Exercise Behavior Among College Students and Sex Differences in a Health-Promotive Intervention

Alyssa J. Matteucci, Drexel University
Daniel Albohn, Millersville University
Tara M. Stoppa* and Wendy Mercier, Eastern University

ABSTRACT. This study examined the effectiveness of a university-based Life Fitness course on college students' health behavior in terms of the number of hours students spent doing various types of exercise-related activities (moderate activities, hard activities, and very hard activities) before and after the course. Participants were asked to complete a series of questions regarding daily activity levels and habits both before and after the completion of the course. Results revealed significant increases in the mean number of hours spent on each type of exercise-related activity. Specifically, for moderate activities, there were significant main effects for time, $F(1, 187) = 6.70$, $p = .01$, $\eta_p^2 = .04$, and sex, $F(1, 187) = 18.80$, $p < .001$, $\eta_p^2 = .09$, with increases in these activities across time and men reporting higher mean levels of this activity compared to women. For hard activities, there was a significant time x sex interaction, $F(1, 112) = 5.90$, $p = .03$, $\eta_p^2 = .04$, indicating more dramatic increases for men during this period. For very hard activities, there was a significant main effect for sex, $F(1, 112) = 11.40$, $p < .001$, $\eta_p^2 = .09$, indicating that men reported higher mean levels of these activities relative to women. Findings yield important implications for future research on the relationship between health-promotive intervention and students' health-related behaviors and the establishment of healthy attitudes and behaviors that persist into adulthood.

Exercise plays an essential role in the maintenance of an overall healthy well-being. Increases in physical activity have been linked to many positive outcomes, including reduction of cholesterol levels, control of obesity, and better management of hypertension and diabetes (Welsh, Robinson, & Lindman, 1998). In addition, involvement in regular exercise may help prevent the development of various eating disorders by supporting healthy body image and body awareness (Nebel, 1995). Participation in exercise has also been linked to improvement in overall mental well-being (Sale, Guppy, & El-Sayed, 2000) and to enhanced self-esteem (Tiggemann & Williamson, 2000). Despite such positive effects, it is estimated that 53.3% of college-aged individuals do not meet the physical activity recommendations set by the American College of Sports Medicine and American Heart Association of moderate intensity cardio or aerobic exercise for at least 30 min on five or more days per week or vigorous intensity cardio or aerobic exercise for at least 20 min on three or more days per week. Further, it is estimated that 32.9% of college students in the U.S. are either overweight or obese, according to the categories defined by the American College Health Association (2007).

The rates of physical activity in college students represent an apparent developmental shift in physical activity (Stephens, Jacobs, & White,

*Faculty mentor

1985). Physical activity declines substantially across adolescence and into the college years as 70% of 12-year-olds report participation in vigorous physical activity, yet only 42% of 21-year-old men and 30% of 21-year-old women report doing so (Tiggemann & Williamson, 2000). Additionally, relapse rates for those beginning exercise programs are high. Approximately one half of people in supervised exercise programs drop out within three to six months (Dishman, 1994). In a 14-week study of new members at a health club (M_{age} = 22), Simkin and Gross (1994) found that 41% of individuals experienced a 3-week relapse episode. Relapsers tended to identify fewer behavioral and cognitive coping strategies for high-risk situations (e.g., negative mood, lack of time, bad weather). The availability of fewer structured exercise opportunities for young adults may also contribute to the decline in physical activity (Marcus et al., 2000).

Progress has been limited in attempts to stifle the rise in obesity rates. French, Story, and Jeffery (2001) suggest that our current culture does not support a level of energy expenditure sufficient enough to offset excess calorie intake, and adults in the U.S. expend less energy at work and leisure than ever before. In addition, the modern environment allows people to obtain food and shelter with minimal energy expenditure and generally surrounds people with devices that promote inactivity such as television, computers, automobiles, and washing machines (Hill, Wyatt, Reed, & Peters, 2003). The amount of energy expended through lifestyle activity is typically insufficient to make up for these diverse sources of reduced energy expenditure. Sparling (2007) also agrees that general availability, inexpensive prices, and large portions in food intake in addition to the already high caloric content of food are large issues in this regard and asserts that in order to combat these significant health challenges among students, action must be taken by administrators, food service representatives, and other key collegiate officials. In order to do so, Sparling (2007) advocates that colleges and universities seek to develop and implement curriculum-based courses that focus on healthy weight with information on nutrition, physical activity, energy balance, and self-management skills. Researchers have looked to address this rapid decline in physical activity by designing interventions to increase physical activity behavior in young adults.

Sailors and colleagues (2010) conducted research on a curriculum-based intervention. In this study, the curriculum-based intervention was a 30-week, 3 day per week class, which included assessing targeted heart rates for each participant and enacting a set schedule of cardiovascular and weight training activities. Sailors et al. (2010) reported that college students' exposure to this exercise program was often the first time any of these students had been made aware of proper exercise techniques and scheduling. Aside from these benefits, participants in the study also reported maintaining a higher level of physical activity on an informal exit questionnaire given a month after the program ended.

In another study, D'Alonzo, Stevenson, and Davis (2004) observed a significant increase in daily step counts compared to baseline after completion of a 16-week aerobic exercise program and at an 8-week follow-up period among African-American and Hispanic college-aged women. Similarly, Leslie, Sparling, and Owen (2001) also reported higher levels of self-reported physical activity among college students after an 8-week Active Recreation on Tertiary Education Campuses initiative at another university. This study sought to promote on-campus physical activity among inactive students attending college. The intervention was multipronged, including classes made available to students on campus (e.g., aerobics, weight training), scheduled demonstrations of various activities, fitness assessments, swimming vouchers to a nearby facility, and on-campus media promotion. Findings from this study affirmed the efficacy of short-term physical activity interventions for college student populations.

In other studies, Slava, Laurie, and Corbin (1984) and Brynteson and Adams (1993) examined the influence of participation in didactic physical education classes during college with respect to attitudes about exercise and physical activity behaviors 2 to11 years after graduation. The philosophy of these physical education classes was that students would learn about the benefits of exercise and how to start their own personal exercise program. Both studies took measures at baseline and at the end of the intervention, and results revealed that participation in a college level, didactic, physical education class improved alumni's exercise attitudes and increased the frequency and types of physical activity that they participated in after graduation (Slava et al., 1984; Brynteson & Adams, 1993).

Continued participation of students in physical

activity through the remainder of their college experience and into adulthood could potentially lead to a reduction in health-related challenges and adult mortality rates (Stephens et al., 1985). Importantly, emerging adulthood has been seen as a crucial period in the adoption of habits of physical activity that persists throughout life (Sullum, Clark, & King, 2000). Emerging adulthood may also be a period when people are especially receptive to advice on adopting regular exercise. It is the period between age 18–25 that is characterized by change, exploration, and the adoption of enduring lifestyle choices (Arnett, 2000). Furthermore, emerging adults are increasingly accessible populations for such interventions. By 2008, it was estimated that nearly 50% of 18- to 24-year-olds were enrolled in postsecondary institutions. As a result, emerging adulthood may be an opportune time to intervene to promote long-term habits of physical activity (Rovniak, Anderson, Winett, & Stephens, 2002).

Further, understanding sex differences in how such interventions work remains an important area for continued research as physical activity interventions may not be monolithically effective. For example, results of an intervention study by Gortmaker et al. (1999) found that greater remission of obesity rates among women who completed the intervention compared to women who did not. However, when the same intervention was delivered to men in a similar setting, there were no significant program effects. Similarly, Stice and Ragan (2001) administered a related intervention, which consisted of informational discussion in which women students were taught valuable preventative information about obesity and obesity prevention. This informational intervention resulted in a significant decrease in participants' body mass.

Project Graduate Ready for Activity Daily (GRAD) randomly assigned undergraduate men and women in their senior year to either a physical activity lecture, laboratory experience course which served as the experimental intervention, or a knowledge-oriented course about a variety of health issues which served as the control group (Calfas et al., 2000; Sallis et al., 1999). The physical activity lecture course discussed health benefits and risks of physical activity, recommended physical activity patterns to promote health and fitness, principles of injury prevention, and principles of behavioral self-management. The laboratory experience, led by peer health facilitators, emphasized learning specific physical activities and self-management techniques to start and maintain a personal exercise program (Ferrara, 2009). Physical activity was then assessed at baseline, immediately post-intervention, and one and two years post-intervention (Sarkin, Nichols, Sallis, & Calfas, 1998). After completion of the intervention, Project GRAD reported higher levels of self-reported physical activity compared to the control group in women but not in men (Calfas et al., 2000; Sallis et al., 1999).

Although there has been an abundance of longitudinal and epidemiological research that has demonstrated the physical benefits of regular physical activity, there is a paucity of research on exercise behaviors and psychological well-being in college students. Also, few researchers have studied the effects of a personal exercise intervention, such as this intervention, on college students' behaviors and perceptions. Building upon previous work highlighting the importance of curriculum-based interventions targeting the adoption of health-related habits and promoting healthy exercise-related behaviors among college students, the current study sought to evaluate the effects of an intervention that combined both physical and informational-based intervention components in a university setting. The intervention was a required, didactic course that focused both on helping students to understand health benefits and cultivating exercise-related habits. An additive feature of the intervention was that it existed as a personal training course, which demonstrates a shift in the old physical education paradigm. Previously, many U.S. universities required a certain number of physical education courses in their core curriculum, focusing on the theory and techniques of a variety of individual and team sports (e.g., tennis, swimming, volleyball, or soccer; Sparling, 2003). The current intervention instead emphasized "personal fitness" and personal goal setting for strength, flexibility, endurance, behavior modification, body composition, overall well-being, and nutrition. The activities were more likely activities engaged in on a daily basis by the average adult through adulthood (e.g., yoga, jogging, or hiking rather than softball, basketball, or lacrosse). It was expected that this more personal and broader information-based fitness course would be effective in enhancing college students' behaviors related to regular physical activity. In this study, therefore, we assessed the effects of the intervention on various activity types and also examined sex differences across specific types of activity outcomes.

Method

This study included 214 young adult college students at a small liberal arts university in the Mid-Atlantic United States. Participants were students who enrolled in a required Life Fitness course at the university. A questionnaire packet was distributed to participants at the beginning of the 16-week semester and at the end of the semester. The data are from the first wave of an ongoing study. This was the first cohort of individuals who participated in the study and we are continuing to collect data. Prior to recruitment, approval from the Institutional Review Board was obtained. The sample (N = 214) was comprised of 44% men and 56% women. Participants were 18 to 26 years of age (M_{age} = 19.4, SD = 1.44). Ethnic backgrounds of participants included: European American (n = 187; 87%), African American (n = 18; 8.4%), Hispanic (n = 3; 1.4%), Asian/Pacific Islander (n = 2; <1%), Native American/Alaskan (n = 1; <1%), and Unidentified (n = 4; 2%). At the outset of the study, the average weights of men in the sample ranged from 127 to 282 pounds (M_{weight} = 174, SD = 32.4) and the average weights of women in the sample ranged from 101 to 350 pounds (M_{weight} = 143, SD = 32.7). Less than 1% of the sample reported that they smoked. We conducted a series of chi-square analyses to assess whether there were potential associations between any of the demographic or physical variables and variables under study. No significant associations were found for any of these indicators and therefore, we did not control for them in subsequent analyses. No follow-up data were collected.

Measures

Demographics. Participants were asked to provide information about their age, ethnicity, self-reported weight, and height. Demographic information was taken at both baseline and after the intervention.

Physical activity. Participants took a pencil-and-paper version of the Physical Activity Readiness Questionnaire (PAR-Q; Blair, 1984) before intervention took place and immediately following conclusion of the course. The PAR-Q was developed in the 1970s as a method of identifying persons for whom increased physical activity may be contraindicated (Chisholm, Collis, Kulak, Davenport, & Gruber, 1975). For most people, physical activity should not pose any problems or hazards. Over the past two decades, the PAR-Q has been administered to more than one million people with satisfactory reliability and validity (Shephard, 1988; 1994). Reliability in the current study was α = .74. The American College of Sports Medicine (1995) has recommended the PAR-Q as a safe, preparticipatory exercise screening measure prior to increased low-to-moderate exercise involvement.

The PAR-Q is a 12-item questionnaire in which participants are asked to indicate the number of hours spent on various exercise-related activities (e.g., brisk walking) at specific levels (i.e., moderate, hard, and very hard). For example, participants are asked "How many total hours in the past week did you spend doing moderate activities?" Moderate activities are then listed and participants are asked to respond by reporting the number of hours spent per week on each type of activity. This measure was chosen in efforts to quantify the amount of time that students spent exercising outside of the classroom. This was administered at baseline and at the conclusion of the intervention.

Intervention

The intervention was a choice of one of eight college-level courses that met for three credit hours per week for 15 weeks. The intervention course was a graded experience that counted toward each enrolled students' grade point average. Grading was based on students' knowledge of exercise and health information covered in the course, attendance, and overall participation. In particular, this intervention course differed from a standard physical education course due to its emphasis on establishing lifelong exercise-related habits and activity patterns that promoted individual health rather than team performance or competition. Scientific information was presented to students throughout the course to promote self-awareness and self-directed health behavior and encouraged participants to create fitness goals.

Specifically, the intervention course involved four different domains: components of physical fitness, nutrition, behavioral modification, and participation. Students were guided in developing short-term and long-term goals for health as they pertained to their own personal abilities, interests, and fitness. The physical activity in each course varied around the specific skills and techniques of promoting particular lifestyle-based (as opposed to solely competition-based) physical activities; such lifestyle-based activities are typically carried through adulthood. For example, students had the option of choosing intervention courses such as Power Walking, Tae Kwon-Do, Yoga and Pilates, Recreational Sports, Fencing, Tai Chi, Hiking, or

Strength Training. Each class met for instruction and supervised participation. The curriculum was developed by a qualified expert in Biokinetics who specializes in human physiology and pathophysiology. The curriculum aligned with standards for teaching these specific courses and although various instructors taught each section, the amount of time students spent in each course remained the same.

Results

We conducted a series of 2 (time) x 2 (sex) mixed between-within subjects ANOVA for each activity level (moderate, hard, and very hard). The means and standard deviations are presented in Table 1. For moderate activities, there were significant main effects for both time and sex. For moderate activities, results indicated a significant within-person effect for time, $F(1, 187) = 6.70$, $p = .01$, $\eta_p^2 = .04$, with mean scores on this type of activity tending to increase across the intervention period. These results represent a small, yet significant, effect size using Cohen's (1988) conventions. The between-person effect for sex was also significant, $F(1, 187) = 18.80$, $p < .001$, $\eta_p^2 = .09$, with a moderate effect size, with men reporting higher mean levels of moderate activities relative to women.

For hard activities, results revealed significant main effects for time and sex, as well as a significant time x sex interaction, with the interaction suggesting that, for men, increases in hard activity levels were more dramatic across the intervention period. For women, mean levels of hard activities actually decreased slightly across the intervention, $F(1, 112) = 5.90$, $p = .03$, $\eta_p^2 = .04$. This represents a small, yet significant effect, with respect to hard activities.

Finally, for very hard activities, results indicated a significant main effect for sex, $F(1, 112) = 11.40$, $p < .001$, $\eta_p^2 = .09$, with a moderate effect size, suggesting that men reported higher mean levels of very hard activities relative to women. Results for time, however, were nonsignificant, $F(1, 112) = 3.50$, $p = .06$, $\eta_p^2 = .03$.

TABLE 1

Mean Number of Hours per Week for Each Activity Level by Time and Sex

Dimension	Time 1 *M* (*SD*)	Time 2 *M* (*SD*)	*F* (Time)	*F* (Sex)	*F* (Time x Sex)
Moderate Activities	8.5 (8.0)	10.4 (9.5)	6.7**	18.8***	2.0
Men	10.2 (8.9)	13.3 (10.8)			
Women	7.0 (6.9)	7.9 (7.4)			
Hard Activities	5.4 (6.9)	6.7 (8.7)	5.1*	15.9***	5.9*
Men	6.6 (8.4)	9.4 (11.1)			
Women	4.3 (5.1)	4.1 (4.4)			
Very Hard Activities	4.9 (7.1)	6.8 (8.6)	3.5	11.4***	2.2
Men	6.0 (7.7)	9.1 (10.1)			
Women	3.6 (6.2)	4.0 (7.1)			

*$p < .05$, **$p < .01$, ***$p < .001$.

Note. Due to missing data, sample sizes ranged from $n = 112$ to 187.

Discussion

The purpose of this study was to examine the effects of a health-promotive intervention course on the activity levels of college students. Results from a mixed between-within subjects ANOVA showed significant main effects for sex at all three activity levels and significant main effects for time at two levels. Specifically, for moderate and hard activity there were significant main effects for both time and sex. These results indicate notable increases in moderate and hard exercise behavior for both men and women after completion of the intervention. Additionally, there was a significant interaction at the hard activity level, suggesting dramatic increases in hard activity for men relative to women's reported activity levels. However, for very hard activity there was only a significant main effect for participant sex, suggesting that only men reported higher levels of very hard activity following completion of the intervention.

The differences found between male and female participants' exercise behavior after completion of the intervention deserves speculation. The current results are surprising given that previous research (Gortmaker et al., 1999; Stice & Ragan, 2001) in exercise behavior has shown increases only in women's exercise behavior after a knowledge-based intervention. It may be possible that these differences occurred due to the demographic of individuals enrolled in each course, as well as the nature of each course. For example, a Yoga course requires less hard and very hard physical demand than a Recreational Sports class. Thus, a female participant enrolled in a Yoga class might report less hard and very hard physical activity than a female participant in Recreational Sports due to the nature of the course in which they selected. An alternative hypothesis is that men and women have different motivations for exercise and healthy habits. Previous research shows that women are motivated to exercise based on extrinsic factors (e.g., maintaining a particular physical

appearance), whereas men exercise for mainly intrinsic reasons (e.g., health reasons; Egli, Bland, Melton, & Czech, 2011). In our health intervention, the curriculum consisted primarily of teaching students about the healthy benefits of exercise. Therefore, it is not unreasonable to speculate that men had more internal motivation to exercise at hard and very hard levels and continue their learned healthy behaviors beyond completion of the course. However, future research should further investigate the relationship between internal motivation and retention of healthy behaviors, as well as longitudinal retention of these behaviors.

Previous research seems to have focused primarily on either health-promotive education or health-related activity. Very rarely have studies combined these two aspects into a single health-promotive intervention. A similar study by Sailors et al. (2010) established that college students reported retention of physical activity after completing a course designed to educate the participants in proper exercising techniques. It is important to focus on research that will predict the best outcomes for young people since healthy behavior and exercise have been linked to outcomes such as increase in self-esteem, better body image, lower rates of developing an eating disorder, and perhaps most importantly, an increase in overall mental well-being (Nebel, 1995; Sale et al., 2000; Tiggemann & Williamson, 2000). Our study builds upon this previous work, as well as combines an educational awareness of healthy behavior with activity-related exercise. Furthermore, we sought to eliminate the competitive aspect that is often associated with team-based activities, and focused predominantly on education, as well as establishing healthy habits. In doing so, we believe that this change has the potential to result in long-term preservation of learned behaviors.

The current findings have important implications for the startling rise in obesity rates among college-level students in the U.S. Late adolescence is an important period for adopting and maintaining learned healthy behavior (Sullum et al., 2000), yet rigorous physical activity during the adolescent years drops dramatically (Tiggerman & Williamson, 2000). Once healthy behavior is established in late adolescence or emerging adulthood, it is more likely to continue throughout adulthood. Although speculation is only conceptual in nature, this study may have provided students with more incentive to maintain health habits by (a) properly and scientifically educating students about both the costs and benefits of maintaining a healthy lifestyle, and (b) by encouraging students to engage in enjoyable, recreational, cooperative and competitive-free physical activity. If a successful health-promotive curricular program such as this could be implemented, not only is there the potential for a decrease in young adult obesity, but also a reduction in the amount of premature cardiovascular deaths (Stice & Ragan, 2001).

In spite of its contributions, the limitations of this study may have affected outcomes and interpretation of the results. In the present study the main limitations are: (a) the lack of a control group, (b) the amount of time allotted between termination of the course and completing the survey, and (c) the form in which the survey was given. For example, without a control group it is impossible to attribute differences observed in the study exclusively to the health-promotive intervention. Indeed, a group of participants who simply attended a college-level institution for a semester may have also shown increases in healthy behaviors. However, due to the design of the current study as exploratory in nature and also as a required course, a nonequivalent control group was not possible. College attendance itself has many effects on an individual and his or her exercise-related activity, and future research should aim to control these variables. Nevertheless, we believe understanding the initial associations, as well as important sex-related differences in outcomes, remain.

A further limitation was the amount of time between the completion of the health-promotive course and the administration of the survey. Participants were asked to fill out the PAR-Q survey indicating their activity levels immediately following the conclusion of the course. The lack of time that elapsed between course conclusion and survey administration might have caused some participants to report higher levels of activity than if the course had ended a few weeks, or even months before administering the final survey. Because it was not specifically stated in the measure, participants might also have mistaken questions for activity outside of the curricular course for the activity that they had been participating in within the curricular course for the past semester. Consequently, participants may have responded with levels of activity that do not accurately represent their true exercise behavior. Finally, it should be noted that the PAR-Q form is a self-report survey. Although we attempted to address common self-report issues by embedding the survey in a larger battery of tests, it

is still possible that participants might have been more inclined to report increases in their activity level both on the pre- and post-test surveys as a result of social desirability or other response biases.

Future research should include a control group to examine the cause-effect relationship between the course and increase in activity levels, as well as use follow-up surveys to gauge retention of learned behaviors. Surveys administered weeks, months, and even years beyond the initial completion of the health-promotive course would provide invaluable insight into the long-term success of such courses and their ultimate health-related outcomes. Additionally, exploration into the reasons why students increased their exercise behavior following completion of the intervention would prove useful in determining whether the intervention itself provided significant changes to behavior or whether some other variable such as university attendance caused this increase. Lastly, it might be beneficial for future research to explore the relationship between increases in activity level with participant's views on health-related behavior (e.g., being active also causes participants to be more aware of the food they eat).

Because lack of physical activity and obesity issues are of immediate concern in the U.S., especially among college-aged individuals, the implications of the current study are an important step within the field of health science with developmental importance. By requiring courses that promote healthy behaviors in the ways outlined above as part of a complete education, colleges and universities are in a unique position to combat obesity among youth and to encourage health-promotive choices and behaviors. Indeed, as a formative period during which attitudes and behaviors become established that individuals may carry with them into adulthood (Sullum et al., 2000), we believe that it is important to develop and assess the potential impacts of these programs in order that they may help young people become more active, and as a result, more health conscious during adolescence and emerging adulthood.

References

American College Health Association-National College Health Assessment (2007). *Spring 2007 Reference Group Data Report.* http://www.acha-ncha.org/docs/ACHA-NCHA_Reference_Group_Report_Spring2007.pdf

American College of Sports Medicine. (1995). *ACSM's guidelines for exercise testing and prescription* (5th ed.). Philadelphia, PA: Lea & Febiger.

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*, 469–480. doi: 10.1037/0003-066X.55.5.469

Blair, S. N. (1984). How to assess exercise habits and physical fitness. In J. D. Matarazzo, N. E. Miller, & S. M. Weiss (Eds.), *Behavioural health: A handbook of health and disease prevention* (pp. 424–447). New York, NY: Wiley.

Brynteson, P., & Adams, T. M. (1993). The effects of conceptually based physical education programs on attitudes and exercise habits of college alumni after 2 to 11 years of follow-up. *Research Quarterly for Exercise & Sport, 64*, 208–212.

Calfas, K. J., Sallis, J. F., Nichols, J. F., Sarkin, J. A., Johnson, M. F., Caparosa, S. ... Alcaraz, J. E. (2000). Project GRAD: Two-year outcomes of a randomized controlled physical activity intervention among young adults. *American Journal of Preventive Medicine, 18*, 28–37. doi:10.1016/S0749-3797(99)00117-8

Chisholm, D. M., Collis, M. L., Kulak, L. L., Davenport, W., & Gruber, N. (1975). Physical activity readiness. *British Columbia Medical Journal, 1*, 375–437.

Cohen, J. W. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

D'Alonzo, K. T., Stevenson, J. S., & Davis, S. E. (2004). Outcomes of a program to enhance exercise self-efficacy and improve fitness in Black and Hispanic college-age women. *Research in Nursing and Health, 27*, 357–369. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3210446/

Dishman, R. K. (1994). *Advances in exercise adherence.* Champaign, IL: Human Kinetics.

Egli, T., Bland, H. W., Melton, B. F., & Czech, D. R. (2011). Influence of age, sex, and race on college students' exercise motivation of physical activity. *Journal of American College Health, 59*, 399–406. doi:10.1080/07448481.2010.513074

Ferrara, C. M. (2009). The college experience: Physical activity, nutrition, and implications for intervention and future research. *Journal of Exercise Physiology Online, 12*, 23–35. Retrieved from http://faculty.css.edu/tboone2/asep/Ferrara12_1_23-35.pdf

Gortmaker, S. L., Peterson, K., Wiecha, J., Sobol, A. M., Dixit, S., Fox, M. K., & Laird, N. (1999). Reducing obesity via a school-based interdisciplinary intervention among youth. *Archives of Pediatric Adolescent Medicine, 153*, 409–418. doi:10.1001/archpedi.153.4.409

Hill, J. O., Wyatt H. R., Reed G. W., & Peters J. C. (2003). Obesity and the environment: Where do we go from here? *Science, 299*, 853–855. doi: 10.1126/science.1079857

Leslie, E., Sparling, P. B., & Owen, N. (2001). University campus settings and the promotion of physical activity in young adults: Lessons from research in Australia and the USA. *Health Education, 101*,116–125. doi: 10.1108/09654280110387880

Marcus, B. H., Forsyth, L. H., Stone, E. J., Dubbert, P. M., McKenzie, T. L., Dunn, A. L., & Blair, S. N. (2000). Physical activity behavior change: Issues in adoption and maintenance. *Health Psychology, 19*, 32–41. doi: 10.1037/0278-6133.19

Nebel, M. A. (1995). *Prevention of disordered eating among college women: A clinical intervention* (Doctoral Dissertation). Retrieved from Dissertation Abstracts International. (Order No. AAM9531106)

Rovniak, L. S., Anderson, E. S., Winett, R. A., & Stephens, R. S. (2002). Social cognitive determinants of physical activity in young adults: A prospective structural equation analysis. *Annals of Behavioral Medicine, 24*, 149–156. doi:10.1207/S15324796ABM2402_12

Sailors, M. H., Jackson, A. S., McFarlin, B. K., Turpin, I., Ellis, K., Foreyt, J. P. ... Bray, M. S. (2010). Exposing college students to exercise: The training interventions and genetics of exercise response (TIGER) Study. *Journal of American College Health, 59*, 13–20. doi:10.1080/07448481.2010.483712

Sale, C., Guppy, A., & El-Sayed, M. (2000). Individual differences, exercise and leisure activity in predicting affective well-being in young adults. *Ergonomics, 43*, 1689–1697. doi:10.1080/001401300750004096

Sallis, J. F., Calfas, K. J., Nichols, J. F., Sarkin, J. A., Johnson, M. F., Thompson, S., & Alcaraz, J. E. (1999). Evaluation of a university course to promote physical activity: Project GRAD. *Research Quarterly for Exercise and Sport, 70*, 1–10. doi:10.1007/BF02908296

Sarkin, J., Nichols, J., Sallis, J., & Calfas, K. (2000). Self-report measures and scoring protocols affect prevalence estimates of meeting physical activity guidelines. *Medicine & Science in Sports & Exercise, 32*, 149–156.

Shephard, R. J. (1988). PAR-Q, Canadian Home Fitness Test and screening alternatives. *Journal of Sports Medicine, 5*, 185–195. doi:10.2165/00007256-198805030-00005

Shephard, R. J. (1994). Readiness for physical activity. *Physical Activity Fitness Resource Digest, 1*, 1–8.

Simkin, L. R., & Gross, A. M. (1994). Assessment of coping with high-risk situations for exercise relapse among healthy women. *Health Psychology, 13*, 274–277. doi: 10.1037/0278-6133.13.3.27

Slava, S., Laurie, D. R., & Corbin, C. B. (1984). Long-term effects of a conceptual physical education program. *Research Quarterly for Exercise and Sport, 55*, 161–168.

Sparling, P. B. (2003). College physical education: An unrecognized agent of change in combating inactivity-related diseases. *Perspectives in Biology and Medicine, 46*, 579–587. doi: 10.1353/pbm.2003.0091

Sparling, P. B. (2007). Obesity on campus. *Preventing Chronic Disease, 4*, 72. Retrieved from www.pubmedcentral.nih.gov.

Stephens, T., Jacobs, D. R., & White, C. C. (1985). A descriptive epidemiology of leisure-time physical activity. *Public Health Reports, 100*, 147–158. Retrieved from http://www.ncbi.nlm.nih.gov/

Sullum, J., Clark, M., & King, T. K. (2000). Predictors of exercise relapse in a college population. *Journal of American College Health, 48*, 175–180. doi: 10.1080/07448480009595693

Stice, E., & Ragan, J. (2001). A preliminary controlled evaluation of an eating disturbance psychoeducational intervention for college students. *Eating Disturbance Intervention, 31*, 159–170. doi: 10.1002/eat.10018

Tiggemann, M., & Williamson, S. (1998). The effect of exercise on body satisfaction and self-esteem as a function of sex and age. *Sex Roles, 43*, 119–127. doi: 10.1023/A:1007095830095

Welsh, M. C., Robinson, T. L., & Lindman, L. S. (1998). Sex differences in health attitudes and choice of health behaviors. *Psychologist Reports, 83*, 1161–1162. Retrieved from www.ncbi.nlm.nih.gov

Author Note. Alyssa J. Matteucci, Department of Psychology, Drexel University; Daniel Albohn, Department of Psychology, Millersville University; Tara M. Stoppa, PhD, Department of Psychology, Eastern University; Wendy Mercier, PhD, Department of Biokinetics, Eastern University.

Correspondence concerning this article should be addressed to Alyssa J. Matteucci, Department of Psychology, Drexel University, Philadelphia, PA 19146. Email: alyssa.j.matteucci@drexel.edu

