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Determining the Relationship between Self-Efficacy and Exercise Frequency among University Students

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Abstract

The purpose of this study was to determine what effect, if any, frequency of exercise had on self-efficacy and fitness levels over a fifteen-week period. Participants included 75 female students enrolled in aerobics classes at a rural university. The study consisted of pre- and post-testing of a self-efficacy instrument, cardiovascular fitness, flexibility, muscular strength, muscular endurance, and body fat. Between groups repeated measure analysis of variance indicated a nonsignificant difference between pre- and post-test exercise self-efficacy between classes that met two days per week and classes that met three days per week. Results also indicated a nonsignificant difference between pre- and post-test fitness tests for 1.5-mile run, push-ups, curl-up, and body fat. However, there was a statistically significant difference in pre- and post-test stretch between the two groups. Overall results indicated that there was no statistically significant difference in fitness levels and frequency of exercise between the two groups in four out of five tests. Although differences were not seen in fitness between two days and three days a week, the study does support that exercise alone can help with self-efficacy and overall well-being of college students. The results of this study may be beneficial to college campus efforts in supporting and maintaining a healthy campus and well-being of their students.

Keywords : Exercise duration, Exercise frequency, Fitness testing, Physical activity, Fitness, Self-efficacy

1. Introduction

The decline in fitness and physical activity is well documented. Studies indicate that overweight youth may never achieve a healthy weight, and up to 70% of obese teens may become obese adults. (President's Council on Fitness, Sports & Nutrition, 2017c). According to May, Freedman, Sherry and Blanck (2013), the obesity rate among children has risen from 5% in the early 1970's to 17% in 2010. Healthy People 2020 reported from 2009 – 2012, 16.9% of children and adolescents ages 2 to 19 were considered obese. The 2010 Surgeon General's report stated that physical activity plays an important role in the prevention and control of obesity. With regards to children, The U.S. Department of Health and Human Services recommends that young people aged 6–17 years participate in at least 60 minutes of physical activity daily (2017a). Only one in three children achieves the minimum amount of physical activity they need each day. Children spend an average of more than seven-and-a-half hours a day on screen time (President's Council on Fitness, Sports & Nutrition, 2017b). This may be the fundamental problem that supports the fact participation in physical activity declines as young people age (President's Council on Fitness, Sports & Nutrition, 2017b). On a positive note, Oaten and Cheng (2006) found that over a two-month period of participation in a regular exercise program, college aged students engaged in healthier behaviors. In 2009, Sidman, D'Abundo and Hritz found that college students reported a greater ability to stick to their exercise program regardless of not having time for it. Furthermore, the college students had higher levels of exercise self-efficacy beliefs and high overall wellness perceptions. Self-efficacy is thought to be the primary determinant of human behavior (Martin and Kulinna, 2004).

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Albert Bandura has done extensive research in the area of self-efficacy. According to Bandura (1977; 2003), self-efficacy is related to a person's performance beliefs and how they exercised control to achieve their desired outcome. For example, if a person was facing a challenging situation and believed he/she was able to accomplish the task he/she would be more likely to attain his/her goal. Conversely, a person's perceived inefficacy had the same effect on the outcome. Bandura (1998) found that a person might fail to perform at his or her potential even though he or she possessed the needed skills and knowledge. Therefore, the quantity of skills established by an individual was not as important as what the individual believed he or she was able to achieve with the skills that he or she had developed. Bandura went on to say that, skills could be overruled by self-doubt resulting in a highly skilled individual, scholarly or athletic, making poor use of their capabilities. Meanwhile, an individual with a strong sense of self-efficacy was capable of overcoming incredible obstacles. Bandura (2003) stated that self-efficacy was situation specific and did not refer to personality characteristics. Self-efficacy was affected by the prior success of an individual in relation to previous attempts at similar situations.Research indicates that there is a relationship between self-efficacy and exercise behaviors. Therefore, the purpose of this study was to determine the effect that frequency of exercise had on self-efficacy and fitness levels.

2. Method

A convenient sample yielded seventy-five (N=75) participants enrolled in a southern mid-major university Physical Activity Class (PACT, Rhythmic Aerobics). One section of rhythmic aerobics was offered three days per week, and the other three sections were offered two days per week. Participants ranged in age from18 to 33 years (M = 20.226, SD = 2.714). Ethnic background was mostly reported as Caucasian (62.7%) followed by African American (34.7%), Asian (1.4%), and Other (1.4%). Participants did not receive any compensation for their involvement in the study. Prior to data collection, Institutional Review Board approval was obtained from the institution where the study took place. During the first week of class, the researcher visited each class and informed the participants of the study. The participants were given an information letter and consent form that stated that participation in the study would not affect their final grade. At this time, informed consent was obtained as well as the pre-testing portion of the research. To ensure that students did not feel coerced to participate in the study each instructor performed their own pre/post testing for the purpose of their syllabus requirements. The researcher was not the instructor.

2.1. Pre-test.

Participants were given a pre-exercise self-efficacy written questionnaire. Participants also completed a series of pre-tests for fitness (i.e., curl-up, push-ups, and sit and reach) the first day. During the second day of fitness pre-tests, students completed the body fat test followed by the 1.5-mile run/walk. During the 15-week semester students participated regularly in their respective classes. No effort was made to change or modify the course content. During the last week of the semester, the students were given the post-test.

2.2. Post-test.

The same procedures utilized in the pre-test were followed for post-testing. Participants' post-data collection forms were matched with their pre-test forms according to the participant identification number.

2.3. Instrumentation

Albert Bandura developed the self-efficacy instrument. The instrument was modified by Garcia and King (1991) and consisted of 15 questions, each ranked by participants on a ten-point scale. The method of determining fitness level consisted of body fat testing (skinfold calipers), muscular strength (push-ups), cardiovascular fitness (1.5 mile run/walk), muscular endurance (curl-up), and flexibility (sit and reach) according to the standards set forth by the American College of Sports Medicine (2013).

2.3.1 Cardiovascular fitness.

Participants were tested using the Cooper 1.5 mile run (Cooper & Cooper, 1972). Testing occurred in the university's indoor track. After a brief self-directed warm-up, participants were timed as they ran/walked nine laps around the track. Participants were encouraged to run but were told to walk if they needed to or so desired. Upon completion of the run/walk, participants' times were recorded.

2.3.2. Flexibility.

For the purpose of this study, participants performed a trunk flexion (sit and reach) test. The participants performed the test using a sit and reach box. Participants had three attempts at leaning over the box to move a marker the furthest distance possible. The furthest distance stretched on the sit and reach test was recorded in inches.

2.3.3. Muscular strength.

For the purpose of this study, a modified push-up was administered. Participants performed push-ups until they could no longer complete a push-up with proper form, or they chose to stop. The number of proper formed push-ups were recorded and used in the data analysis.

2.3.4. Muscular endurance.

ACSM curl-up test was administered. Participants completed as many curl-ups as possible within a one-minute time limit. Upon completion of the test, the number of proper form curl-ups were recorded on the data collection form.

2.3.5. Body fat testing.

Using the guidelines and procedures set forth by ACSM, a three-site skin fold measurement was tested using calipers. Females; measurements were taken from the triceps, suprailiac and the thigh. All measurements were taken on the right side of the body. Two measurements were taken at each site. Any measurement that varied greater than one millimeter was taken a third time. The sum of the three sites were calculated to determine body fat percentage.

3. Data Analysis

Pre-test and post-test scores were entered into SPSS, and repeated measures general linear model was used to determine the significance of the results from trial to trial. Data were screened for outliers by means of observation. Descriptive statistics were calculated to obtain important information regarding the participants and their performance levels from pre- to post-testing. Between-groups repeated measures analysis of variance was used to determine the difference between the two days per week and threedaysperweek classes.

4. Results

The participant total (N = 75) consisted of all women. The age of the participants ranged from 18 to 33 years (M = 20.22). Ethnicity was divided into four categories: Caucasian (n = 47), Black (n = 26), Asian (n = 1) and Other (n = 1). The students' classification in college was represented as: Freshman (n = 18), Sophomore (n = 24), Junior (n = 19), Senior (n = 12) and Graduate student (n = 2). Frequency was determined by two categories: students enrolled in aerobics classes that met two days per week (n = 60) (Group 1) and classes that met three days per week (n = 15) (Group 2).

4.1 Effects of frequency on self -efficacy

The descriptive statistics in Table 1 identify the mean and standard deviation for pre- and post-exercise self-efficacy between Group 1 and Group 2. The pre-test exercise self-efficacy mean of Group 1 (N = 60) was 56.46 (SD = 18.57) compared to the post-test mean of 63.31 (SD = 18.17). The pre-test exercise self-efficacy computed mean of Group 2 (N = 15) was 57.76 (SD = 17.51) compared to the post-test mean of 61.56 (SD = 18.45). Repeated measures general linear model was used to determine the significance of the results of self-efficacy from trial to trial (Table 2). Results determined that there was not a significant difference for the between subjects variable, Days met,($F = .002$, $p = .963$) from trial to trial. Additionally, there was a significant difference ($F = 5.7$, $p = .019$) for the within subjects variable of Time from trial to trial at the $p = <.05$ level from the group as a whole. However, there was not a significant difference between the two groups ($F = .456$, $p = .497$) for Time x Days met from trial to trial at the $p = <.05$ level.

Table 1 Means and Standard Deviations for Self-Efficacy			
Variable	N	M	SD
Self-efficacy			
Group 1 (2 days per week)			
Pre	60	54.46	18.57
Post	60	63.31	18.17
Group 2 (3 days per week)			
Pre	15	57.76	17.51
Post	15	61.56	18.45

*p< .0

Table 2 Repeated Measures ANOVA for Self-Efficacy			
Source	df	F	p
Between subjects			
Days met (D)	1	.002	.963
error	73		
Within subjects			
Time (T)	**1**	**5.7**	**.019***
T x D	1	.465	.497

*p< .05

4.2 Effects of frequency on Fitness

The five tests administered to determine fitness levels for the purpose of this study, were 1.5-mile run/walk, sit and reach, push-ups, curl-up, and body fat.

4.2.1. 1.5 Mile Run

The pre-test 1.5 mile run computed mean time of Group 1 (N = 60) was 19.63 (SD = 3.86) compared to the post-test mean time of 18.10 (SD = 3.25). The pre-test 1.5 mile run computed mean time of Group 2 (N = 15) was 19.88 (SD = 2.40) compared to the post-test mean of 17.23 (SD = 1.47). Repeated measures general linear model was used to determine the significance of the results of 1.5 mile run from trial to trial. There was not a significant difference between the two groups (F = 3.657, p =.060) for Time x Days (Table 4) met from trial to trial at the p = <.05 level; however, the p value was approaching significance. Furthermore, results determined that there was a significant difference (F = 50.881, p =.000) for the within subjects variable of Time from trial to trial at the p = <.05 level from the group as a whole (Table 3).

Table 3Summary Table of Repeated Measures ANOVA Within Subjects (Time-from trial to trial)			
Source	df	F	p
HO1:Self-efficacy	1	5.7	.019*
HO2:Fitness levels.			
1.5 Mile Run	1	50.881	.000*
Sit and reach	1	42.664	.000*
Push-up	1	81.199	.000*
Curl-up	1	62.789	.000*
Body Fat	1	17.773	.000*
*p<.05.			

Table ummary Table of Repeated Measures ANOVA Between Subjects (Time x Days met)			
Source	df	F	p
HO1: Self-efficacy	1	.465	.497
HO2:Fitness levels.			
1.5 Mile Run	1	3.657	.060
Sit and reach	**1**	**6.430**	**.013***
Push-up	1	.202	.654
Curl-up	1	2.944	.090
Body Fat	1	.707	.403
*p<.05.			

4.2.2. Sit and reach

The pre-test sit and reach computed mean for Group 1 (N = 60) was 6.00 (SD = 2.71) compared to the post-test sit and reach mean of 8.12 (SD = 2.88). The pre-test sit and reach computed mean of Group 2 (N = 15) was 6.21 (SD = 3.07) compared to the post-test sit and reach mean of 7.15 (SD = 2.92). Repeated measures general linear model was used to determine the significance of the results of flexibility from trial to trial (Table 4). Results determined that there was a significant difference for the between subject variable, Days met, (F = 6.430, p =.013) from trial to trial. Additionally, results determined that there was a significant difference (F = 42.664, p =.000) for the within subjects variable of Time from trial to trial from the group as a whole (Table 3).

4.2.3. Push-ups

The pre-test push-up computed mean for Group 1 (N = 60) was 17.40 (SD = 9.20) compared to the post-test push-up mean of 28.50 (SD = 12.56). The pre-test push-up computed mean of Group 2 (N = 15) was 16.60 (SD = 9.20) compared to the post-test push-up mean of 28.86 (SD = 9.99). Repeated measures general linear model was used to determine the significance of the results of muscular strength from trial to trial. Results determined that there was a significant difference (F = 81.199, p =.000) for the within subjects variable of Time from trial to trial from the group as a whole (Table 3). However, there was not a significant difference between the two groups (F =.202, p =.654) for Time x Days (Table 4) met from trial to trial.

4.2.4. Curl-ups

The pre-test curl-up computed mean for Group 1 (N = 60) was 49.00 (SD = 13.93) compared to the post-test curl-up mean of 65.66 (SD = 14.64). The pre-test curl-up computed mean of Group 2 (N = 15) was 42.13 (SD = 8.65) compared to the post-test curl-up mean of 52.86 (SD = 5.92). Repeated measures general linear model was used to determine the significance of the results of muscular endurance from trial to trial (Table 3). Results determined that there was a significant difference (F = 62.789, p =.000) for the within subjects variable of Time from trial to trial (Table 3) from the group as a whole. However, there was not a significant difference between the two groups (F = 2.944, p =.090) for Time x Days (Table 4) met from trial to trial.

4.2.5. Body Fat

The pre-test body fat computed mean for Group 1 (N = 60) was 24.68 (SD = 4.96) compared to the post-test body fat mean of 23.10 (SD = 4.90). The pre-test body fat computed mean of Group 2 (N = 15) was 25.53 (SD = 4.62) compared to the post-test body fat mean of 24.51 (SD = 4.41). Repeated measures general linear model was used to determine the significance of the results of muscular endurance from trial to trial. Results determined that there was a significant difference (F = 17.773, p =.000) for the within subjects variable of Time from trial to trial and there was not a significant difference between the two groups (F = .707, p =.403) for Time x Days met from trial to trial (Table 3 and Table 4 respectively).

5. Discussion

The present study was designed to examine whether: (a) frequency of exercise had a significant effect on self-efficacy, and (b) frequency of exercise had a significant effect on fitness levels. The results did not support that frequencyof exercise had a significant effect on self-efficacy and fitness levels between exercising 2 days and 3 days a week. The researchers point out that there was a significant difference in flexibility between the 2 days a week and 3 days a week groups. The 2 day a week group had higher sit and reach scores post-test than the 3 day a week group. Consistent with findings in the literature, results of this study indicated that participation in regular physical activity results in a significant difference in fitness levels over an extended period of time (Cardinal & Cardinal, 1997). The ACSM (2013), Kennedy and Newton (1997), Lane and Lovejoy (2001), Pollock and Vincent (1996), Spence and Blanchard (2001), and USDHHS (1996a; 2003) agreed that exercise is beneficial for people of all ages.In regards to self-efficacy, Marcus, Selby, Niaura, and Rossi (1992), and Spence and Blanchard (2001), reported that different exercise stages have different degrees of exercise-specific self-efficacy. Group 1 (two days per week) had a higher post-test self-efficacy, while Group 2 (three days per week) had a higher pre-test self-efficacy. Group 1 (two days per week) had greater increase on self-efficacy; meanwhile, Group 2 (three days a week) increased much less, perhaps because they had a higher self-efficacy to begin with. This outcome was opposite of what was expected according to the related studies of Spence and Blanchard (2001) and Keller, Fleury, Gregor-Holt and Thompson (1999). In closing, it was evident that participants in both groups increased their exercise self-efficacy as well as their fitness levels during the fifteen-week period, regardless of frequency levels. The researchers do recognize degree of difficulty and the intensity of the workouts could have varied between the different instructors. Additionally, students' class attendance, as well as the amount of exercise performed outside of class, may have had an effect on the results of the study. Nonetheless, the study's result does have merit in supporting that exercise can affect self-efficacy and fitness levels.

6. Implications

The results of this study are important for health care promotion practitioners and universities offering physical activity courses for several reasons. First, the findings indicate that the frequency of exercise may not be as important as the duration. Participation in a fitness program offered two days per week versus three days per week, with equal duration and training intensity, might result in similar fitness gains. In fact, in the ACSM's position statement on frequency, duration, and intensity of exercise, indicates intensity plays a more significant role in fitness gains Garber et al. (2011). This concept may be more appealing to individuals who want to maintain or improve already established fitness levels. A two day a week course would enable them to have the freedom to choose other exercise options on their non-scheduled class days. Health care providers can also consider this when prescribing exercise intensity in concurrence with time and duration.Secondly, college students setting a fifteen-week exercise goal is achievable. If college students believed that it was possible to increase fitness levels by enrolling and participating in a university aerobics class, regardless of fitness levels, students may be more likely to enroll in a university based physical activity course. Thirdly, since the majority of participants were enrolled in a two day per week class, it may be more advantageous for universities to offer more fitness classes two days per week. Researchers, in the study, observed that the two-days-per-week schedule was selected over the three days per week classes due to the nature of the class. Students generally tried to arrange their schedules so that they did not have to attend a lecture class immediately following their workout. Therefore, students were able to achieve their fitness goals while accommodating their semester schedule by allowing them the freedom to engage in other campus activities, work, or other exercise endeavors on their non-scheduled class days.Finally, this study is beneficial to individuals who may be hesitant to begin a fitness program based on their initial fitness levels. It may be more appealing to participants with low levels of fitness, thus low levels of self-efficacy, to be more comfortable participating in a structured aerobics class offered fewer days per week. In conclusion, the purpose of this study was to determine what effects, if any, that frequency of exercise had on self-efficacy and fitness levels over a fifteen-week period. Although the results of this study indicated that there was no significant difference in either self-efficacy or fitness levels between the two groups, this study is beneficial to health care providers concerning the positive effects of fitness over time.

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