The College of New Jersey

Attendance & GPA: Health as a Deciding Factor

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ABSTRACT: Arguments for class attendance having the most impact on student success (as measured by grade point average) have been widely accepted. A smaller number of studies have suggested that better overall health is associated with academic accomplishment, and that health related variables have effects on college undergraduates' GPAs. Data was collected through an anonymous survey of 1,458 undergraduate students enrolled in The College of New Jersey in order to study the determinants of students' academic success (measured by GPA, on a 4-point scale). The survey included items concerning students' attendance, health, lifestyle (e.g. time spent exercising, vitamin intake, alcohol consumption), parents' education, and individual demographic controls. Results revealed that attendance patterns, such as missing one class per week or three days of school per month, and time spent exercising, can negatively affect a student's GPA. Results also showed that consuming alcohol more than four times per week or having five or more alcoholic drinks at a time can significantly reduce a student's likelihood of having a GPA between 3.6 and 4.0. Staying healthy by eating breakfast, eating fruits and vegetables, and not smoking can facilitate academic success.

I. Introduction

Although many researchers have documented the effects of health and attendance practices on college student success, as measured by GPA, the results have yet to isolate any dominant factor that holds the key to academic success (George, Dixon, Stansal, Gelb, & Pheri, 2008). Many studies have suggested that better overall health is associated with academic accomplishment, and that health related variables, both physical and psychosocial, have effects on college undergraduates' GPA (DeBerard, Spielmans, & Julka, 2004; Dusselier, Dunn, Wang, Shelley, & Whalen, 2005; George, et al., 2008; Trockel, Barnes, & Egget, 2000). Others have argued that class attendance has the most impact on student success (Cohn & Johnson, 2006; Romer, 1993). It is possible that the determinants of an undergraduate's grade point average are based on past performance, such as high school achievement, SAT scores, or previous college course grades (Allen & Carter, 2007; Rothstein, 2004). The best predictor of college GPA may be individual motivation or self efficacy (Devadoss & Foltz, 1996; Jones, 1984; Zajacova, Lynch, & Espenshade, 2005). Course load during the semester, number of hours spent working, and even relationships with parents have been found to affect a college student's GPA (Cutrona, Cole, Colangelo, Assouline, & Russell, 1994; Devadoss & Foltz, 1996; Szafran, 2001).

Given the list of predictors specified above and the laundry list of other possible predictors, it is difficult to decipher where exactly health, diet, stress, quality of life, hours of sleep, and risky behavior actually fit in when predicting student success. If an academic institution can ensure a healthy campus environment, either by removing impediments to

learning or fostering new and healthy habits, will it make a difference in the achievement of its students? If so, which factors should an institution focus on in order to be most beneficial for its students? What should individual students do for themselves in terms of health to successfully manage their academic career? Answering these questions has implications for developing programs and services, helping colleges and universities retain students, improving students' academic performance, and reducing the resource burden for student support services (Trockel, Barnes, & Egget, 2000).

The purpose of this paper is to make the connection between health-related variables and academic performance. The relationship should be such that healthy habits and overall wellness will positively correlate with student academic success as measured by grade point average.

II. Background

The traditional view of college GPA prediction was simplistic in that it emphasized attendance as the most important aspect influencing academic performance. After controlling for a variety of students' individual characteristics, attendance and performance emerged as significantly positively correlated variables. Romer (1993) used his own classroom as a sample to illustrate the attendance-performance theory. Romer took attendance during six of his intermediate macroeconomics course classes, and used grades from three exams to measure student performance. In an effort to control for individual differences in motivation and overall skill level, the author restricted the sample to the students who completed all of their homework assignments, and then dropped the lowest scoring student. He also controlled for prior GPA by including the students' GPAs at the beginning of the semester, because prior GPA would capture the effect of attendance on performance in prior semesters. The results indicated that 48% of the

variance in performance could be explained by attendance. Although attendance is not able to completely account for the variation in performance, Romer's results reinforced the idea that attendance is an essential determinant of performance.

Further supporting the attendance model of performance is a study by Cohn and Johnson (2006), which used a sample of 347 students enrolled in a principles of economics class. The data was collected over a 4-year period from 1997 to 2001 at the University of South Carolina. The authors found that attendance did have an impact on test scores, such that students missing 50% of classes were likely to have a total test score 8 points lower than those without any absences, translating into almost a full letter grade difference. After controlling for student ability using prior GPA and SAT scores, the difference dropped to 4.3 points, which is still a half-letter grade difference. Cohn and Johnson also noted that in the case of performance on a single exam, a 10% increase in attendance resulted in a 1 point increase on a 100 point test after controlling for individual heterogeneity (e.g. ability, age, class, gender, major, and race).

Given the consistent but incomplete relationship found between attendance and academic performance, it would be prudent to explore alternative variables that could account for the remaining variance in GPA. Possible predictive variables of academic achievement that have not been extensively studied are related to student mental and physical health.

Evidence of health related variables influencing academic performance is provided by Trockel, Barnes, and Egget (2000) who surveyed 185 students living in residence halls. Eating breakfast and exercising were found to significantly relate with higher first year students' GPA, while later waking and going to bed times significantly correlated with lower GPA. For each hour of delay in reported average weekday or weekend wake-up time, the predicted GPA

decreased by 0.132 or 0.115, respectively, on a standard 4.0 grading scale (Trockel, Barnes, & Egget, 2000). Although previous studies had suggested that too much time spent exercising was significantly associated with poorer academic performance, the results from this study showed a positive value for strength training when predicting GPA.

Additional evidence for health related predictors of academic success has been found by George, Dixon, Stansal, Gelb, and Pheri, (2008). The researchers obtained 5-day time diaries and questionnaires from 231 undergraduate students in order to assess the factors associated with academic and personal success. Academic success was measured by cumulative GPA, while personal success was measured by participants' ratings of progress towards personal goals. A measure of total success was computed by weighing GPA and personal success equally. The regression analysis revealed that waking up earlier and a healthy diet were among the variables that were strong predictors of GPA and total success. Overall health was significantly and positively correlated with GPA and total success in the raw data, but did not remain significant in the multivariable regression. Overall health was however significant in the regression for personal success. The result of early wake up time yielding a better GPA was consistent with findings from Trockel et al. (2000), which suggests that personal discipline, such as a set sleeping schedule, correlates with academic success.

DeBerard, Spielmans, and Julka (2004) included 204 undergraduate students in their study on health and psychosocial predictors of freshman academic achievement. They investigated health related quality of life, smoking, and binge drinking as potential predictors, as well as physical and mental health. Given that physical health has been shown to influence work performance, it seemed likely that physical health would play a role in academic performance, such that students with a greater degree of health problems would suffer academically

(DeBerard, Spielmans, & Julka, 2004). The general subjective dimensions of physical and mental health-related quality of life were assessed using the 36 item Short-Form Health Survey (SF-36). The SF-36 assesses general subjective dimensions of physical and mental health-related quality of life, and asks questions such as, “How much bodily pain have you had during the past four weeks?”, with responses such as a 6-point Likert scale ranging from “None” to “Very Severe.”

The study found that although the physical health portion of the SF-36 significantly correlated with cumulative GPA, it did not remain significant in the regression when other variables were introduced. Smoking, but not binge drinking, was found to be a significant predictor even after accounting for the influence of other variables, such as high school GPA, SAT score, coping strategy, gender, and social support. The results from the mental portion of the SF-36 indicated that overall level of mental health was a significant independent predictor of achievement (DeBerard, Spielmans, & Julka, 2004).

Dusselier et al. (2005) focused on stress as a mental health indicator, and performed a study to examine the influence of selected personal, health, academic, and environmental variables on stress experienced by undergraduates living in the residence halls of Iowa State University. Using data collected from 416 students via web based self-report surveys, the authors were able to find why students experienced higher levels of stress during the semester as compared to breaks. Health variables related to increased stress included sleep difficulties, greater frequency experiencing chronic illness, depression, anxiety, and seasonal affective disorder. Even though young people are generally in good health, college may put extra strain on emotional and mental health, which can have deleterious effects on GPA.

III. Data

A questionnaire was developed partially based on information from the literature on health behavior variables that are potential predictors of attendance patterns and consequently academic performance. The 29-question survey consisted of basic demographic questions (age, gender, race, parents' educational level), questions concerning academics (GPA, number of credits taken last semester, attendance patterns), and questions capturing health and lifestyle variables (rating of health, number of doctor visits, exercise, daily fruit and vegetable consumption, vitamin intake, hours of sleep per night, cigarette and alcohol use). See Appendix A for a complete list of the survey questions and response formats.

A mini pilot test of the survey was administered to four undergraduate students from different universities. Each of the four students felt the informed consent and survey instructions were easily understood and appropriate for the intended audience. All questions that one or more of these students judged as unclear were reworded for clarity.

The informed consent included requirements for participation (TCNJ undergraduate student and at least 18 years of age), identification of contacts in case of questions, and an emphasis on the voluntary nature of participation. The instructions included a brief description of the study, assurance of complete confidentiality, a request that participants respond as honestly as possible, and an invitation to enter into a drawing for one of two $50.00 prizes. All aspects of this study were approved by The College of New Jersey's Institutional Review Board.

Data was gathered using the survey. It was administered to The College of New Jersey's undergraduate population during a two week period in March, 2009. The survey was

administered electronically; 6,058 emails were sent asking for participation in the survey. The emails were sent to all undergraduates who were at least 18 years of age. Three days after the first request, a "follow-up" reminder email was sent out to the entire group (6,058) again. The survey was available through TCNJ's online survey application, Form Genie. The survey could be accessed for two weeks from the date of the first email and could be completed at any time of the day or night.

One thousand eight hundred and twenty-one participants completed the electronic survey in exchange for an entry into one of two $50 raffles. Though the initial response rate was 30% (n=1,821), after data cleaning the usable response rate was 24%, with a final sample size of 1,458 as a number of surveys (n=363) were incomplete or had incorrect response types (see Appendix B for selected examples).

IV. Methods

Variables included in the questionnaire were demographics (8 items), academic success (3 items), health (3 items), lifestyle (9 items), attendance (7 items), and other activities (2 items). Dummy variables were formed for the multiple choice responses. Selected continuous variables were also made into dummies in order to categorize larger groups of responses.

Students' grade point average was the dependent variable in all of the models. In the models for cumulative GPA, probits were done for either GPA 3.0 – 4.0 or for GPA 3.6 – 4.0. These grades were chosen because they fall in the range of GPAs that most people would say characterizes a successful student. In the models for last semester's GPA, the continuous variable of lastsemgpa, on a 4.0 scale, was used for the regressions.

The factors affecting the probability of a student having a cumulative GPA of 3.1 to 4.0 were tested using the following conceptual model:

$$gpa31to40 = f\ (absences,\ lifestyle,\ socio\text{-}economic\ status,\ demographics)$$

where gpa31to40 is a dummy variable for a student's cumulative GPA lying between 3.1 and 4.0, which represents the student's overall academic success. Absences were measured by being absent from school three days per month or more, and missing at least one class per week. Lifestyle was captured by how many days per week the student ate breakfast, if they were a smoker, if the student drank more than four times per week, if they drank five or more drinks in one night, if they exercised for at least twenty minutes once per week or more, if they lifted weights or strength trained at least once per week, servings of fruits and vegetables eaten per day, vitamin or supplement consumption, and hours of sleep per school night. Socio-economic status was proxied by parent's education. Demographics included gender, race, class year, and housing arrangements. See Table 1 for a brief definition of each of the variables.

The factors affecting the probability of a student having a cumulative GPA of 3.6 to 4.0 were tested using the same conceptual model, where gpa36to40 is a dummy variable for a student's cumulative GPA lying between 3.6 and 4.0, which represents a higher level of overall academic success.

It was expected that the health related items of breakfast, sleep, and taking vitamins or supplements would be positively associated with having a GPA between 3.1 and 4.0. Eating one serving or less of fruits and vegetables per day was expected to have a negative association. The lifestyle variables of smoking cigarettes, drinking more than four times per week, and drinking

five or more drinks in one night were expected to be negatively associated with having a GPA between 3.1 and 4.0. The attendance variables of missing three or more days of school per month and missing one or more classes per week were also expected to have negative marginal effects. The exercise variables of cardio workouts and weight lifting were of particular interest because Trockel et al. (2000) found positive correlations between exercise and academic performance, but those variables did not remain significant in the regression analysis. The demographic variables of age, male, white, sophomore, upperclassmen, and living off campus were included as controls. Parental education level variables, which were used as a proxy for socio-economic status, were also used as controls.

The determinants of last semester's GPA for undergraduate students were tested using the following conceptual model:

lastsemgpa = f (missed classes per month last semester by reason, lifestyle, course load, non-academic activities, socio-economic status, and demographics)

where lastsemgpa is a continuous variable ranging from 0 to 4.0.

The respondents reported the number of classes missed last semester due to illness, other obligations, sleeping in, or because of no perceived benefit from class. Lifestyle was captured by how many days per week the student ate breakfast, if they were a smoker, if they exercised for at least twenty minutes once per week or more, if they lifted weights or strength trained at least once per week, servings of fruits and vegetables eaten per day, number of doctor visits last semester, vitamin or supplement consumption, and hours of sleep per school night. Course load was characterized as either less or more than sixteen credits. Respondents reported the number

of hours they worked for pay each week during the last semester, and the number of hours they spent engaged in extra-curricular activities or performing community service per week last semester. Socio-economic status was again proxied by parent's education. Demographics included gender, race, class year, and housing arrangements.

In addition to the predicted associations stated above for models one and two, the regression model included more specific variables relating to the Fall 2008 semester. Missing classes due to illness, sleeping in, other obligations, not perceiving benefits from attending, and number of doctor visits were all expected to negatively affect last semester's GPA. The variables of working one to ten hours per week and working more than ten hours per week were included to capture the effect of working while going to school. Almost half of the survey respondents (n=686) replied that they did not work at all. It seems intuitive that more hours spent working would reduce a student's GPA. Taking less or more than the standard sixteen credits was included to study the effects of course load on last semester's GPA. 62% of the respondents were enrolled in 16 credits last semester. Credit hours can be viewed as a proxy for stress, in which case more credit hours would be expected to decrease last semester's GPA. Alternatively, credit hours can be viewed as a proxy for student motivation, and may have a positive association with last semester's GPA.

Each of these three models was run using the entire sample (n=1,458). They were also run separately by class (freshman, sophomore, and upperclassmen) and by gender (male and female). The models for the dichotomous dependent variables (*gpa31to40* and *gpa36to40*) were analyzed using probability density function (probit) models to capture the marginal effects of each independent variable on the probability of achieving the given GPA range. The model for

the continuous dependent variable (*lastsemgpa*) was analyzed using an ordinary least squares (OLS) regression.

V. Analysis & Results

Descriptive statistics are presented in Table 1. Out of the 1,458 participants who fully completed the survey, there were 465 men (31.89%) and 993 women (68.11%). The sample is fairly homogenous with respect to age, with a mean age of 20.38 years, and a standard deviation of 2.76. The ethnic breakdown was 79.63% white, 6.1% Hispanic, 5.28% Asian, 4.39% black, and 4.6% other. 24.35% of respondents classified themselves as freshmen, 23.73% as sophomores, 24.38% as juniors, and 27.64% as seniors or fifth-year seniors. 62.07% of participants (n=905) responded that they were enrolled in exactly 16 credit hours last semester. Out of the 553 students who were not enrolled in 16 credit hours last semester, 275 were enrolled in less than 16 credit hours, while 278 were enrolled in more than 16 credit hours.

Cumulative GPA of 3.1 to 4.0 & Cumulative GPA of 3.6 to 4.0

Table 2 presents the estimated marginal effects from probit regressions of the probability of having a cumulative GPA between 3.1 and 4.0 for the entire sample; it is also broken down by class year and gender. Table 3 shows the marginal effects of the independent variables on the probability of having a cumulative GPA of 3.6 to 4.0, broken down by class year and gender. GPA of 3.6 to 4.0 was also tested because it represents a more stringent measure of academic success.

As compared to students who are never absent, having three or more absences per month can significantly affect the probability of having either a GPA between 3.1 and 4.0 or 3.6 to 4.0.

Missing an average of one class per week, when compared to not missing any classes per week, also had the predicted negative effect on student success in both models.

Surprisingly, the average number of hours of sleep per night did not affect the probability of having a GPA between 3.1 and 4.0 or 3.6 to 4.0. Drinking more than four times per week was expected to have a negative effect, as was drinking five or more drinks in one night. However, in the 3.1 - 4.0 GPA model, they did not have any effect on academic success, when compared to students who drank once per month, or had less than five drinks in one night. When used in the regression on 3.6 to 4.0 GPA, both drinking variables were negative and significant, which is consistent with findings from Musgrave-Marquart, Bromley, and Dalley (1997), who found that alcohol use and nicotine use were negatively related to GPA

Eating breakfast was found to increase the likelihood of having a cumulative GPA between 3.1 and 4.0, and 3.6 to 4.0, suggesting that increasing the days per week a student eats breakfast would increase the probability of that student having a better GPA. As seen in Tables 2 and 3, eating breakfast shows the most significant effect for freshman and females. Trockel et al. (2000) did find a positive relationship between eating breakfast and academic success, but breakfast lost significance in the multivariate regression. Eating breakfast was the only nutrition related variable that Trockel et al. found to have any effect on GPA, which is consistent with the results from Table 2. Neither vitamin and supplement consumption nor fruit and vegetable servings per day were correlated with the dependent variables.

Consistent with Trockel et al.'s findings, strength training had no noticeable effect on academic success. Cardio workouts of twenty minutes or more at least once per week did emerge

as a negative predictor, with very high significance, but only in the 3.1 - 4.0 GPA model (Table 2). Smoking was found to have the predicted negative effect on academic success.

When compared to students whose parents have only completed college, a student with a father who had completed all or some graduate school had a higher likelihood of having a GPA between 3.0 and 4.0. Level of mother's education and having a father who has only completed high school or less did not emerge as significant predictors in the 3.1 - 4.0 GPA model. Using 3.6 to 4.0 as the dependent variable revealed a significant negative effect of having a father who has completed high school or less (Table 3).

As compared to females, male students are less likely to have a cumulative grade point average between 3.1 and 4.0 (Table 2). These results are in contrast to Cohn and Johnson (2006), who found no significant effect on GPA for student's sex, and Allen and Carter (2007) who found no significant difference in academic success for different genders, ages, or ethnicities. However, in studying the probability of having a GPA between 3.6 and 4.0, gender did in fact emerge as significant. DeBard et al. (2004) did find that females had higher GPAs at the end of their freshman year than their male counterparts, however, they only studied freshmen students, and suggested that the freshman course load was more geared towards topics in which females typically excel (DeBard et al., 2004).

When compared to non-white students, it was found that white students had a higher likelihood of having a cumulative GPA of 3.1 to 4.0 and 3.6 to 4.0. As mentioned above, this finding is in contrast with Allen and Carter (2007), who found no differences in academic success between ethnicities.

Class year and living on or off campus did not emerge as significant predictors, when compared to students who live on campus.

Last semester's GPA

Table 4 shows the results from the regression for last semester's GPA, broken down by class year and gender.

The attendance variables captured different reasons students had missed classes on a per month basis in the Fall 2008 semester. Out of the four reasons for missing class (illness, sleeping in, other obligations, and not benefitting from class time), only one was not negative and significant at the .1 percent level: not benefitting from class time. This is not surprising, because skipping a class that has no benefit to the student should not change that student's level of success. However, this finding is not consistent across all subgroups, with freshmen having a negative and significant coefficient for this variable. This suggests that freshmen should attend class regardless of the benefits they perceive, because during their first semester in college, students may not be able to accurately judge whether there isn't actually a benefit from attending class.

Consuming four or more servings of vegetables per day emerged as a significant predictor of last semester's GPA, suggesting that eating the recommended daily amount of fruits and vegetables (five servings) can actually increase a student's GPA by .06 points. The coefficients and significance levels for eating breakfast remained practically unchanged from the 3.1 - 4.0 GPA model.

Hours worked per week last semester emerged as an interesting, although somewhat predictable, variable. As compared to students who do not work, students who work one to ten

hours per week had a higher GPA last semester. Working just a few hours per week may be a proxy for student motivation or correlate with natural academic ability, as highly motivated or talented students are able to work while going to school without compromising their GPA. On the other hand, working more than 10 hours per week had a negative coefficient at the 1% significance level for upperclassmen and females.

Participation in extracurricular activities has significant positive effect on last semester's GPA, and there is a negative effect from no participation, suggesting that students who are more involved in their school or community have higher grade point averages and are more successful academically. Cardio workouts of twenty minutes or more at least once per week have a significant negative effect on last semester's GPA, at the .1 percent level. Strength training or weight lifting did not emerge as significant.

Being enrolled in under sixteen credits (usually less than four classes) had a significant negative effect on last semester's GPA. If credit load was a proxy for stress, it would be expected that students enrolled in less than sixteen credits would be able to devote more time to each class, thereby increasing their GPA. However, this finding is consistent with Szafran (2001), who found that students enrolled in more credit hours have higher GPAs, and that course difficulty plays a larger role in academic success than does credit hour load.

The coefficients and significance levels for father's education and gender remained practically unchanged from the 3.1 - 4.0 GPA model. Being a junior or senior student (upperclass) was found to have a positive effect on last semester's GPA at the 10% significance level, contrasting the probit models' finding that class year was not useful in predicting student's academic success.

Health & Attendance

We have seen that, separately, health variables and attendance patterns both have effects on a student's academic success even when other variables are controlled for. Results from a regression of health variables on the total number of missed classes per month last semester are shown in Appendix C. After controlling for student age, class year, ethnicity, and living arrangements, the variables of smoking cigarettes, eating little to no fruits or vegetables, and drinking four or more drinks in one night all were found to significantly increase the number of classes a student misses per month. Eating breakfast was found to significantly decrease the number of classes a student misses per month. Breakfast may be viewed as a proxy for self-discipline, as a student with enough discipline to wake up early will have time to eat breakfast in the morning.

Compounded over the entire semester (usually 3 and a half months), these results suggest that health-related lifestyle habits can affect the number of classes a student misses each month. When students miss class, they are hurting their academic performance. If students can reduce the number of classes they miss per month by adopting healthier habits, they are more likely to succeed academically, especially if these habits continue throughout a student's entire college career.

VI. Conclusion

This study examines the effects of attendance on GPA among TCNJ undergraduate students. The results presented may be generalizable to other highly selective medium-sized liberal arts colleges.

A particular strength of the study was the survey. It synthesizes different topics into one single survey, as it was developed after reviewing the literature on health, attendance, and academic performance. The development of a new survey allowed for the questions to be tailored in order to capture the specific variables of interest, namely the specific reasons that students fail to attend class. The relatively high number of useable responses is also a strength when compared to other surveys that have been done concerning topics on health, attendance, and GPA, which typically include 500 or less participants.

As with all self-reported surveys, there is always a chance that responses will be untruthful. The anonymous nature of the survey means that all data were self reported, including students' GPA. A study designed to measure the effect of changes in health and lifestyle habits on academic performance over time, if administered by a college or university, would be much more accurate than the current survey, especially if that institution uses school records, for example actual GPA, as well as self-report data.

The wording of question 25 may have presented a slight limitation when predicting academic success based on drinking habits. It must be noted that the "number of drinks per night" variable is most likely an underestimation, if drinks were to be defined as 1.5 ounces of liquor, 12 ounces of beer, or 5 ounces of wine. The meaning of "one drink" was not defined in the body of the survey; most college students would not tend to define a drink in those terms, and would underestimate the actual quantity of drinks being consumed (e.g. defining a mixed drink containing three shots of alcohol as one drink).

Despite these limitations, this study has made some important findings. The paper has shown that students' health and lifestyle decisions have the ability to influence their academic

success. Staying healthy by eating breakfast, eating fruits and vegetables, and not smoking can help a student stay in the 3.1 to 4.0 range. Additionally, consuming alcohol more than four times per week or having five or more alcoholic drinks at a time can significantly reduce a student's likelihood of having a GPA between 3.6 and 4.0, which may be important for graduate school acceptance or job prospects. If an academic institution can ensure a healthy campus environment by increasing the health conscientiousness of its students, it may help to improve the academic success of individual students and the success of the institution as a whole.

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Table 1: Descriptive Statistics

Variable	Brief Definition*	Mean	Std Dv	Min	Max
gpa31to40	1=Student has a cumulative GPA of 3.1 – 4.0	.7846	.4112	0	1
gpa36to40	1=Student has a cumulative GPA of 3.6 – 4.0	.3807	.4857	0	1
lastsemgpa	Student's GPA last semester, on a 4.0 scale	3.404	.4499	1.4	4.0
lsmcexill	Classes missed per month last semester for all reasons, excluding illness	1.7316	2.5353	0	21
tcabs3ormore	1= Average days absent per month throughout college career is 3 or more	0.0754	0.2642	0	1
tcmc1ormore	1= Missed 1 or more classes per week throughout college career	0.2147	0.4107	0	1
illness	Classes missed per month last semester because of illness	0.7135	1.1965	0	10
nobenefit	Classes missed per month last semester because of not benefitting from class time	0.5123	1.2792	0	15
obligation	Classes missed per month last semester because of other obligations	0.5873	0.9245	0	8
sleepingin	Classes missed per month last semester because of sleeping in	0.6320	1.2246	0	10
breakfast	Days per week that breakfast is eaten	4.0775	2.4422	0	7
cigsyes	1= Smokes	0.0487	0.2153	0	1
drk4xweek	1= Drinks 4 or more times per week	0.0247	0.1552	0	1
drk5ormore	1= Consumes 5 or more drinks in one day or night	0.3080	0.4618	0	1
cardioyes	1= Works out at least once a week for 20 minutes or more	0.7359	0.4410	0	1
wght1ormore	1= Lifts weights or strength trains at least one day per week	0.4870	0.5000	0	1
fv0to1	1= Eats zero or 1 serving of fruits or vegetables per day	0.2997	0.4583	0	1
fv4ormore	1= Eats 4 or more servings of fruits or vegetables per day	0.1529	0.3601	0	1
drVisits	Number of visits last semester	1.5014	2.2463	0	25
vsyes	1= Takes vitamins or supplements at least one day per week	0.4582	0.4984	0	1
sleep	Average hours of sleep, per night	6.8269	1.1299	0	10
efhsorless	1= Father has a high school degree or less	0.2442	0.4297	0	1
efsomegradgrad	1= Father has completed some or all graduate work	0.2661	0.4421	0	1
emhsorless	1= Mother has a high school degree or less	0.2154	0.4112	0	1
emsomegradgrad	1= Mother has completed some or all graduate work	0.2092	0.4069	0	1
crls16	1= Enrolled in less than 16 credits last semester	0.1886	0.3913	0	1
crmr16	1= Enrolled in more than 16 credits last semester	0.1907	0.3930	0	1
hrs1to10	1= Worked 1-10 hours per week last semester	0.2545	0.4357	0	1
hrsmore10	1= Worked more than 10 hours per week last semester	0.2750	0.4467	0	1
xcurricls10	1= Participates in extracurricular or community service for 10 hours or less per week	0.6118	0.4875	0	1
xcurricmr11	1= Participates in extracurricular or community service for 11 hours or more per week	0.1708	0.3764	0	1
age	Age, in years	20.376	2.758	18	57
male	1=male	0.3189	0.4662	0	1
white	1= white	0.7963	0.4029	0	1
sophomore	1=sophomore	0.2373	0.4256	0	1
upperclass	1= upperclassmen (juniors & seniors)	0.5192	0.4998	0	1
livoff	1= Living off campus	0.3738	0.4840	0	1

Table 2. Marginal Effects from Probit Models
on the Probability of Having a GPA of 3.1-4.0

Independent Variables	Entire Sample	Freshmen	Sophomores	Upperclassmen	Females	Males
Tcabs3ormore	-.2067****	-.3423***	-.1573	-.1696****	-.2093**	-.163**
	(.0553)	(.1386)	(.1179)	(.0669)	(.0708)	(.0864)
Tcmc1ormore	-.1212****	-.0604	-.1088*	-.1611****	-.1279****	-.1442***
	(.0323)	(.0721)	(.0691)	(.0432)	(.0393)	(.056)
Brkfst	.0148***	.0010	.0214**	.0162***	.0171****	.0065
	(.0311)	(.0109)	(.0092)	(.0062)	(.0052)	(.0095)
Cigsyes	-.1752****	-.1765	-.1104	-.1787***	-.153**	-.2231**
	(.0629)	(.1648)	(.1303)	(.0807)	(.0794)	(.1064)
Drkmore4xwk	.0474		.0078	.0502	.1208	.0279
	(.0606)		(.1809)	(.0639)	(.0516)	(.0929)
Drinks5ormore	-.0341	-.1379***	-.0044	-.0096	-.0377	-.0228
	(.0254)	(.0557)	(.0497)	(.0345)	(.0304)	(.0453)
Cardioyes	-.0655***	-.0925	-.0271	-.6235*	-.0382	-.0964*
	(.0241)	(.0532)	(.054)	(.0309)	(.0276)	(.0489)
Wght1ormore	. 0138	.0375	-.0335	.0301	.0014	.0248
	(.0241)	(.0529)	(.055)	(.0309)	(.0266)	(.0498)
Fv0to1	-.0231	-.0227	.0022	-.0278	-.0052	-.06813
	(.0246)	(.0570)	(.0524)	(.0319)	(.027)	(.049)
Vsyes	.0251	.1121**	.0299	.0006	.0213	.0694
	(.0222)	(.0493)	(.0489)	(.0293)	(.0244)	(.0453)
Sleep	. 0023	-.0036	.0104	-.0049	.0158	-.0387*
	(.0094)	(.02)	(.0196)	(.0136)	(.0105)	(.0206)
Efhsorless	-.0011	-.0799	.0602	.0271	-.0157	.0100
	(.0275)	(.0687)	(.0544)	(.0338)	(.0309)	(.0581)
Efsomegradgrad	.0889****	.0825	.1187**	.0747**	.0554*	.1469***
	(.0232)	(.0518)	(.0462)	(.0305)	(.0276)	(.0448)
Emhsorless	.0033	.0525	-.0016	-.0196	.0286	-.043
	(.0288)	(.0662)	(.0588)	(.0384)	(.0296)	(.0623)
Emsomegradgrad	-.0285	.0410	-.0868	-.0308	.0009	-.1089*
	(.0290)	(.0568)	(.0647)	(.0388)	(.032)	(.0582)
Age	-.0022	0.046	.0005	-.0037	-.0066*	.0072
	(.0041)	(0.041)	(.0104)	(.0039)	(.0034)	(.0104)
Male	-.0817****	-.0017	-.1279***	-.0844***	-	-

	(.0259)	(.0539)	(.0538)	(.0356)		
White	.1537****	.2097****	.1441***	.124****	.1734****	.0543
	(.0311)	(.0622)	(.064)	(.0433)	(.036)	(.055)
Sophomore	.0078	-	-	-	.0397	-.1223*
	(.0301)				(.0305)	(.0678)
Upperclass	.0382	-	-	-	.0589	-.051
	(.0314)				(.0339)	(.0671)
Livoff	.0293	-.0712	.0727	.0244	.0462	.0442
	(.0274)	(.1218)	(.0596)	(.0327)	(.027)	(.0557)
Pseudo R^2	.1277	0.1501	0.1052	0.1445	0.1551	0.1042
Observations	1458	353	346	757	993	465

Reporting marginal effects and robust standard errors (in parentheses).

**** Statistically significant at the .1% level. ** Statistically significant at the 5% level.

*** Statistically significant at the 1% level. * Statistically significant at the 10% level.

- Class and gender variables were removed.

-* Drkmore4xwk was dropped because of collinearity and 2 observations were not used.

Table 3. Marginal Effects from Probit Models on the Probability of Having a GPA of 3.6-4.0

Independent Variables	Entire Sample	Freshmen	Sophomores	Upperclassmen	Females	Males
Tcabs3ormore	-.1880***	-.2534	-.1021	-.2204***	-.1678**	-.1937**
	(.0508)	(.1194)	(.1149)	(.0585)	(.0681)	(.0725)
Tcmc1ormore	-.1779****	-.2053***	-.1366*	-.2034****	-.2015****	-.1717***
	(.0322)	(.0692)	(.0717)	(.0416)	(.0407)	(.0501)
Brkfst	.0228****	.0356***	.0236**	.0112	.0278****	.0067
	(.006)	(.0126)	(.0116)	(.0082)	(.0073)	(.0102)
Cigsyes	-.1567**	-.2465	-.1596	-.1191	-.2594***	-.015
	(.0588)	(.1184)	(.1353)	(.0794)	(.0606)	(.1071)
Drkmore4xwk	-.1937*	.4079	-.0281	-.2673***	-.1776	-.1845*
	(.0812)	(.3126)	(.2786)	(.0644)	(.1736)	(.0857)
Drinks5ormore	-.0707**	-.1288**	-.1319**	-.0339	-.1043***	-.0492
	(.0295)	(.0577)	(.0573)	(.0416)	(.0365)	(.0477)
Cardioyes	-.0169	-.0760	.1191*	-.0566	-.0120	-.0417
	(.0339)	(.0769)	(.0625)	(.0472)	(.0423)	(.0583)
Wght1ormore	-.0227	-.0333	-.1507***	.0364	-.0486	.0146
	(.0305)	(.0643)	(.0616)	(.0414)	(.0369)	(.0539)
Fv0to1	-.0330	-.0689	-.0891	-.0041	-.0224	-.0712
	(.0296)	(.0654)	(.06133)	(.0399)	(.0371)	(.0488)
Vsyes	.0181	.0347	.0694	.0063	.0214	.0406
	(.0275)	(.0577)	(.0573)	(.0373)	(.0332)	(.0491)
Sleep	-.0108	-.0252	.0199	-.0102	-.0111	-.0063
	(.0121)	(.0240)	(.0256)	(.0173)	(.0151)	(.0201)
Efhsorless	-.1179****	-.1939***	-.0755	-.1089**	-.1398****	-.0603
	(.0322)	(.0646)	(.0719)	(.0433)	(.0383)	(.0618)
Efsomegradgrad	.0543*	.0546	.0372	.07692*	.0469	.0716
	(.0332)	(.0692)	(.0688)	(.0469)	(.0402)	(.0551)
Emhsorless	.0173	.1172	-.1239	.0492	.0237	.0021
	(.0359)	(.0892)	(.0653)	(.0484)	(.0436)	(.0636)
Emsomegradgrad	-.0152	.0497	-.0156	-.0488	.0179	-.0841
	(.0345)	(.0739)	(.0714)	(.0467)	(.0436)	(.0562)

Age	.0023 (.0053)	-.0269 (.0493)	.0194* (.0103)	-.0028 (.0057)	-.0016 (.0059)	-.0054 (.0130)
Male	-.0016 (.03)	.0876 (.0628)	.0516 (.0629)	-.0311 (.0406)	-	-
White	.1124**** (.0317)	.1312** (.0632)	.1099 (.0657)	.1044** (.045)	.1315**** (.0384)	.0805 (.0557)
Sophomore	-.0175 (.0377)	-	-	-	-.0083 (.0465)	-.0189 (.0649)
Upperclass	-.0027 (.0387)	-	-	-	.0241 (.0472)	-.0451 (.0723)
Livoff	-.0443 (.033)	.0164 (.1338)	-.0732 (.0765)	-.0555 (.0392)	-.0709* (.0405)	.0308 (.0591)
Pseudo R^2	.0885	.1222	.1089	.1007	.0993	.0880
Observations	1458	355	346	757	993	465

Reporting marginal effects and robust standard errors (in parentheses).

****Statistically significant at the .1% level. **Statistically significant at the 5% level.

***Statistically significant at the 1% level. * Statistically significant at the 10% level.

- Class and gender variables were removed.

Table 4. Coefficient Estimates from OLS Regressions for Last Semester's GPA

Independent Variables	Entire Sample	Freshmen	Sophomores	Upperclassmen	Females	Males
Illness	-.0498****	-.0279	-.0989****	-.039***	-.0449****	-.0805****
	(.0113)	(.0258)	(.0232)	(.015)	(.0125)	(.024)
Sleeping in	-.0701****	-.0727***	-.0354	-.0761****	-.071****	-.0634****
	(.0116)	(.0272)	(.0233)	(.0145)	(.0154)	(.0186)
Obligation	-.0466****	-.046	-.055*	-.0449**	-.0537****	-.0324
	(.0144)	(.031)	(.03)	(.0198)	(.0164)	(.0269)
Nobenefit	.0054	-.0561*	.0164	.0139	.0139	-.0129
	(.0118)	(.0302)	(.02)	(.0133)	(.0141)	(.0213)
Brkfst	.0210****	.0147	.0274***	.02***	.0239****	.0143
	(.0048)	(.0106)	(.0093)	(.0066)	(.0056)	(.0089)
Cigsyes	-.0296	-.0272	.0553	-.0427	-.0398	-.0287
	(.0567)	(.1916)	(.0976)	(.0717)	(.0661)	(.1091)
Cardioyes	-.0944****	-.0926	-.1147**	-.0795**	-.086***	-.1002*
	(.0272)	(.0578)	(.0536)	(.0379)	(.0319)	(.0565)
Wght1ormore	-.0005	-.0525	-.0121	.0178	-.0218	.0327
	(.0248)	(.0564)	(.0483)	(.0332)	(.0286)	(.0488)
Fv4ormore	.0587**	.086	.0728	.0649	.0457	.151***
	(.0285)	(.0562)	(.0564)	(.0397)	(.0318)	(.0582)
Drvisits	-.0008	-.0111	.0322**	-.0062	.0004	.0052
	(.0059)	(.0162)	(.0127)	(.0073)	(.0065)	(.0167)
Vsyes	-.0027	.0305	.0291	-.0226	-.0333	.0815*
	(.0232)	(.0556)	(.0476)	(.0302)	(.027)	(.0438)
Sleep	-.0042	-.0094	-.0019	-.0009	-.003	-.0276
	(.0103)	(.0209)	(.02)	(.0149)	(.011)	(.0205)
Crls16	-.0699**	-.1949**	-.1505**	.0066	-.0758*	-.1317**
	(.0349)	(.0896)	(.0745)	(.0434)	(.0406)	(.063)
Crmr16	.0122	-.0703	.095*	-.0086	-.0095	.0189
	(.0275)	(.0688)	(.0502)	(.0383)	(.0327)	(.0499)
Hrs1tro10	.0584**	-.0369	.1509****	.0373	.0413	.1059**
	(.0299)	(.0711)	(.0472)	(.0358)	(.0306)	(.0537)

Hrsmore10	-.0625**	.0102	-.0341	-.0952***	-.0863***	-.0492
	(.0299)	(.085)	(.0631)	(.0371)	(.0336)	(.0539)
Xcurricls10	.1011****	.104	.06	.1192****	.1298****	.0619
	(.0292)	(.0679)	(.0595)	(.0371)	(.0339)	(.0523)
Xcurricmr11	.0871**	.1065	.0272	.11966**	.1189****	.0374
	(.0382)	(.0888)	(.0756)	(.0527)	(.0442)	(.0687)
Efhsorless	-0.0476	-.1488**	.0794	-.0452	-.0624*	-.0154
	(.0284)	(.0702)	(.0568)	(.036)	(.0326)	(.0574)
Efsomegradgrad	0.0813***	.0823	.1383***	.0531	.0722**	.0832*
	(.0261)	(.0524)	(.05)	(.0377)	(.0306)	(.0498)
Emhsorless	0.0105	.1244*	-.073	.0176	.0413	-.033
	(.0292)	(.0744)	(.0517)	(.0395)	(.034)	(.0576)
Emsomegradgrad	0.0030	.0430	-.0209	.0116	.053*	-.0866
	(.0284)	(.0561)	(.0601)	(.0409)	(.032)	(.0585)
Age	.0038	.0504	.0237***	-.0031	-.0034	.0193
	(.0052)	(.047)	(.0092)	(.0045)	(.0047)	(.0135)
Male	-.0681***	.0348	-.1375***	-.0618*	-	-
	(.0256)	(.0527)	(.0533)	(.0345)		
White	.1496****	.1242**	.1441**	.1674*	.1755*	.0679
	(.0299)	(.0581)	(.0599)	(.0419)	(.0341)	(.0564)
Sophomore	.0149	-	-	-	.0794**	-.1037
	(0.332)				(.0386)	(.0638)
Upperclass	.0649*	-	-	-	.097**	-.0149
	(.0349)				(.0404)	(.0649)
Livoff	.0295	.0572	.0436	.0079	.0587*	-.03
	(.0284)	(.1123)	(.0767)	(.0333)	(.0314)	(.058)
Intercept	3.2153	2.4771	2.8083	3.4044	3.257	3.1534
	(.1317)	(.8958)	(.2631)	(.1519)	(.1347)	(.3175)
R^2	.2060	.2562	.2505	.2144	.2357	.1904
Observations	1438	355	346	757	993	465

Reporting coefficient estimates and robust standard errors (in parentheses).

[a] Statistically significant at the .1% level. [b] Statistically significant at the 1% level.

[c] Statistically significant at the 5% level. [d] Statistically significant at the 10% level.

Appendix A

Health & Attendance Survey

1. Age: _____

2. Gender: Male // Female

3. Class Year: Freshman// Sophomore // Junior // Senior// Super Senior

4. School: Arts & Communication // Business // Culture & Society // Education // Engineering // Nursing, Health, & Exercise Science // Science

5. Housing: Dorms// Off Campus// Off Campus with parents or family

6. Race/Ethnicity: White/Caucasian // African American // Hispanic // Asian or Pacific Islander // Asian Indian // Native American // Other

7. Indicate your father's education level: Some high school // High school degree //Some college // College degree // Some graduate // Graduate degree

8. Indicate your mother's education level: Some high school // High school degree //Some college // College degree // Some graduate // Graduate degree

9. Number of credits taken last semester: less than 12 // 12 -15 //16// 17-20 // more than 20

10. What is your cumulative GPA? Below 2.0 // 2.1-2.5// 2.6–3.0 // 3.1–3.5 // 3.6-4.0

11. What was your GPA last semester? _____

12. On average, how many hours did you work for pay each week last semester ? : none //1 – 5 // 6-10 // 11-15 // 16 – 20 // 21 – 30 // more than 30

13. How many hours did you usually spend participating in extra-curricular activities or community service each week last semester? :
_____

14. How many times did you visit the doctor last semester?: _____

15. In general, would you say your health last semester was:
Excellent // Very Good // Good // Fair // Poor

16. Throughout your college career would you say your health has been:
Excellent // Very Good // Good // Fair // Poor

17. How many days per week do you usually eat breakfast?: 0 1 2 3 4 5 6 7

18. How many servings of fruits and/or vegetables do you usually have per day? 0 1 2 3 4 5 more than 5

19. How many days per week do you usually take a vitamin and/or supplement? 0 1 2 3 4 5 6 7

20. How many days per week do you usually engage in a cardio work out for 20 minutes or more?: 0 1 2 3 4 5 6 7

21. How many days per week do you usually engage in strength training or weight lifting?: 0 1 2 3 4 5 6 7

22. How many hours of sleep do you usually get on a school night?: _____

23. How many cigarettes do you smoke per day? (please respond zero if you do not smoke): _____

24. How often do you have any alcohol to drink?: 4 or more times per week // 2-3 times a week //once a week// 2 -3 times a month // once a month or less // never

25. How many drinks containing alcohol do you have on a typical day or night when you are drinking?: _____

26. Thinking about your entire college career, how many days of school do you usually miss per month? (If you go to school 4 days a week, you have about 18 school days per month):
Zero // 1-2// 3-4// 5-6// 7-8// 9 or more

27. Thinking about your entire college career, how many class meetings do you usually miss per week? (If you take 4 classes that meet twice per week, you have 8 class meetings a week):
Zero// 1// 2// 3// 4// more than 4

28. Last semester, about how many days of school did you usually miss per month? (If you go to school 4 days a week, you have about 18 school days per month):
zero// 1-2// 3-4// 5-6// 7-8// 9 or more

29. Last semester how many classes did you usually miss per month…
(If you take 4 classes that meet twice per week, you will have about 34 class meetings per month)

a. Due to illness? _____
b. Due to sleeping in? _____
c. Due to other obligations? _____
d. Because you weren't benefiting from class time?_____

Appendix B

Examples of Discarded Survey Responses

Question # 25: How many drinks containing alcohol do you have on a typical day or night when you are drinking?

* This question required a numerical answer.

"Honestly? Haha. You don't want to know!"

"5 shots and some beers"

"excessive"

"2 glasses of wine, but only with dinner"

Question #29: Last semester how many classes did you usually miss per month…
(If you take 4 classes that meet twice per week, you will have about 34 class meetings per month)
Due to illness? _____
Due to sleeping in? _____
Due to other obligations? _____
Because you weren't benefiting from class time? _____

*This question required a numerical answer.

...Due to sleeping in?

"1 per month, just sometimes"

…Because you weren't benefiting from class time?

"1 per month (but that was my 10:00am so the REASON I would sleep in was because I wasn't benefiting...seriously!)

"some classes were useless but I still went to them"

"most teachers say missing 1 class doesn't hurt, so I miss 1"

Appendix C

Regression Results for Total Number of Missed Classes per Month Last Semester

Lifestyle Variables Predict Missed Classes per Month Last Semester (Excluding Classes Missed due to Illness)

Independent Variables	Coef	Robust Std Err	t	P>|t|	[95% Conf	Interval]
breakfast	-.1113	.0263	-4.0	0.000	-.1648	-.06147
sleep	2.0731	. 0598	-0.67	0.502	-.1574	.07718
cigsyes	.3821	.4589	4.52	0.000	1.1728	2.9734
fv0to1	.29927	.1510	1.98	0.048	.00302	.59552
drk2or3xwk	.3311	.2048	1.62	0.106	-.0706	.7329
drinks4ormore	.6198	.1394	4.44	0.000	.34618	.8934
age	-0.0377	0.015	-2.51	0.012	-0.0671	-0.0083
male	0.5520	0.1482	3.72	0.000	0.2612	0.8427
white	-0.6528	0.1802	-3.62	0.000	-1.0063	-0.2994
sophomore	0.0940	0.1697	0.55	0.58	-0.2389	0.4269
upperclass	0.4381	0.1667	2.63	0.009	0.1112	0.7650
livoff	0.2540	0.1560	1.63	0.104	-0.0520	0.5599
intercept	2.71	.6091	4.45	0.000	1.5154	3.9051

R^2 = .1265