptions of behaviors: attitude, subjective norm, and perceived behavioral

control. The SDT (39), instead, mainly focuses on the quality of an individual's motivation. According to SDT the nature of a motivated behavior lies in the desire to satisfy the three basic psychological needs: Autonomy, Competence, and Relatedness. Facilitating these needs has been considered essential to enhance the well-being. Furthermore, the SDT conceptualizes human motivation along a continuum characterized by different forms of behavioral regulations that vary in degrees of self-determination from the more autonomous "Intrinsic Regulation" to the most controlled "External Regulation". In addition, the authors also described a state of "Amotivation", reflecting a lack of intrinsic or extrinsic motivation (21, 43). This integration was based on the links between self-determined motivation and the system of beliefs underpinning the proximal antecedents of intention (22); as well as on the idea that a controlled type of motivation to engage in health behaviors predisposes the individual to beliefs congruent with these motives (25). Therefore, it is possible to believe that self-determined motives to engage in a behavior could be considered distal predictors of attitudes and PBC (25).

Based on this review of the literature we developed two hypotheses. Hypothesis 1 predicts that after completing a 15-week LPF course, students' motivation and engagement in PA will increase compared to the baseline. Hypothesis 2 predicts a positive relationship between the level of PA and health behavior engagement (i.e., healthy nutrition) and a negative relationship between the level of PA and unhealthy behavior engagement (i.e., drinking, smoking).

METHODS

Participants

A total of fifty-eight predominantly first (64.4%) and second (17.8%) year college students, aged between 17 and 23 years of age (M=18.72; SD=1.09), completed both administrations at the beginning and the end of the semester. Students were mostly Caucasian (68.5%) and Black (16.4%) female (57.5%) students. Most students (91.7%) were enrolled in majors other than Exercise and Sport Science. The majority of participants reported height and weight levels characteristic of a normal Body Mass Index (BMI) (65.8%) with about a fourth of the sample (26%) reporting to be overweight or obese. Many participants met the recommended physical activity guidelines (VPA 63%; MPA 34.2%) and consumed the suggested nutritional guidelines (94.5%).

Protocol

In spring 2012, after receiving IRB approval, four sections of a health-related fitness course at a Mid Atlantic higher educational institution were selected based on the frequency of their meetings (three 50-min meetings per week). Paper and pencil questionnaires were anonymously administered at the beginning and end of a 15-week semester. Students who completed both pre- and post-surveys were awarded 10 extra credit points, while those students who chose not to participate had alternative options to earn extra points. The pre-survey was administered during the first week of class, and the post-survey was administered during the last week of the course. Of the 98 students enrolled in the four sections of the class, 73 students completed the pre-test survey and 70

completed the post-test survey. Although a total of 85 students completed the survey at least once, between the pre-test and the post-test, we only analyzed the 58 participants that completed both the pre- and post-test administrations.

Physical activity: Four items from the questionnaire focused on how frequently students engaged in PA. Two items asked how many days the individual engaged in at least 30 minutes of moderate or vigorous physical activity (MVPA) respectively. The last two items asked how many days the individual was involved in strength training and stretching activities respectively. These items were developed and used in previous studies (40).

Psychological need satisfaction: The Basic Psychological Needs in Exercise Scale (BPNES) (4, 57) is a self-report instrument developed specifically for the context of exercise to evaluate participants' perceived fulfillment of their psychological need in exercise. This scale consists of 12 items assessing perceived competence (4 items), autonomy (4 items), and relatedness (4 items). Responses are provided on a 5-point Likert scale ranging from "1" ("*Strongly Disagree*") to "5" ("*Strongly Agree.*") The BPNES scale has demonstrated good construct validity and internal reliability (57).

Behavioral regulation: The Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2) (35) is a 19-item inventory that assesses the behavioral regulation of exercise. Responses are provided on a 5-point Likert scale ranging from "0" ("*Not true for me*") to "4" ("*Very True for me.*") The BREQ-2 is different than the BREQ in that it includes amotivation, though it does not include "integrated regulation." The reliability and validity of the BREQ-2 have been supported (35). Researchers scored the BREQ-2 also by computing the Relative Autonomy Index (RAI) (42), a one-dimensional index of the degree of self-determination. The RAI is a single score representing the overall degree of self-determination, which is obtained by weighing each subscale and summing the weighted scores: RAI = (amotivation × (−3)) + (external regulation × (−2)) + (introjected regulation × (−1)) + (identified regulation × (+2)) + (intrinsic regulation × (+3)). Higher scores represent higher degrees of self-determined motivation of the individual.

In order to compare the present results with the most recent studies looking at the integration of the SDT and TPB (27), the authors chose to use the BREQ-2. Additionally, the use of the BREQ-2 seems to be justified by the number of recent studies using it when looking at the behavioral regulations of physical activity (20).

Motivation for Physical Activity Measure – Revised: The MPAM-R (44) is a 30-item instrument developed to assess the strength of the motives for participating in physical activity. The motives are: enjoyment (7 items), competence/challenge (7 items), physical appearance (6 items), fitness (5 items), and social (5 items). Responses are provided on a 7-point Likert scale ranging from "1" ("*Not true for me*") to "7" ("*Very True for me*").

Theory of Planned Behavior: The TPB components were measured using a multi-

item scale in relation to participation in regular physical activity. Regular exercise was defined at the start of the questionnaire as: "*Regular exercise is any physical activity performed either at moderate intensity for at least 30 minutes, 5 times per week, or at vigorous intensity for at least 20 minutes, 3 times per week. Activities that are primarily sedentary, such as bowling or playing golf with a golf cart, are NOT considered exercise*." Unless otherwise indicated, items were scored between 1 and 7, and were coded such that higher scores indicated a higher level of interest. Mean scores were computed for each variable. Intention to engage in regular physical activity was assessed by 3 items (e.g., "*I intend to be involved in any physical activity either at moderate intensity for at least 30 minutes, 5 times per week, or at vigorous intensity for at least 20 minutes, 3 times per week, over the next month.*" S*trongly agree/disagree*). *Attitude* was assessed by 3 semantic differentials (e.g., "*For me, being involved in exercise as any physical activity either at moderate intensity for at least 30 minutes, 5 times per week, or at vigorous intensity for at least 20 minutes, 3 times per week, over the next month is.*" *Useless/useful*). *Subjective norm* was assessed using 4 items (e.g., "*Most people close to me expect me to be involved in exercise as any physical activity either at moderate intensity for at least 30 minutes, 5 times per week, or at vigorous intensity for at least 20 minutes, 3 times per week, over the next month.*" *Unlikely/likely*). *Perceived behavioral control* was assessed by 3 items (e.g., "*I am in complete control over my being involved in exercise as any physical activity either at moderate intensity for at least 30 minutes, 5 times per week, or at vigorous intensity for at least 20 minutes, 3 times per week, over the next month.*" *Strongly agree/disagree*).

Health Behaviors additional questions were developed by the first author in order to inquire about the frequency with which the participants engaged in health behaviors. For nutritional habits, a 7-point Likert scale was used to ask about how many times the participants ate certain types of food during the previous week. Additionally, a series of items based on an 8-point Likert scale was developed to ask about the frequency with which participants skipped meals and ate after 10pm. A similar series of items were developed to ask about the frequency of drinking behaviors and tobacco product use.

Statistical Analysis

Analysis of the data was completed by using IBM SPSS Statistics for Macintosh, Version 22.0. Descriptive statistics were reported as means and standard deviation. The effects of the course on physical activity behaviors, motivations toward physical activity, and health behaviors were determined using paired *t*-tests. Cohen's *d* was used to calculate effect size of changes between administrations. To examine whether changes in active behaviors and motivations toward physical activity predicted a change in health behaviors, Pearson correlations were used between the differences (post values - pre values). Two-tailed significance value was set at .05.

RESULTS

The study sample included 58 individuals, mostly represented by females (N=33; 56.9%) aging between 17 and 23 years (*M*=18.72; *SD*=1.09). This sample was mostly constituted by white Caucasian (68.5%) freshmen (64.4%) students living on campus (65.7%).

Table 1. Pre and post changes.

	Pre		Post		Difference	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
Physical Activity						
VPA	3.2	1.6	2.9	1.4	-0.3	1.6
MPA	3.6	2	3.3	1.4	-0.3	2.1
SPA	2.9	2.1	3.2	1.8	0.3	2.3
STPA	2.0	1.8	2.0	1.6	-0.1	1.6
MPAM						
Enjoyment	5.1	1.6	5	1.5	-0.1	1.1
Competence	5.4	1.4	5.2	1.3	-0.2	1.2
Appearance	6.2	1.6	5.7	1.2	-0.5*	1.5
Fitness	6.2	0.9	5.9	1.0	-0.3**	0.9
Social	4.2	1.5	4.3	1.5	0.2	1.3
PNSE						
Competence	4.6	1.0	4.5	0.9	-0.1	0.9
Autonomy	4.4	1.0	4.5	0.7	0.1	0.9
Relatedness	4.0	1.1	4.1	0.9	0.1	1.0
Theory of Planned Behavior						
Intention	5.6	1.5	5.1	1.3	-0.6**	1.5
Attitude	6.3	1.0	5.8	1.2	-0.5**	1.2
Social Norm	5.8	1.2	5.3	1.2	-0.5**	1.3
PBC	5.7	1.1	5.3	1.1	-0.4*	1.3
Health Variables						
NH1	2.9	1.4	3.0	1.3	-0.1	1.7
NH2	2.4	1.2	2.5	1.4	-0.1	1.6
NH3	2.9	1.4	3.1	1.3	-0.2	1.7
NH12	2.7	1.1	2.7	1	0.1	1.3
MNH56	2.6	1.2	2.6	1.1	0.0	1.1
MNH7	2.7	1.2	3.1	1.2	0.4*	1.2
AL2	1.0	1.2	1.2	1.4	0.2	1.1
AL3	1.4	1.4	1.5	1.4	0.1	1.3
AL4	0.9	1.4	1.0	1.3	0.1	1.0
TB4	0.4	1.4	0.4	1.5	0.0	1.2
TB6	0.9	2.0	0.6	1.6	-0.3	1.9

*p<.05, **p<.01

Note. The abbreviations in the above table refer to: VPA – Vigorous PA; MPA – Moderate PA; SPA – Strength PA; STPA – Stretching; PBC – Perceived Behavioral Control; NH = Nutritional Health; MNH – Healthy Nutrition Meals; AL – Drinking behaviors; TB – Tobacco-related behaviors

The analysis did not reveal any change in physical activity behaviors across time (p > .05). BREQ-2 variables did not change across time (p > .05). Among the MPAM variables, appearance (d = -0.34, p = .013) and fitness (d = -0.37, p = .006) decreased significantly over time. Also, all variables related to the Theory of Planned Behavior (intention, attitude, social norms, perceived behavioral control) decreased significantly over time (d = -0.32 to -0.41, p < .05). Among the health behaviors, there was a significant increase in eating after 10pm (d = -0.29, p = .030). No significant differences were noted between the beginning and end of the

Table 2. Pearson correlations of the pre and post differences.

	NH1	NH2	NH3	NH12d	MNH56d	MNH7d	AL2d	AL3d	AL4d	TB4d	TB6d
Physical activity											
VPA	-.12	-.08	.00	-.13	.06	-.18	-.06	-.16	-.15	.09	.10
MPA	.10	.01	.08	.07	.03	-.15	-.09	-.05	-.15	.08	.15
SPA	-.17	-.11	-.04	-.18	.08	.05	.06	-.05	.13	.17	.02
STPA	.10	.15	.02	.15	.17	-.19	-.09	-.01	.09	-.02	-.15
MPAM											
Enjoyment	-.06	-.04	-.07	-.06	-.02	-.25	-.21	-.09	-.04	.06	-.08
Competence	-.16	-.11	-.11	-.17	.10	-.13	-.07	.08	-.02	.20	-.14
Appearance	-.10	-.03	-.05	-.09	.08	-.27*	-.10	-.11	.00	-.01	-.07
Fitness	-.13	.05	-.08	-.05	.17	-.35**	-.05	.00	.08	.07	-.16
Social	-.25	-.02	-.07	-.18	.15	-.08	.16	-.03	.19	.20	.01
PNSE											
Competence	-.12	.00	.05	-.08	-.14	-.10	.06	.11	.08	-.08	-.18
Autonomy	-.14	.09	.02	-.04	-.21	-.16	.03	-.11	-.02	.12	.04
Relatedness	.04	.24	.18	.17	-.23	.00	.19	.04	.21	.06	-.23
Theory of Planned Behavior											
Intention	-.06	.00	-.10	-.04	.04	-.24	-.03	-.06	.01	.02	.04
Attitude	-.14	-.03	-.25	-.11	.09	-.33*	-.28*	-.36**	-.26*	.00	.09
Social Norm	-.03	-.07	-.25	-.07	.11	-.23	-.07	-.17	-.10	.14	.26*
PBC	-.20	-.10	-.19	-.19	.22	-.23	.04	-.13	-.08	-.02	.02

*p<.05, **p<.01 *Note*. The abbreviations in the above table refer to: VPA – Vigorous PA; MPA – Moderate PA; SPA – Strength PA; STPA – Stretching; PBC – Perceived Behavioral Control; NH = Healthy Nutrition; MNH – Healthy Nutrition Meals; AL – Drinking behaviors; TB – Tobacco-related behaviors

semester in other health behaviors, such as drinking and tobacco use (see Table 1).

Among the motivations toward physical activity, changes in appearance (r = -.266), fitness (r = -.346), and attitudes (r = -.326) were negatively related to the changes in frequency of eating after 10pm. Changes in attitude also negatively predicted changes in alcohol consumption, including days characterized by episodes of binge drinking (r = -.277), episodes of heavy drinking (r = -.357), and typical number of drinks per day (r = -.261). Also, changes in social norms negatively predicted days of use of at least one tobacco-based product in the previous week (r = .262). All other relationships were not significant (see Table 2).

DISCUSSION

This study aimed to understand the effectiveness of a health-related fitness course on enhancing the levels of physical activity engagement of the college students enrolled in the course. In addition, the paper explores the possible effect of course participation on other health-related behaviors, such as nutritional habits, and alcohol and tobacco consumption.

The authors did not find any statistically significant change in the level of physical activity participation as a result of the participation in LPF courses, which might have been due to the already high level of reported physical activity participation characterizing the attending students. In particular, participants in the study were students who chose to enroll in the 2-credit section (3 hours of class per week) of a required class, versus the generally chosen

1-credit section (2 hours per week). This initial self-selection process, might explain the lack of significant change in the level of engagement in physical activity in this group. However, it is also possible that this lack of differences in the students' level of engagement in physical activity is due to the general tendency of over reporting the level of physical activity engagement (51), which might have limited the ability of detecting changes across the semester.

Although the course did not seem to have increased the levels of physical activity directly, it did impact other factors such as the participants' motivation toward physical activity in a statistically significant manner. More specifically, it seems that the impact of some extrinsic motivators (appearance and fitness) to engage in active behavior decreased over time. Although there was no significant change in more intrinsic motives to be active (competence and engagement), the decrease in extrinsic motives along with the fairly high level of PA participation may represent a shift of attention toward a more intrinsic-like engagement in physical activity.

The shift of attention from extrinsic motivation to exercise to intrinsic motives to engage in PA can lead to a prolonged engagement in physical activity (43). Furthermore, the consistent high levels of engagement in PA maintained throughout the semester, along with lower attention to extrinsic reasons to be involved in physical activity, could represent a positive outcome of participation in the LPF course. However, it might be still important for instructors of these courses to continue exploring strategies that would support the development of intrinsic motivation to engage in exercise, which will enhance the longevity of these healthy habits. For example, instructors could focus on specific activities that satisfy the three basic needs: autonomy, competence, and relatedness. This approach has been found to be effective in supporting the development of a more and more intrinsic approach to wellness and physical activities (45).

Participants reported a statistically significant decrease in their level of TPB intention to participate in physically active behaviors, attitude, social norms, and their perceived control. These results seem to contradict the previously reported results. However, the reason of the decrease can be related to the way this study has been designed. The pre-test was administered during the first week of school, a period during which students are fresh from their vacation time and are not yet involved with time-consuming academic work. The post-test was administered the last week of the course, directly before entering the highly demanding "finals week" (7). Therefore, the participants might have temporarily switched their priorities towards academic work while decreasing their values for physical activity (attitude) and their intention to participate in physical activity. Additionally, the social environment of these students may have become less supportive of their engagement in physical activity (social norms). The increased amount of academic work and responsibility might have also had a negative effect on the participants' perceived control or in other words ability of being in charge of their engagement in physical activity.

Alternatively, the academic challenges at the end of the semester may have led students to face a discrepancy between their desire to engage in active behaviors (positive attitude) and their consciousness of their need to study. Facing this cognitive dissonance (19), students striving to develop internal consistency may attempt to solve this dissonance by shifting away from their positive attitude of physical activity. This shift in attitude towards physical activity might enable them to explain their inability to engage in the desired amount of activity, while satisfying the need for study time.

The study results may be viewed as encouraging considering the decrease of extrinsic motives for engaging in physical activity. Because the levels of physical activity engagement did not decrease and the participants seemed to give less and less importance to extrinsic reasons (such as appearance and fitness) to be active, it is possible that the class did have a positive outcome on students. However, working on the development of students' stress and time management techniques could enhance this effect. The development of these techniques as part of the LPF course might be beneficial in reducing students' sense of "lack of time." These possible course outcomes might also help students to continue developing a positive attitude toward physical activity, an enhanced perceived control over the activity, and possibly a more positive social support of their engagement in physical activity. The enhancement of these factors could potentially lead to an increase in physical activity engagement during this perceived busy time, overall if supported by an increasingly autonomous motivation toward these behaviors.

For other health behaviors, it is possible to explain the lack of significant changes reported by recognizing that the pre-test students were the ones characterized by fairly healthy nutritional habits, drinking habits and tobacco use. The majority of the participants reported drinking only 1-2 drinks during the previous week (81%), not using tobacco products (96.6%), and eating vegetables (58.6%), whole grain products (72.4%), white meat (65.5%), and natural juice (58.6%), 3 or more days a week. On the other hand, it is also possible to think that the timing of the second administration might also have affected the results related to the other measured health behaviors. For example, the participants reported a statistically significant increase in the frequency of late dinner (after 10pm), which can be explained with their increased level of academic work and time spent in the library.

Based on these results, it is possible to provide LPF courses' instructors with a few suggestions. For example, LPF courses' instructors could focus their attention on activities and contents focused on guiding students to develop more positive attitude, both instrumental and affective, toward the behavior, and helping them to attribute a functional and affective value to the engagement in a specific health behavior. Along with this effort, it is important that LPF instructors would also prepare course content aiming to enable students to develop a sense of control over their engagement in physical activity as well as on other health behaviors. Concurrently, it is important to support students to develop

a sense of efficacy to productively engage in these behaviors, possibly structuring a goal setting program focused on enhancing students' competence. External influences have been found to play a major role on the decision of adolescence and young adults to engage in unhealthy behaviors (e.g., alcohol use, drug use, and tobacco use (22, 33). Peers seem to be very influential by introducing, providing, or pressuring risky activities, such as alcohol use (9, 33). LPF courses' instructors cannot manage external influence, but could play a key role in providing students with alternative positive examples (i.e., descriptive norms) and intangible support (i.e., indjuctive norms). Moreover, the future LPF courses could focus on equipping students with knowledge and skills (e.g., time management skills) sufficient to help them dealing with "expected" academic demands, such as "finals week," supporting them to avoid the decrease of their engagement in health behaviors during stressful times.

The present study was characterized by a series of limitations that might have reduced the value of its results. The self-reported instruments might have limited the accuracy of the results, as the responses may have been unreliable or socially desirable, also due to the sensitivity of some of the foci of the study (e.g. alcohol use).

The research design of this study might have limited its results and usefulness. Future studies may consider adding a mid-point test during the semester to evaluate possible changes in these behaviors or assessing a self-log addressing the targeted behaviors. Additionally, performing follow-up measurements may be useful in examining the long-term effects of participation to the mandatory LPF course. Data focused on the academic life of the participants (e.g., hours per week doing school work, credit hours taken during the semester, even GPA) could help to clarify if the decrease of positive attitude toward PA is effectively linked to a shift of the participants' priorities. Moreover, data on life outside of academics would also help in clarifying if the decrease in positive attitude toward PA is associated with the decrease of positive attitude toward other extracurricular activities (e.g., time spent with friends, hobbies) or if it is an isolated choice.

The lack of a control group may have been limiting, due to the fact that it was not possible to speculate if the course had a real effect on students since the authors were unable to survey students not enrolled (and that have never been involved) in this course.

This study supported the usefulness of lifetime physical fitness courses offered to college students. Based on the results of this study, it is possible to conclude that lifetime physical fitness courses are effective in shifting college-aged students' locus of motivation from external (e.g., looking good) to more internal (e.g., enjoyment). This motivational shift is foundational to support the adoption of lifetime physical activity (43, 44).

Based on their own professional experiences and research activity, the authors would recommend institutions to require participation in a LPF course to their incoming freshmen students. In this

way, not only would students be able to develop these healthy habits at the beginning of their college career, but they would also be provided with knowledge and skills to face challenges during college.

REFERENCES

1. Adams TM, Brynteson P. A comparison of attitudes and exercise behaviors of alumni from universities with varying degrees of physical education activity programs. Res Q Exerc Sport 63:148–152, 1992.

2. Ajzen, I. The theory of planned behavior. Organ Behav Hum Dec 50(2): 179-211, 1991.

3. American College Health Association. Healthy campus 2010: Make it happen. Baltimore, MD, 2002.

4. American College Health Association National College Health Assessment Spring 2014. Retrieved June 17th, 2015 from http://www.acha-ncha.org/docs/NCHA-II_WEB-PAPER_SPRING 2014_ UNDERGRAD_REFERENCEGROUP _EXECUTIVESUMMARY.pdf.

5. American College Health Association. (2012). Healthy campus 2020. Retrieved September 27th, 2013 from http://www.acha.org/ HealthyCampus/student-obj.

6. Arnett JJ. Emerging Adulthood. Am Psychol 55(5): 469-480, 2000.

7. Bellone J, Navarick D, Mendoza R. Participant Withdrawal as a Function of Hedonic Value of Task and Time of Semester. Psychol Rec 62(3): 395-407, 2012.

8. Biddle SJ, Nigg CR. Theories of exercise behaviour. Int J Sport Psychol 31: 290-304, 2000.

9. Borsari B, Carey KB. Peer Influences on College Drinking: A Review of the Research. J Substance Abuse 13(4): 391-424, 2001.

10. Brynteson P, Adams TM II. The effects of conceptually based physical education programs on attitudes and exercise habits of college alumni after 2 to 11 years of follow-up. Res Q Exerc Sport 63:208–212: 1993.

11. Cardinal B, Jacques K, Levy S. Evaluation of a university course aimed at promoting exercise behavior. J Sports Med Physical Fit 42(1):113-119, 2002.

12. Caspersen CJ, Pereira MA, Curran KM. Changes in physical activity patterns in the U.S., by cross-sectional age and sex. Med Sci Sport Exer 32(9): 1601-1609, 2000.

13. Corbin CB, Cardinal BJ. Conceptual Physical Education: The anatomy of an innovation. Quest 60: 467-487, 2000.

14. Corbin C, Laurie D. Exercise for a lifetime: An educational effort. Physician Sportsmedicine 7(1):51-55, 1978.

15. Core Institute. Core Alcohol and Drug Survey Long Form - Form 194. Executive Summary, 2012. Retrieved September 20th, 2014 from http://core.siu.edu/results/index.html

16. Dale DD, Corbin CB. Physical activity participation of high school graduates following exposure to conceptual or traditional physical education. Res Q Exercise Sport 71(1): 61-68, 2000.

17. Dunn MS, Wang,MQ. Effects of physical activity on substance use among college students. American Journal of Health Studies 18(2/3): 126-132, 2003.

18. Ferreira I, Twisk JW, van Mechelen W, Kemper HC, Stehouwer CD. Development of fatness, fitness, and lifestyle from adolescence to the age of 36 years: determinants of the metabolic syndrome in young adults: the Amsterdam growth and health longitudinal study. Arch Intern Med 165(1): 42-48, 2005.

19. Festinger, L. (1962). Cognitive Dissonance. Sci Am 207: 93-106.

20. Fortier M, Wiseman E, Sweet SN, O'Sullivan TL, Blanchard C, Sigal RJ, Hogg W. A moderated mediation of motivation on physical activity in the context of the Physical Activity Counseling randomized control trial. Psychol Sport Exerc 12(2): 71-78, 2011.

21. Gagné M, Deci EL. Self-determination theory and work motivation. J Org Behavior 26(4): 331-362, 2005.

22. Gardner M, Steinberg L. Peer Influence on Risk Taking, Risk Preference, and Risky Decision Making in Adolescence and Adulthood: An Experimental Study. Devel Psychol 41(4): 625– 635, 2005.

23. Gordon-Larsen P, Adair LS, Nelson MC, Popkin BM. Five-year obesity incidence in the transition period between adolescence and adulthood: the National Longitudinal Study of Adolescent Health. Am J Clin Nutr 80(3): 569-575, 2004.

24. Hagger MS, Chatzisarantis NLD. Integrating the theory of planned behaviour and self-determination theory in health behaviour: A meta- analysis. Brit J Health Psych 14(2): 275-302, 2009.

25. Hagger MS, Chatzisarantis NL, Harris J. From psychological need satisfaction to intentional behavior: Testing a motivational sequence in two behavioral contexts. Pers Soc Psychol B 32: 131-148, 2006.

26. Hensley LD. Current status of basic instruction programs in physical education at American colleges and universities. J Phys Ed Rec Dance 71(9): 30-36, 2000.

27. Jacobs N, Hagger MS, Streukens S, De Bourdeaudhuij I, Claes N. Testing an integrated model of the theory of planned behaviour and self-determination theory for different energy balance-related behaviours and intervention intensities. Br J Health Psychol 16(Pt 1): 113-34, 2011.

28. Kazi HA, Coopoo YY. Physical activity, alcohol use, smoking and dietary profiles of a cohort of university students. Afr J Phys Health Ed Rec Dance 16(4): 104-118, 2000.

29. Kinard B, Webster C. The effects of advertising, social influences, and self-efficacy on adolescence tobacco use and alcohol consumption. J Consumer Affairs 44(1): 24-43, 2010.

30. Kulinna P, Warfield W, Jonaitis S, Dean M, Corbin C. The progression and characteristics of conceptually based fitness/wellness courses at American universities and colleges. J Am Coll Health 58(2): 127-131, 2009.

31. Kvaavik E, Andersen LF, Klepp KI. The stability of soft drinks intake from adolescence to adult age and the association between long-term consumption of soft drinks and lifestyle factors and body weight. Public Health Nutr 8(2): 149-157, 2005.

32. Laska MN, Pasch KE, Story M, Ehlinger E. Latent class analysis of health risk behavior and lifestyle characteristics among college students. Prev Sci 10: 376-386, 2009.

33. Lewis CE, Lewis, M. Peer pressure and risk-taking behaviors in children. Am J Public Health 74(6): 580-584, 1984.

34. Lien N, Lytle LA, Klepp K. Stability in consumption of fruit, vegetables, and sugary foods in a cohort from age 14 to age 21. Prev Med 33(3): 217-226, 2001.

35. Markland D, Tobin V. A Modification to the Behavioural Regulation in Exercise Questionnaire to Include an Assessment of Amotivation. J Sport Exerc Psychol. 26(2): 191-196, 2004.

36. McCracken M, Jiles R, Blanck HM. Health behaviors of the young adult U.S. population: Behavioral Risk Factor Surveillance System, 2003. Prev Chronic Dis 4(2): A25, 2007.

37. Medalie J. The college years as a mini-life cycle: developmental tasks and adaptive options. Col Health 30(2): 75–79, 1981.

38. Mellen KR. Health behaviors of college students: Sample comparisons, physical activity associations, and a physical activity intervention. [Doctoral dissertation]. Iowa City, IA: The University of Iowa; 2007.

39. Pearman SN, Valois RF, Sargent RG, Saunders RP, Drane JW, Macera CA. The impact of a required college health and physical education course on the health status of alumni. J Am Coll Health 46(2): 77-85, 1997.

40. Quartiroli A, Maeda H. Self-determined Engagement in Physical Activity and Sedentary

Behaviors of US College Students. Int J Exerc Sci 7(1): 87-97, 2014.

41. Quartiroli A, Zizzi S. A Tailored Wellness Intervention for College Students Using Internet-Based Technology: A Pilot Study. Int Electron J Health Ed 15:37-50, 2012.

42. Ryan R, Connell J. Perceived locus of causality and internalization: Examining reasons for acting in two domains. J Pers Soc Psychol 57(5): 749-761, 1989.

43. Ryan R, Deci E. Intrinsic Motivation and Self-Determination in Human Behavior. Plenum 1985.

44. Ryan RM, Frederick CM, Lepes D, Rubio N, Sheldon KM. Intrinsic motivation and exercise adherence. Int J Sport Psychol 28(4): 335-354, 1997.

45. Ryan RM, Williams GC, Patrick H, & Deci EL. Self-Determination Theory and Physical activity: the Dynamics of Motivation in Development and Wellness. Hellenic J Psychol 6: 107-124, 2009.

46. Snyder TD, Dillow SA. Digest of Education Statistics 2013. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

47. Sparling P. College physical education: an unrecognized agent of change in combating inactivity-related diseases. Perspect Biol Med 46(4): 579-587, 2003.

48. Sparling PB, Snow TK. Physical activity patterns in recent college alumni. Res Q Exercise Sport 73(2): 200-205, 2002.

49. Strand B, Egeberg J, Mozumdar A. Health-Related Fitness and Physical Activity Courses in U.S. Colleges and Universities. J Res Health Phys Ed Rec Sport Dance 5(2): 17-20, 2010.

50. Torres MD, Sancho LL, Perez GG, Campillo JE. Physical Exercise, Physical Fitness, Nutritional Patterns, And Tobacco And Alcohol Consumption In A Population Of Young Spanish People. Biol Sport 21(3): 249-260, 2004.

51. Troiano RP, Berrigan KW, Dodd, LC, Masse TL, McDowell M. Physical activity in the United States Measured by Accelerometer. Med Sci Sport Exer 40(1): 181-188, 2008.

52. VanKim N, Laska M, Ehlinger E, Lust K, Story M. Understanding young adult physical activity, alcohol and tobacco use in community colleges and 4-year post-secondary institutions: A cross-sectional analysis of epidemiological surveillance data. BMC Public Health 10: 208-216, 2010.

53. US Department of Health and Human Services. Healthy People, 2010. US Government Printing Office: Washington, DC, 2000.

54. Van Kim N, Nelson T. Vigorous Physical Activity, Mental Health, Perceived Stress, and Socializing Among College Students. Am J Health Prom 28(1): 7-9, 2013.

55. Warburton DER, Nicol CW, Bredin SSD. Health benefits of physical activity: the evidence. Can Med Assoc J 174(6): 801-809, 2006.

56. Wechsler H, Lee JE, Rigotti N. Cigarette Use by College Students in Smoke-Free Housing Results of a National Study. Am J Prev Med 20(3): 202–207, 2001.

57. Wilson PM, Rogers W, Rodgers WM, Wild T. The Psychological Need Satisfaction in Exercise Scale. J Sport Exerc Psy 28(3): 231-251, 2006.