The Effect of Physical Activity Homework on Physical Activity Among College Students

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Background: This study examined the effect of using physical activity homework on physical activity levels of college students. Methods: Students in randomly assigned sections of a university health course were assigned 30 minutes of physical activity homework 3 days a week or no homework for 12 weeks. Participants completed self-reports of physical activity before the homework intervention and again at the conclusion of the 12 weeks of physical activity homework. Results: Participants in all course sections reported significant increases in the number of days per week of moderate and vigorous physical activity. Participants in homework sections additionally showed significant increases in the days they engaged in muscular strength/endurance training and activities to manage weight. Participants in sections without homework showed a significant increase in the number of days engaged in flexibility training. Comparison of gain scores showed statistically significant increases by the homework group in the days they participated in activities designed to manage weight. Conclusion: Physical activity homework was deemed to be an effective method of increasing college students' levels of physical activity.

Keywords: health promotion, physical education, health behavior

Most Americans do not get enough physical activity to achieve health benefits from exercise. The Centers for Disease Control and Prevention (CDC) data from the Behavioral Risk Factor Surveillance System (BRFSS) show that 52.8% of Americans do not meet the recommended guidelines for moderate physical activity, and 73.7% do not meet recommended guidelines for vigorous physical activity. This lack of physical activity has been associated with a myriad of health problems such as obesity, heart disease, and diabetes.

College students are not immune to these problems, and increasing the physical activity levels of college students has the potential to contribute to the prevention of inactivity-related chronic diseases among this segment of the US population. In a recent survey conducted at the regional state university used in this study, when students were asked to report the number of days they participated in 20 minutes of vigorous exercise or 30 minutes of moderate exercise in the last week, 28% of students reported no moderate or vigorous exercise. Another 34% reported that they only exercised 1 to 2 days a week. This corresponds to data from the 2007 National College Health Assessment, which found that 28.1% of college students did not participate in any moderate or vigorous physical activity, and another 28.6% only participated in physical activity 1 to 2 days a week.

A number of groups have been recognized as potential contributors to the solution of this problem. Local governments are being encouraged to make their parks more accessible and their communities more pedestrian friendly. Parents are being encouraged to become more involved in physical activity with their children to set themselves up as good role models. Colleges are supporting a variety of campus activities, and state-of-the-art fitness centers are being built in an attempt to improve physical health among students. Physical educators are receiving renewed support in their efforts to get students physically active and fit. However, the amount of physical activity time in which students can participate during physical education classes at any level, elementary school through college, is not enough to meet the CDC recommendations. Therefore, students must be encouraged to participate in regular physical activity beyond the amount of time spent in a physical education class. The US Department of Health and Human Services (USDHHS) has targeted for improvement several specific areas of physical activity. Their recommendations include increasing the number of people who engage in (a) vigorous physical activity 3 or more days per week.
Participants were students enrolled in a health education course at a regional, comprehensive university in the southeast. The health class covered a broad array of health topics including drug and alcohol use and abuse, sexuality, and nutrition and placed a great deal of emphasis on physical activity and its contribution to health. Participants were students in 17 intact sections of the health course who had been asked to fill out questionnaires at the beginning of the semester and again 12 weeks later regarding their levels of physical activity. An informed consent form was given to each student, assuring that completion of the questionnaire was voluntary, and approval of the protocol of the study was granted by the university’s Institutional Review Board.

Data for the study were used only from those students who filled out both forms in their entirety and voluntarily and who submitted forms at both the beginning of the semester, before the physical activity homework had been assigned, and again 12 weeks later. A total of 365 students completed both surveys completely, 201 in the course sections that did not have physical activity homework assignments and 164 in classes that were assigned physical activity homework. A total of 217 additional students completed either the first or second survey of physical activity but did not fill out a second survey or did not fill out the second page of the survey. Reasons for failure to complete both surveys or complete them fully may have been the result of students withdrawing from the class between surveys, being absent on the day of one of the surveys, choosing not to complete a survey, or being unaware that the survey had a second page. Data analysis was conducted to check for discrepancies in the results of those students who completed both surveys and those who took only one. Analysis of a t-test for each variable showed no significant differences between those participants who completed both surveys and those who completed only one.

The health classes that composed this study met for 150 minutes per week on 2 (Tuesday/Thursday [TR] classes) or 3 (Monday/Wednesday/Friday [MWF] classes) days per week. Requirements for all sections of the health class included

1. a 5-week Behavior Change Project with students free to select for improvement any health-related behavior and
2. the use of heart rate monitors to help teach the importance of exercise for cardiovascular fitness and how to calculate their target heart rate zones.

One-third of all classes was devoted to physical activity. On a typical week for a MWF class, the class met in a classroom for traditional lecture and discussion.
for 2 days per week and then met at the pool, soccer field, running track, etc for the third day of instruction. Instructors of the TR classes had the option of meeting every third 75-minute class in an activity space or grouping the activities together in a 5-week period in which each class would be an activity session for 10 consecutive class meetings—the other 10 weeks of class were lecture and discussion in the classroom.

Ages of the students participating in the study and who completed both questionnaires ranged from 17 to 54 (mean = 19.43 years, SD = 3.41); 206 (56.44%) of the students were male and 159 (43.56%) of the students were female. Six different instructors taught the classes, assisted by 6 additional graduate assistants who led the physical activity portions of the classes.

The participants in this study were generally more physically active at the outset than national and state norms. Whereas 56.44% of our participants reported meeting the recommendations for physical activity (30+ minutes of moderate physical activity 5 or more days per week, or 20+ minutes of vigorous physical activity 3 or more days per week), the CDC’s BRFSS data for 2005 reported that only 40.8% of adults nationwide and 36.1% of North Carolina’s adults reported meeting those guidelines.2 When compared with Healthy People 2010 recommendations, the participants in the study surpassed the 2010 goals for vigorous physical activity but were below the recommended activity levels for moderate physical activity (Figure 1). Self-reports of physical activity indicated that over 34% of the students were engaged in vigorous physical activity for a minimum of 20 minutes, 3 days per week at the beginning of the semester, and almost 13% of the students reported participating in moderate physical activity for a minimum of 30 minutes, 5 days per week.

Measures

The physical activity questionnaire used in the study was adapted from questions used in Healthy People 2010.7 These questions were pulled from the National Health Interview Survey (NHIS),24 which is a multipurpose health survey conducted by the National Center for Health Statistics and the Centers for Disease Control. This survey instrument has been used to gather national health data since 1957. These same questions have been used by the American College Health Association in their National College Health Assessment.5

The physical activity questionnaire asked participants to report how often during the last week they participated in (a) vigorous physical activity for at least 20 minutes that caused heavy sweating or large increases in breathing or heart rate (vigorous activity), (b) moderate physical activity for at least 30 minutes that caused sweating or a moderate increase in breathing or heart rate (moderate activity), (c) physical activities specifically designed to strengthen muscles, and (d) physical activities specifically designed to enhance and maintain flexibility. Furthermore, the participants were asked to report the approximate duration of each of these activities. In addition, participants were asked a question not related to the Healthy People 2010 goals. They were asked how often, over the last week, they participated in physical activity designed to maintain or lose weight. The questionnaire was pilot tested by a class of 40 students during the semester before its administration, and modifications specific to the university were made based on the results of the pilot test.

Self-reports have been shown to be effective measures of physical activity.22,23 Self-reports of physical activity were administered at the beginning of the semester and again 12 weeks later.

Procedure

The 17 sections of the health classes were randomly assigned to either the treatment group (those given physical activity homework—8 sections) or the control group (no physical activity homework—9 sections). Students in the sections with homework were instructed to keep a personal log of the type, length, and intensity of physical activity they acquired each day and to turn in the log to their instructor each week. In addition to the in-class physical activity that was an integral part of the course for all students, the students with physical activity homework assignments were required to participate in at least 30 minutes of physical activity of their choice for an additional 3 days each week. They were allowed to complete the activity in one continuous 30-minute bout or in two 15-minute or three 10-minute bouts per day. Their homework was used as a portion of their final grades.

Students were allowed to choose the type of physical activity they wished for the completion of their homework. Allowing students to choose the form of physical activity in which they participated and holding students accountable for their homework by having it count toward their grades were both consistent with recommendations from research into the effectiveness of using activity homework in physical education. Previous research had shown that assigning physical activity homework had no significant effect on increasing levels of physical activity when the homework was not used in the computation of grades.19 Incorporating the homework into the grading system was designed to remedy that omission.

It is important to note that the submission of the physical activity homework logs that were used for grading purposes was independent of the submission of the questionnaires that were used in the data analysis for this study. Students were made aware of the differences. For instance, they signed their names to the homework logs to receive credit for that portion of their grade. The submission of their physical activity surveys that were used for comparison in the study was far more anonymous; students recorded only an identification number, not their name, to report their engagement in physical activity on the questionnaire. Furthermore, the surveys
participated in vigorous exercise, moderate exercise, muscular strength/endurance training, flexibility training, and physical activity for weight management. For comparison with national baselines and goals, participants’ initial levels of physical activity were computed to determine the percentage of participants who were physically active at vigorous and moderate levels. Means and standard deviations were computed for all participants and participants assigned to intervention categories (physical activity homework [PA] or no physical activity homework [NPA]) were computed.

For the purpose of comparing the effect of the homework intervention on changes in physical activity levels, gain scores were computed for both groups. A t test was conducted to examine the difference between

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**Figure 1** — Comparison of beginning-of-semester reports to baselines (How Healthy is our Campus Survey; National College Health Assessment) and goals (Healthy People 2010). * No flexibility data available for campus survey data.
the change in frequency of moderate physical activity, vigorous physical activity, muscular strength training, flexibility training and physical activity for weight management.

**Results**

The participants in the study were more active than the typical US adult and more active than the typical US college/university student in 2 out of 3 measures at the beginning of the study. Analysis of the preintervention data showed that 35% of the participants in all of the health classes reported engagement in vigorous exercise at least 3 days per week for at least 20 minutes and 13% were engaged in moderate exercise for at least 5 days per week and 30 minutes per session. They also were active in muscular strength and endurance training at a high rate (47% engaged in strength/endurance training at least twice per week) and in flexibility training (54% engaged in flexibility training in the past week). Participants in this study exceeded the national baselines in all categories for physical activity except for moderate physical activity at least 5 days per week (see Figure 1).

Before the intervention, participants in the sections of health class that were assigned PA homework reported being slightly less physically active than participants in the NPA sections (see Figure 2). Comparisons of means showed that over the 12 weeks of the study, the number of days in which participants engaged in physical activity increased, regardless of their assignment to the treatment or control group. Analysis of t-tests for both groups showed significant increases in the number of days they participated in moderate and vigorous physical activity. The participants in the PA group increased significantly in the number of days they engaged in muscular strength and endurance activities and in activities to control or manage weight. The NPA group increased significantly in the number of days they engaged in flexibility activities.

An analysis of gain scores shows that the PA group had average increases that exceeded the NPA group’s increases in every area of physical activity (see Table 1). Although the PA group’s gain scores neared significance (.058) in exceeding the NPA group in the number of days in which participants participated in muscular strength and endurance activities, the only variable that met the .05 level of significance was the number of days in which the PA group engaged in physical activity to manage or lose weight.

**Discussion**

This study investigated the effect of assigning physical activity homework to students in college health classes. Physical activity homework has been recommended by the Centers for Disease Control and Prevention as a way to increase physical activity levels of school-age children. The American College Health Association has included increasing physical activity among college students as one of its national goals. However, no study has been conducted to measure the effect of homework on physical activity levels of college students.

This study randomly assigned 8 sections of a university health course to have physical activity homework (PA), while 9 sections of the same course did not (NPA). Participants in the study completed self-reports of physical activity, and comparisons were made among activity levels of PA participants and NPA participants.

Participants in all sections of the health classes were initially more active than the normal US adult population at the beginning of the study. Participants exceeded the national baseline and the Healthy People 2010 goals for vigorous physical activity, muscular strength/endurance training, and flexibility activities but failed to meet the recommended goals for moderate physical activity. After 12 weeks of intervention (physical activity homework assignments), PA participants significantly increased the number of days per week they were involved in both moderate and vigorous physical activity, as well as muscular strength/endurance training, and physical activity to manage weight. NPA participants showed significant increases in the number of days they engaged in moderate activity, vigorous activity, and flexibility activities.

Our hypothesis was that assigning physical activity homework to the PA sections would result in greater increases of physical activity in that group. Comparisons of gain scores showed that the PA group had a significantly larger gain in the number of days they participated in physical activity to manage weight than the NPA group. Although the PA group had larger increases than the NPA group in the number of days they were active in all of the other variables, only the gain in the number of weight management days reached significance.

One explanation for the lack of greater comparative gains by the PA group might be that the typical health class in the study included 1 day per week of physical activity, most of which was classified as moderate physical activity. This may have contributed to the increases in physical activity for both the homework and no-homework groups. In addition, the behavior change projects that were required in each of the classes might have led to more physical activity in all sections. Students in all sections of the health course were required to select one aspect of health and modify their behavior over the course of the semester to improve their health. Many chose to increase their levels of physical activity to meet that requirement. Finally, the fact that the participants in this study were more active than the general population at the beginning of the study left less opportunity to increase physical activity than if they were very inactive from the outset.

A previous study recommended that students who were assigned physical activity homework should be given maximum autonomy in choosing the type of physical activity in which to participate. That recommendation was incorporated into this study. The homework assigned to the students was very general,
requiring only that students participate in some type of physical activity for 30 minutes for 3 days per week in addition to the physical activity they did as a part of the class. Students chose a variety of activities, including walking, running, weight training, and intramural activities. Further research into physical activity homework could investigate the potential for increasing specific Healthy People 2010 activity goals such as days per week of flexibility or muscle strength/endurance training by requiring specific activities to be assigned as homework.

The study used self-reports of physical activity to document the physical activity levels of the participants. Other objective measures, such as the use of pedometers to record levels of physical activity, could be used in future studies of the effect of physical activity homework on physical activity levels.

The current study took place in multiple sections of a university health course, but there is no reason to believe that it would not have the same effect on increasing physical activity levels of students in health or physical education classes in public schools or in higher education settings. Still, research into the use of physical activity homework in physical education classes is another area where further study is needed. Because of the fact that the participants in the study reported high levels of physical activity at the beginning of the study, questions remain about the potential for impacting physical activity levels of more sedentary students through the use of physical activity homework.

Figure 2 — Physical activity self-reports.
An important goal for health and physical education teachers is to increase the physical activity levels of their students. It appears, from the results of this study, that assigning physical activity homework has great potential to help in that effort.

References


Table 1 Means and t-Test Results of Physical Activity Self-Reports

<table>
<thead>
<tr>
<th>Condition</th>
<th>Pretest mean (SD)</th>
<th>Posttest mean (SD)</th>
<th>Change mean (SD)</th>
<th>P for change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days per week, moderate activity</td>
<td></td>
<td></td>
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<tr>
<td>PA homework</td>
<td>2.31 (1.75)</td>
<td>3.11 (1.67)</td>
<td>0.73 (1.88)c</td>
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<td>2.36 (1.82)</td>
<td>2.82 (1.60)</td>
<td>0.47 (1.85)c</td>
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<td>Days per week, vigorous activity</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>PA homework</td>
<td>1.79 (1.86)</td>
<td>2.19 (1.73)</td>
<td>0.42 (1.60)a</td>
<td>.1500</td>
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<td>1.95 (2.02)</td>
<td>2.19 (1.82)</td>
<td>0.23 (1.82)c</td>
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<td>Days per week, muscular strength/ endurance activity</td>
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<td></td>
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<tr>
<td>PA homework</td>
<td>1.68 (1.92)</td>
<td>2.10 (1.90)</td>
<td>0.46 (1.80)b</td>
<td>.0579</td>
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<td>1.97 (1.84)</td>
<td>0.15 (1.86)</td>
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<td>Days per week, flexibility activity</td>
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<tr>
<td>PA homework</td>
<td>1.54 (1.94)</td>
<td>1.78 (1.93)</td>
<td>0.28 (2.03)</td>
<td>.3254</td>
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<td>1.90 (1.89)</td>
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<td>Days per week, weight management activity</td>
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<tr>
<td>PA homework</td>
<td>1.69 (1.98)</td>
<td>2.17 (2.10)</td>
<td>0.53 (2.28)b</td>
<td>.0293</td>
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<td>2.19 (1.98)</td>
<td>0.07 (2.28)</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviation: PA, physical activity.

a P < .05.
b P < .01.
c P < .001.