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ABSTRACT

A number of existing studies focus on the effect exercise and dietary habits have on social relationships; however, few studies examine the relationship between exercise and academic performance on college students. In this study, surveys were administered to 202 students at the University of New Hampshire. Although the data presented no statistically significant findings to prove a correlation between exercise and academic performance, students who never exercised were shown to be more likely to do poorly rather than excel academically. Future research should consist of a larger sample using a random sampling method for better reliability and validity in determining a relationship between student exercise and academic performance.

INTRODUCTION

Weight gain and obesity are growing health concerns (Gruber 2008). Among university students weight gain is especially prevalent giving way to the ubiquitous expression "the freshman 15". In a college environment, however, exercise is common in part because of various social desires, such as being physically fit or having healthier habits. The purpose of this paper is to explore whether the time college students spend exercising will boost their academic achievement.

LITERATURE REVIEW

There is limited peer-reviewed research on the relationship between exercise and academic achievement. However, there is an abundance of research pertaining to factors regarding the social support of exercise, dietary habits, and academic performance. Due to the affiliation between physical activity and healthy habits along with healthy diet, research studies including one or more variables were taken into consideration for the purpose of this study.

Gruber (2008) demonstrated that social support is a powerful motivator for college students' diet and exercise behavior. The study assessed changes in behavioral patterns such as lower rates of physical activity, more overeating and poor nutritional choices. In addition to the previously mentioned variables, weight gain in the first few years of college was also found to be of significance. Patterns of social influence in regard to college student physical activity and consumption habits were measured using an assessment inventory Friend/Peer Support scale. This scale included factors such as encouragement to exercise, avoidance of high fat foods, criticism about exercise behavior, and support for dieting or exercise to lose weight. The study indicates that female participants were more likely to find peer support for maintaining a healthy diet and a regular exercise routine than males. This distinction was accompanied by more exercise encouragement, better dietary habits, weight loss, and higher criticisms. These results are plausible when considering the social and physical pressures society and media put on young women.

A study conducted by Field, Diego, and Sanders (2001) assessed how exercise influenced high school adolescents' relationships and academics using a questionnaire study design. A number of variables (e.g., relationships with parents and peers, depressive tendencies, drug use, sports involvement, and academic performance) were measured. The study concluded that exercise was most influential on relationships with parents and peers due to the social support for the activity. However, frequent engagement in exercise also correlated with less drug use and more time spent

playing sports. Findings also showed that those in the high-exercise group reported higher grade point averages. This positive correlation could be attributed to an increase in neurotransmitters, such as serotonin, that are scientifically linked to increased exercise (Field *et al.* 2001). In regard to spurious variables, the study discussed better familial relationships as a possible additional factor that enhanced academic performance.

Trudeau and Shephard (2008) conducted a study which investigated the relationships between academic performance and school-based physical activities in primary school students through systematically reviewing available comprehensive literature from databases. Rather than examining independent student exercise, this study looked at physical education, free school physical activity, and school sports. Overall, previous literature consistently displayed that an additional hour per day spent on physical education programs did not affect the performance of students negatively. However, allocating time previously dedicated to physical education to academic subjects did not result in higher grades in those subjects and were consequently unfavorable to students' health. The literature appears to support a positive relationship between physical activity and concentration, memory, classroom behavior, and other cognitive tasks. However, while physical activity affected performance, students' physical fitness did not.

In a study conducted by Kantomma et al. (2010), the interrelation of multiple factors, such as emotional and behavioral problems, maternal education, and self-reported educational performance, were gauged with a positive relationship with physical activity. The adolescent students' physical activity was measured using time in hours as an instrument compared with intensity of activity outside school hours. Students' academic performance was collected via self-report. The scale used to measure response alternatives consisted of above average, average, below average, and bottom in comparison to their peers. When fully adjusted, the result models showed that a higher level of physical activity as well as higher parental socioeconomic status position had an overall positive association with higher future education expectations and higher academic performance.

Kantomma et al.'s (2010) research was limited in terms of academic validity due to the use of self-report as the sole method of collecting student performance data. Another limitation was the contrast in educational outcomes, which certainly affected the significance of the findings. In using surveys in most of the previous research, social desirability bias may have been present, specifically in terms of overemphasizing the intensity of physical activity, physical fitness, or academic performance. The findings purported by Trudeau and Shephard (2008) lacked variance in terms of different types of school systems, in particular more disadvantaged socioeconomic areas.

All of the studies previously mentioned share common limitations in that they primarily focus on students of particular age groups and did not conduct follow-up assessments or failed to include them where relevant. This severely hindered the ability to determine future repercussions of the exercise habits, or lack thereof, of the students. This is important to address when attempting to link previous research findings to this study because this study only examines the average exercise frequency of current university students in relation to academic achievement and does not address prior physical activity and academic performance. A longitudinal study would be useful in determining whether a positive trend over time would occur from starting a routine of exercise earlier in life and applying it to both the physical and mental aspect of the study.

METHOD

Data for this study was gathered as part of a survey created by students in the Spring 2013 Methods of Social Research Class. Surveys were distributed to three discovery level classes at the University of New Hampshire upon the approval of professors teaching these classes. A verbal

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recruitment statement was read before handing out the survey to obtain consent and ensure the subjects were aware that all answers would be anonymous. A convenience sampling method was used to gather the most responses from an assumed diverse assortment of respondents in discovery requirement classes. The benefits of using a convenience sample were that the surveys are all completed relatively quickly and are administered at no cost. However, the sample could potentially show itself to be unrepresentative, as attitudes of the selected respondents may not be generalizable to all college students.

There is also the risk of social desirability bias when using a survey. The research subjects were not compensated for completing the survey and had the option to decline to participate in the survey. As indicated previously, the study was assisted and supervised by the professor of the Methods of Social Research class who indicated the students' experience with the proposed research paradigm through a letter to the Institutional Review Board.

The risk factors for the subjects of the survey were minimal in terms of physical, psychological, and emotional harm due to the anonymity of the survey and nature of the questions. Some questions potentially could have made the subjects uncomfortable in which case they had the option not to answer. The potentially valuable research gained from conducting the survey warranted the risk of marginal emotional harm to subjects who may have felt apprehensive in answering personal questions. Due to the fact that subjects were not compensated, benefits of respondent participation in the study were purely in contributing to student social researchers' studies and providing latent insight into proposed links between academic achievement and physical exercise.

The independent variable, exercise, was measured by the number of days subjects responded that they exercised in an average week. The dependent variable, academic performance, was measured with two questions. The first asked students about their GPA, "What is your overall grade point average?", and the second about the Dean's List "During your time enrolled at UNH, how many semesters have you made the Dean's List?". The data collected from the surveys was coded and entered into an Excel spreadsheet; data was then transferred into an SPSS dataset. In the original survey questions, the data regarding exercise was coded into 6 categories: 0 days a week, 1 day a week, 2-3 days a week, 4-5 days, more than 5, and doesn't know. However, in an effort to display a greater level of statistical significance, exercise was recoded into 0 days, 1-3 days, and 4-7 days a week. Also to see if trends emerged, grade point average was recoded.

Similarly, the original survey sorted GPA into five categories: less than 2.5, 2.50-2.99, 3.0-3.29, 3.3-3.69, and 3.7-4.0. GPA was later recoded and collapsed into 4 groups, combining the "less than 2.5" and "2.5-2.99" into one group of "less than 3.0". Collapsing across categories to recode was done in this case to regroup the categorical variables in an effort to map any patterns which may have appeared that had not initially in the first cross-tabulations. Another concern was that an overabundance of categories made it more difficult for any substantial relationship to be noticeable. The Dean's List was categorized according to amount of semesters that subjects made the list: none of them, some of them, most of them, all of them. Because this variable was categorical, it was unable to be collapsed and recoded.

RESULTS

Overall, 202 subjects from three Discovery requirement classes responded to the survey (n=202). Table 1 describes that the majority of respondents exercise 4-7 days a week (51.2%), while 40.8% of respondents exercise 1-3 days a week, and only 8% do not exercise. Only one subject chose not to answer this question. Due to the fact that the majority of respondents exercise

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at least 4 days a week and the overwhelming majority exercise at least once a week, this sample could reasonably be representative of the UNH population.

Table 2 shows the respondents' grade point averages. While there was no drastic majority, 32.5% of respondents had less than 3.0 GPA, 28.5% had from a 3.00-3.29, 26.5% had from a 3.30-3.69, and a minority of respondents were getting a 3.7 or above (12.5%). Two hundred of the total 202 respondents answered this question, which is a good percentage of respondents for a question early in the survey.

Table 3 displays how frequently respondents were named to the Dean's List. The majority of the respondents (48.7%) had not made the list once so far in their college career, while 15.2% made the list some of the semesters, 8.6% made the list most of their semesters, and 27.4% had consistently made the Dean's List every semester they were in attendance at the university. These results may be inconsistent due to the system in place for awarding recognition to Dean's List students. The Dean's List is broken up into three groups – honors, high honors, and highest honors – with the minimum GPA for attaining recognition to the Dean's List being 3.50. However, that specific GPA falls into the 3.30-3.69 GPA group on the survey administered as part of the present study. Fewer respondents answered the survey question about the Dean's List compared to the other two questions. This may have occurred because students may not have had the knowledge of whether they had made the Dean's List and there was not a "Don't Know" option available for the question.

Table 1: Exercise Frequency

	Frequency (# of Students)	Percentage
0 days a week	16	8.0%
1–3 days a week	82	40.8%
4–7 days a week	103	51.2%
Total	201	100.0%

Table 2: GPA

	Frequency (# of Students)	Percentage
Less than 3.0	65	32.5%
3.00–3.29	57	28.5%
3.30–3.69	53	26.5%
3.70–4.00	25	12.5%
Total	200	100.0%

Table 3: Dean's List

	Frequency (# of Students)	Percentage
None of the semesters	96	48.7%
Some of the semesters	30	15.2%
Most of the semesters	17	8.6%
All of the semesters	54	27.4%
Total	197	100.0%

Table 4 presents a cross-tabulation of the relationship between frequency of exercise and grade point average. The category that had the most respondents (36) was that which represents those who trained for 4-7 days a week and concurrently had a GPA of less than 3.0. However,

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those who exercised 4-7 days a week also accounted for the most respondents in both the 3.00-3.29 (30 respondents) and the 3.70-4.00 (30 respondents) GPA groups.

For the purposes of this study, an alpha level of .05 was used to determine if the Pearson's Chi-Square Test results were statistically significant, applying a 95% confidence interval to be certain that results were not coincidental or arbitrary. The Chi-Square test for GPA and exercise gave a p-value of .385 and a test statistic of 6.355. Because the p-value was greater than .05, the null hypothesis cannot be rejected. In simpler terms, frequency of exercising has no significant relationship with GPA.

Even though there is not a significant relationship between GPA and exercise, the cross-tabulation reveals some patterns. For example, of those who exercised 0 days a week, the majority (62.5%) have a GPA of less than 3.0 or 3.00-3.29. Meanwhile, the majority of respondents who have a GPA of 3.70-4.00 (14 respondents) tended to exercise 1-3 days a week. Although there was no statistically significant positive correlation between frequency of exercise during an average week and grade point average, a possible succinct explanation could be that those who exercised 0 days were less likely to excel academically. A trend also appeared in those who exercised 4-7 days; this group constituted the most representation in every GPA category, excluding 3.70-4.00. This vast representation could indicate that this group was comparatively suffering academically due to devoting much time to physical exercise and comparatively less to academic pursuits.

Table 4: Cross-Tabulation of Exercise Frequency and GPA

	0 days	1–3 days	4–7 days	Total
Less than 3.0	(6)	(23)	(36)	(65)
	37.5%	28.7%	35%	32.7%
3.00–3.29	(4)	(23)	(30)	(57)
	25%	28.7%	29.1%	28.6%
3.30–3.69	(3)	(20)	(30)	(53)
	18.8%	25%	29.1%	26.6%
3.70–4.00	(3)	(14)	(7)	(24)
	18.8%	17.5%	6.8%	12.1%
Total	(16)	(80)	(103)	(199)
	100%	100%	100%	100%

Chi-Square: 6.355   **Pr:** .385

Table 5 shows the data regarding the relationship between frequency of exercise and how often respondents made the Dean's List. In alignment with the cross-tabulation for exercise and GPA, the highest number of respondents (52) was in the group who exercised for 4-7 days in a given week and never made the Dean's List. Following, the second largest number of respondents (39) represented the group who exercised 1-3 days a week and never made the Dean's List as well. However, the majority who made the Dean's List all semesters they were present at the University of New Hampshire tended to exercise 4-7 days a week (26 respondents) or 1-3 days a week (23 respondents). This may vary from that of GPA because of the requirements a student needs to be named to the Dean's List, as described in Table 3. However, respondents who exercised 0 days of

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the week were as likely to be named to the Dean's List zero to few semesters (50%) as they were to be named most or all of the semesters (50%).

Based on the findings in Table 5, the null hypothesis would fail to be rejected. Since the probability of obtaining the test statistic (4.048) is greater than .05 (.67>.05), one can determine that there is no statistically significant relationship between exercise frequency and how often one makes the Dean's List.

Table 5: Cross-Tabulation of Exercise Frequency and Semesters Making Dean's List

	0 days	**1–3 days**	**4–7 days**	**Total**
None of them	(5)	(39)	(52)	(96)
	35.7%	48.8%	51%	49%
Some of them	(2)	(11)	(17)	(30)
	14.3%	13.8%	16.7%	15.3%
Most of them	(3)	(7)	(7)	(17)
	21.4%	8.8%	6.9%	8.7%
All of them	(4)	(23)	(26)	(53)
	28.6%	28.7%	25.5%	27%
Total	(14)	(80)	(102)	(196)
	100%	100%	100%	100%

Chi-Square: 4.048   **Pr:** .67

CONCLUSION

The purpose of this study was to explore whether or not there is a relationship between frequency of exercise and academic achievement. The results were not conclusive, and the null hypothesis cannot be reasonably rejected. However, the findings display information that could prove useful to future studies. Although as a whole the sample was small ($n=202$) compared to the total number of undergraduates at the University of New Hampshire (about 12,200), the findings from the frequencies seemed to be rather reliable. On average UNH is an exceptionally active campus, with the sample indicating that 92% of students exercise at least once a week. This is useful information to the University in terms of overall student interest in health and physical fitness. With this information, the university could attribute more focus to healthier options in their dining halls as well as renewed support classes that consist of more physical activity. This information might also bring attention to the impending expansion of the recreation center due to the overwhelming student interest in exercise and health. Another main finding was that although a fair number of students consistently make the Dean's List, only 12.5% of students have above a 3.70 GPA which is in the range of an A-. This might indicate that UNH's rigorous academic curricular requires that students apply themselves and work hard to excel in their academics.

Yielding no statistically significant relationships, there were a number of substantial limitations to this study. One noteworthy limitation: this study did not take into account what level or types of exercise were done. For example, the survey did not ask if the respondents' exercise regiments consisted of running, biking, lifting weights, or playing a sport among others. One respondent might define exercise as walking often in one day while another might interpret exercise as an activity that burns excess calories such as running. Because the question did not effectively conceptualize a definition of exercise or differentiate between different types of exercise, it left much room for interpretation by the respondent. Another limitation was that the

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study was only concerned with the frequency in which the respondent exercised rather than for how long on average each exercise session lasted. Measuring exercise with time in hours as well as frequency of sessions might have made the results more statistically significant and could have displayed a more positively correlated pattern.

An additional shortcoming of the study was a failure to determine whether gender biases were present in relation to the effect of exercise on GPA. Additionally, other variables such as the respondents diet or length of their workout regimen may have certainly influenced the findings. Further, a limitation with using the Dean's List as a measure of academic achievement was that a large portion of students in discovery-level classes are first-year or second-year students, limiting their responses based on their short-term university experience and therefore affecting ability to effectively generalize findings to all UNH students. As expanded upon in the methods section, using a convenience sample may have caused major limitations. Had the surveys been able to accommodate more questions per student researcher, this study could have incorporated more factors that might in turn present more statistically significant findings. However, had the survey been longer, respondents may have lost interest in providing truthful answers or even chose not to participate altogether.

Future studies could be done to examine how much exercise contributes to the overall well-being of students, in terms of relationships with peers, parents, and coworkers, level of depression, self-satisfaction, drug and alcohol use, among other factors that could be elaborated. With more time and resources, a random sampling method could be employed to gain a larger, more representative portion of the sample population. To increase reliability and validity in determining whether there are actual significant relationships between variables, one survey should be used with more developed questions concerning the topics in this study rather than just a few questions dedicated to determine their relationship. If further and more well-developed studies can establish a significant correlation between exercise and student academic achievement and well-being, a larger percentage of university students may be aided in the improvement of their lifestyles, academics, and health.

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