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Do Gamers Get the Grades? A Study of University of Tennessee Students, their GPAs, and gaming behavior

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Due 11/1 002 Maclennan

SENIOR HONORS PROJECT ADVISOR PROGRESS REPORT

MENTOR'S NAME: Dr. Don Clark

I HAVE MET WITH Virginia Brooks AND REVIEWED THE PROGRESS BEING MADE ON HIS/HER SENIOR HONORS PROJECT.

Progress is satisfactory ✓

Progress is unsatisfactory ___

IF PROGRESS IS UNSATISFACTORY, PLEASE NOTE HERE THE PLANS THAT HAVE BEEN MADE TO MOVE THE PROJECT FORWARD.

* Free trade presentation complete (see attached)
* First draft to be written over holiday break

Because I changed topics twice, the project is just now getting started, but much will be done over the next few weeks.

Mentor's Signature Dm P. Clark Date 12/6/05

Student should return this form to her/his Senior Seminar Instructor by the week of ~~November 1~~

Do Gamers Get the Grades?

A study of University of Tennessee students, their GPAs, and gaming behavior.

Virginia Brooks
4/25/2006
Honors Thesis / Econ 381 Project draft

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Introduction

The purpose of this study is to evaluate whether or not gaming behavior, defined in this case to be the playing of computer and console (video) games, has a significant effect on the grade point averages (GPAs) of college students at the University of Tennessee, Knoxville. The study was facilitated through the use of a survey taken by 916 University of Tennessee students. The survey consisted of 25 questions which comprised the 28 independent variables in the model. Some questions were purposely left out of the model, whereas others represented up to four variables due to dummy variable construction.

Stigma associated with the gaming subculture

Since ancient times, gaming has been a part of popular culture. The ancient Taino Indians of the Caribbean played soccer-like games on primitive ball-courts. The early Western World enjoyed games such as poker, chess, and croquet as a social activity and to keep their minds sharp. Over the last century, games have become more and more intricate as technology has advanced exponentially from generation to generation. The 1972 release of Atari's Pong introduced the era of the video game, though the first few games were quite primitive in design.

Until recently, the stereotypical Gamers were overweight, single men surrounded by empty pizza boxes and beer cans, or suspender-clad nerds straight out of 1990s sitcoms. However, video games have now been embraced by popular culture as a "normal" form of entertainment. According to a 2005 survey released by the Entertainment Software Association and conducted by Peter D. Hart Research

Associates, 93% of gamers read books and/or newspapers regularly, and 62% of gamers consistently attend cultural events such at concerts, museums, and theaters.

Gaming's purported influence on violence

Numerous studies have been conducted on gaming's influence on America's youth. Although by law video and computer games are required to have age-appropriate restrictions whenever sex, violence, nudity, or language is involved, the warnings have done little to curb what has been coined "underage gaming." The upcoming presidential election of 2008 will have heavy ties to gaming regulations, with presidential hopeful Hillary Clinton being well-known as an outspoken critic of violence in console and computer games.

This paper neither supports nor refutes the claim that underage use of violent games leads to violent, antisocial behavior; rather, this disturbing issue is simply set aside for the purpose of finding a correlation between college GPAs and the gaming behaviors of those college-aged survey respondents. As nearly all college students are of 18 years of age and their violent and/or antisocial behavior is not referenced in the survey questionnaire, the issue of underage gaming holds little importance to this study.

Intellectual advantages of video and console games

Today's video games are highly complex, no longer like the Pong™ and PacMan™ of the past. They incorporate storytelling, character development, and animation in a way that constantly challenges the gamer. University of Wisconsin video game researcher James Gee has defined video game technology as "the new literacy."

When referring to the vocabulary and dialogue of certain video games, Gee says that, "Some of the language of gaming is more complex than what kids are exposed to at school." Indeed, games are no longer a simple ball-and-paddle notion of the past.

Historical strategy games such as Firaxis' Civilization III™ encourage players to "match wits against some of history's greatest leaders as they strive to build the ultimate civilization to stand the test of time." Popular massive multi-player online role playing games (MMORPGs) such as Blizzard Entertainment's World of Warcraft™ incorporate lessons of geography, strategy, budgeting, sales, communication, memorization, and group interaction in addition to forcing the gamer to learn intricate vocabulary and special history and behavioral patterns. Computer and console games teach players the problem solving and communication lessons that have long since been a struggle for America's teachers.

Conceptual Framework

Although the survey's ultimate goal was to show the relationships between University of Tennessee students' GPAs and their gaming behaviors, it is important that the model control for the other, non-gaming determinants of students' grade point average. Seeing as how many students do not play any video or console games at all, there are obviously other forces at work in the determination of students' GPAs. In this model, control independent variables are gender, age, student classification, cumulative grade point average, academic courseloads, missed classes, financial aid, fraternity and sorority involvement, extracurricular activities, and living conditions. Each of these variables was evaluated for the Fall 2005 semester to maximize the accuracy of the

results. Had the students been asked to estimate data for the current (Spring 2006) semester, there would have been a much wider margin of error in the model.

The Model

$$FALL05GPA = B_0 + B_1MALE + B_2AGE + B_3SOPHOMORE + B_4JUNIOR + B_5SENIOR + B_6CREDITHRS + B_7MISSED + B_8STUDY + B_9YESAID + B_{10}JOBHRS + B_{11}YESGREEK + B_{12}SPIRIT + B_{13}DAYSDRINK + B_{14}DRINKS + B_{15}ROOMIES + B_{16}DORM + B_{17}APARTMENT + B_{18}FRATHOUSE + B_{19}FAMILY + B_{20}ACTIONG + B_{21}RPGG + B_{22}STRATG + B_{23}SPORTG + B_{24}SIMG + B_{25}PARTYG + B_{26}PUZZG + e$$

The estimation method will be Ordinary Least Squares (OLS) because in this situation, it is the best linear unbiased estimator.

H_0 : All independent variable coefficients = 0

H_A : any of the coefficients will be greater than or equal to zero

The Data

In order to facilitate data collection a survey consisting of 25 questions was posted through www.createsurvey.com. These questions gathered information from University of Tennessee students such as grade point average, demographic information, and gaming behavior. Posted on discussion boards and sent through e-mail listservs, the survey was eventually answered by 916 respondents. (Some respondents chose not to answer all 25 questions, leading to several independent variables having fewer than 916 data entries.)

To judge the relatability and credibility of the findings of this survey, it was important to compare the demographics of the survey respondents to the demographics of the University of Tennessee population. Table 1 (below) shows the differences between

the age, sex, and student classification of the students participated in the survey, and the student body as a whole. (Source: University of Tennessee Fact Book, 2004-2005)

Table 1: Survey Repondents and UT Student Body Comparison

	Survey Respondents	UT Student Body
Headcount	916	27769
% Freshmen	37.12%	21.85%
% Sophomores	21.74%	13.85%
% Juniors	16.16%	13.86%
% Seniors	19.21%	19.99%
% Grad Students	5.79%	29.28%
Avg. Age	20.26	26.52
% Male	41.48%	48.05%
% Female	58.52%	51.95%

Compared to the UT general student body, the survey respondents were significantly younger. This can be attributed to the fact that the survey was posted electronically on which are more often frequented by younger (underclassmen) students.

Dependent Variable

The dependent variable, FALL05GPA, was constructed from the following survey question: "For the Fall 2005 semester, your grade point average was: _____ / 4.00" Out of 916 respondents, 4 responses were omitted from the dependent variable due to the respondents giving an incomplete answer (e.g. "confidential") to this question.

FALL05GPA

Minimum	**0.00**
Maximum	**4.00**
Mean	**3.177697**
Standard Deviation	**0.6613582**

The respondents with minimum GPA 0.00 failed all of their coursework, whereas the respondents with the maximum 4.00 Fall 2005 GPA made straight "As" in all of their

coursework. The average respondent's GPA was a 3.18/4.00, or a 79.5%/100%. At the University of Tennessee, this translates roughly into a "C+" average.

B_0	Constant term
e	Error term, generated through STATA as residual

Summary of Independent Demographic Variables

B_1MALE	=1 if male =0 otherwise
B_2AGE	Respondent's age.
B_3SOPHOMORE*	=1 if sophomore =0 otherwise
B_4JUNIOR	=1 if junior =0 otherwise
B_5SENIOR	=1 if senior =0 otherwise
B_7CREDITHRS	# of credit hours respondent was taking
B_8MISSED	# of classes respondent missed weekly
B_{10}STUDY	# of hours respondent studied weekly.
B_{11}YESAID	=1 if respondent received financial aid =0 otherwise
B_{12}JOBHRS	# of hours respondent worked weekly at a job
B_{13}YESGREEK	=1 if respondent was fraternity or sorority member =0 otherwise
B_{14}SPIRIT	# of hours respondent was involved in extracurricular activities
B_{15}DAYSDRINK	# of days respondent had alcoholic beverages weekly
B_{16}DRINKS	# of alcoholic beverages respondent consumed each day
B_{17}ROOMIES	# of roommates respondent had
B_{18}DORM**	=1 if respondent lived in a dormitory =0 otherwise
B_{19}APARTMENT	=1 if respondent lived in apartment =0 otherwise
B_{20}FRATHOUSE***	=1 if respondent lived in fraternity house =0 otherwise
B_{21}FAMILY	=1 if respondent lived with family members =0 otherwise

** Freshman variable excluded to avoid dummy variable trap.*
*** "Other" has been excluded to avoid dummy variable trap.*
**** Sorority houses are not allowed at the University of Tennessee and as such were not included in the survey.*

Explanation of Individual Independent Variables

Male: This variable signifies whether the survey respondent is male or female. Out of 916 repondents, there were 380 males (41.48%) and 536 females (58.52%). The predicted coefficient for gender is negative, because numerous studies have shown that female students generally peform better academically.

Age: This variable signifies the survey respondent's current age. The data was obtained through the survey question, "What is your age? ____ years old."

Table xxx: Ages of Survey Respondents

Minimum	**16**
Maximum	**38**
Mean	**20.26201**
Standard Deviation	**2.101032**

The predicted coefficient of the Age independent variable is positive. As students age, they tend to do better in college due to improved study skills, fewer distribution requirements, and classes concentrated within the students' majors.

Student Classification: These variables denote whether a student is of undergraduate or graduate status, and if undergraduate, which classification they had as of Fall 2005 (freshman, sophomore, junior, or senior). The data was obtained through the survey question, "In Fall 2005, what was your classification at the University of Tennessee?" Out of a total 916 respondents, there were 340 Freshmen (37.12%), 199 Sophomores (21.74%), 148 Juniors (16.16%), 176 Seniors (19.21%), and 53 Graduate Students (5.79%). The Freshman variable was excluded to avoid a dummy variable trap since

independent variables Sophomore, Junior, and Senior were assigned dummy values of 0 or 1.

The predicted Sophomore coefficient is negative because although they are more experienced than freshman students, sophomore students are still subject to distribution requirement coursework that may not be related to their field of study. They will not perform as well as juniors and seniors who will be more interested in their courses. Juniors begin taking classes within their major and have had two years to learn how to succeed with undergraduate coursework. Seniors take classes almost exclusively within their major and have had three years to learn how to succeed with undergraduate coursework. Also, they are applying to graduate schools and to jobs; as a result, they want to have the best possible GPA. The predicted Junior and Senior coefficients, then, will be positive.

Finally, graduate students were left out of the model. The graduate grading scale is different than the undergraduate grading scale, and many professors inflate grad students' grades.

Credit Hours: This variable denotes the number of credit hours (classes) the student completed during the Fall 2005 semester. The data was obtained through the survey question, "How many credit hours did you complete in Fall 2005?"

TABLE XXXX #CREDIT HRS

Minimum	**1**
Maximum	**21**
Mean	**14.07533**
Standard Deviation	**2.861809**

The predicted coefficient for Credithrs is positive. Although one would think that a higher number of credit hours would reduce the amount of time the student could devote to each class, there should be a positive correlation between courseloads and GPAs; it seems logical that the more dedicated students are more likely to succeed.

Missed Classes: This variable denotes the approximate number of classes the student missed or skipped each week during the Fall 2005 semester. The data was obtained through the survey question, "In Fall 2005, how many classes, on average, did you miss each week? _____ classes."

TABLE XXXX #MISSED CLASSES

Minimum	**0**
Maximum	**10**
Mean	**1.081599**
Standard Deviation	**1.344266**

The relationship between missed classes and GPA is expected to be negative. Simply stated, a student who misses classes is less likely to perform well in his or her classes.

Number of hours spent studying outside of class per week: this variable (STUDY) denotes the approximate number of hours that the student spent studying outside of class each week during the Fall 2005. The data was obtained through the survey question, "In Fall 2005, how many hours, on average, did you study outside of class each week? _____ hours."

TABLE XXXX #HRS STUDY

Minimum	**0**
Maximum	**60**
Mean	**8.698578**
Standard Deviation	**7.080604**

The relationship between studying and GPA is expected to be positive. A student who studies several hours outside of class is more likely to perform well in their coursework.

Financial Aid Status: This variable (Yesaid) denotes whether or not the student was a recipient of financial aid (grants, loans, work study, etc.) during the Fall 2005 semester. The data was obtained through the survey question, "In Fall 2005, did you receive financial aid (grant, scholarship, work study, loan)?" Out of 916 respondents, 765 responded that they did receive financial aid (83.52%) and 151 responded that they did not (16.48%). The predicted coefficient for Yesaid is positive. A student who is a financial aid recipient should be more motivated to perform well in their coursework (return on investment).

Student Employment: This variable (Jobhrs) signifies the approximate number of hours per week that each respondent spent at their place of employment during the Fall 2005 semester. The data was obtained through the following survey question: "In Fall 2005, how many hours, on average, did you work at a job each week? _____ hours." Survey data showed that the average student worked 10.22 hours per week at their job.

TABLE XXXX: JOB HRS

Minimum	**0**
Maximum	**65**
Mean	**10.22022**
Standard Deviation	**12.00879**

The predicted coefficient for the Jobhrs variable is negative. A student who works an outside job should have better time management skills, and as such should perform better in classes. In addition, students whose jobs are directly related to their coursework will

be directly reinforcing what they are learning in their classes. (Stern, 215) However, the time taken away from studying will outweigh the time management skills gained. Most college students work to pay for living expenses and discretionary consumption, not to benefit what they are learning in their chosen field of study. (Stern, 213)

Greek Life: This variable (Yesgreek) denotes whether or not the respondent was a member of a social fraternity (males) or sorority (females). The data was obtained by the survey question "* In Fall 2005, Were you a member of any social fraternity or sorority at the University of Tennessee?" Out of 916 respondents, 175 admitted to being a member of a fraternity or sorority (19.10%) and 741 were not affiliated with Greek life 80.90%. The predicted coefficient for Yesgreek is negative. Social fraternities and sororities are distractions to students' academic well-being. Study hours are often required, but rarely enforced. In addition, sororities and fraternities are highly time-consuming organizations.

Extracurricular Activities: This variable (Spirit) signifies the approximate number of hours per week that each respondent spent working on non-Greek extracurricular activities such as student government, clubs, or intramurals. The data was obtained through the survey question "In Fall 2005, how many hours on average did you spend each week involved in non-fraternity/sorority college-related activities? (Examples: student clubs and organizations, intramural sports, student government, residence hall activities)."

TABLE XXX HRS INVOLVED IN EXTRACURRICULAR ACTIVITIES

Minimum	0
Maximum	41
Mean	3.14083
Standard Deviation	4.661297

The predicted coefficient for Spirit is negativie. Although being highly involved in extracurricular activities will increase the student's interest in the school, they will be distracted from their classes when highly involved in extracurricular activities.

Alcohol Consumption: The first alcohol-related model variable "Daysdrink" signifies the approximate number of days per week that the respondent consumed at least one alcoholic beverage. The data was obtained through the survey question, "In Fall 2005, how many days a week, on average, did you consume an alcoholic beverage? _____ days."

TABLE XXXX DAYS DRINKING PER WEEK

Minimum	0
Maximum	7
Mean	1.245633
Standard Deviation	1.388372

The predicted relationship between the number of days the respondent consumed alcoholic beverages per week and the respondent's GPA is negative. Students who are inebriated more days of the week will be unable to study for their classes, and will have lower GPAs. The consumption of alcohol has a negative impact on GPA through (a) its impact on the students' cognitive abilities, and (b) its impact on students' study habits. (Powell, 135)

The Model variable "Drinks" signifies the approximate number of alcoholic beverage that the respondent consumed on those days that they did consume at least one alcoholic beverage. The data was obtained through the survey question, "In Fall 2005, on days when you consumed alcohol, about how many drinks would you have? _____ drinks (1 drink = 1 12 oz. beer = 1 glass wine = 1 oz. liquor)."

TABLE XXXXX AVG # OF DRINKS PER DAY

Minimum	**0**
Maximum	**27**
Mean	**3.391803**
Standard Deviation	**3.66511**

The predicted coefficient for Drinks is also negative. Students who drink heavily will have hangovers, rendering them unable to study both when they are drinking, and also the morning after. In addition, students who drink heavily may place a lower value on future earnings, and as such invest less time and effort in their studies. (Powell, 135)

Living Arrangements: The model variable Roomies signifies the number of roommates the respondent had during the Fall 2005 semester. The data was obtained through the survey question, "In Fall 2005, how many roommates did you have?"

TABLE XXX: # ROOMIES

Minimum	**0**
Maximum	**6**
Mean	**1.255459**
Standard Deviation	**1.127027**

The predicted coefficient for Roomies is negative. Students who have several roommates will be distracted by noise and interpersonal relations, as opposed to students who live alone in a quiet environment.

The students' actual living quarters were represented by dummy variables signifying whether the respondent lived in a dorm room, in an apartment, in a fraternity house*, with family, or in another living arrangement. The survey data was obtained by the survey question, "In Fall 2005, what were your living arrangements?" with the option choices Dorm Room, Apartment, Fraternity House*, With Family, and Other. (Other has been excluded to avoid dummy variable trap.) * *Note: sorority houses are not allowed at the University of Tennessee and as such were not included in the survey.*

Out of 916 respondents, 418 (45.63%) lived in a Dorm Room, 336 (36.68%) lived in an Apartment, 7 (0.7%) lived in a Fraternity House (0.7%), 101 (11.03%) lived With Family (11.03%) and 54 (5.90%) had Other living arrangements. The predicted Dorm coefficient is negative. Dorms are often loud and cramped, with conditions that are hardly conducive to studying. The predicted Apartment coefficient is positive. Students who live off-campus in an apartment will have a quieter environment in which to study. The predicted Fraternity House coefficient is negative. Students who live in a fraternity house are often subject to loud noise and heavy drinking. The predicted With Family coefficient is positive. Students who live with their families will likely be prompted by family members to be diligent about their studying.

Independent Variables: Gaming Behavior

Now that the chief non-gaming determinants of student GPA have been accounted for, the effects of students' gaming behavior can be analyzed. For the purpose of the survey, video and console games were sectioned into seven segments: Action games (such as Mortal Kombat and Halo), Role Playing Games (such as Final Fantasy and

World of Warcraft), Strategy Games (such as Civilization), Sports Games (such as Madden), Simulation Games (such as SimCity), Party Games (such as Mario Party and Dance Dance Revolution), and Puzzle Games (such as Minesweeper and Tetris).

As any hardcore gamer would testify, video and console games simply cannot be separated into seven clear-cut segments. However, for the purpose of simplifying the model, gaming was segmented into these seven largely-encompassing genres that were well-defined by the survey questions.

TABLE XXXX: HRS SPENT PLAYING ACTION GAMES

Minimum	**0**
Maximum	**40**
Mean	**0.9175764**
Standard Deviation	**2.822243**

The first Model variable "Actiong" signifies the approximate number of hours the respondent spent playing Action-genre games each week of the Fall 2005 semester. The data was obtained through the survey question, "Complete the following sentence: In Fall 2005, I spent approximately _____ hours per week playing ACTION / FIGHTING /FIRST PERSON SHOOTER video/computer games. (examples: Halo, Metal Gear Solid, Grand Theft Auto, Mortal Kombat, Soul Calibur) The predicted ActionG coefficient is positive. Action/fighting/first person shooter games are full of high-resolution graphics, quick movements, and involve lots of memorization of weaponry, plot, and character development. These cognitive exercises should lead to students having higher GPAs.

TABLE XXX: HRS SPENT PLAYING RPGS

Minimum	**0**
Maximum	**40**

Mean	**0.6320961**
Standard Deviation	**2.905904**

The model variable "Rpgg" signifies the approximate number of hours the respondent spent playing Role Playing-genre games each week of the Fall 2005 semester. The data was attained through the survey question, "Complete the following sentence: In Fall 2005, I spent approximately ____ hours per week playing RPG / MMORPG video/computer games. (Examples: World of Warcraft, Everquest, Final Fantasy, Kingdom Hearts, Dragon Quest)

The predicted RPG Coefficient is positive. Role Playing Games and Massive Multiplayer Online Roleplaying Games (MMORPGs) are quite possibly the most complex and challenging genre of videogames. Literally, entire worlds are represented by complex maps that the player must be able to interpret and/or memorize. Character attributes and development evolve throughout the game, and most RPGs rely on cooperation between several characters, leading to each player having to possess intimate knowledge of all other players involved. Students who enjoy this level of difficulty should perform well in their classes.

TABLE XXX: HRS SPENT PLAYING STRATEGY GAMES

Minimum	**0**
Maximum	**12.5**
Mean	**0.3406114**
Standard Deviation	**1.306449**

The model variable "Stratg" signifies the approximate number of hours the respondent spent playing Strategy-genre games each week of the Fall 2005 semester. The data was obtained through the survey question, "Complete the following sentence: In Fall 2005, I spent approximately ____ hours per week playing STRATEGY video/computer games.

(Examples: Starcraft, Warcraft 3, Civilization 2, Age of Empires) The predicted Stratg coefficient is positive. Just as in role playing games, strategy games are highly complex and involved. Students who excel at certain strategy games must also posess a keen knowledge of and interest in history. As a result, they should perform better in school.

TABLE XXX: HRS SPENT PLAYING SPORTS GAMES

Minimum	**0**
Maximum	**26**
Mean	**0.805131**
Standard Deviation	**2.343801**

The model variable "Sportg" signifies the approximate number of hours the respondent spent playing Sports-genre games each week of the Fall 2005 semester. The data was obtained through the survey question, "Complete the following sentence: In Fall 2005, I spent approximately ____ hours per week playing SPORTS video/computer games. (Example: Fantasy Baseball Leagues, Madden NFL, SSX, All-Star Baseball, ESPN NFL 2k5, FIFA Soccer, NCAA March Madness). The predicted Sportg coefficient is negative. Students who play sports games generally do so for recreational purposes rather than for the intellectual challenge and stimulation. Alcohol is often involved in the playing of these games, leading to the prediction that sports games will not have a positive effect on student GPA.

TABLE XXX: HRS SPENT PLAYING SIMULATION GAMES

Minimum	**0**
Maximum	**12**
Mean	**0.2532751**
Standard Deviation	**1.181247**

The model variable "Simg" signifies the approximate number of hours the respondent spent playing Simulation-genre games each week of the Fall 2005 semester. The data was obtained through the survey question: "In Fall 2005, I spent approximately ____ hours per week playing SANDBOX / SIMULATION video/computer games. (Examples: The Sims, RollerCoaster Tycoon). The predicted coefficient for Simg is positive. Reason(s): Students who enjoy simulation games have an appreciation of micromanagement and creation. They manage their own microcosms of people, businesses, and cities. They should perform well in several of their related classes, which should hopefully be reflected in a higher GPA.

TABLE XXX: HOURS SPENT PLAYING PARTY GAMES

Minimum	**0**
Maximum	**12**
Mean	**0.2603712**
Standard Deviation	**0.951933**

The model variable "Partyg" signifies the approximate number of hours the respondent spent playing Party-genre games each week of the Fall 2005 semester. The data was obtained through the survey question "Complete the following sentence: In Fall 2005, I spent approximately ____ hours per week playing PARTY / GROUP video/computer games. (Examples: Mario Kart, Mario Party, Dance Dance Revolution, Smash Brothers). The predicted Partyg coefficient is negative. Party games have little room for intellectual stimulation and are usually played to facilitate social interaction (often in situations where alcohol is involved.)

TABLE XXX: HRS SPENT PLAYING PUZZLE GAMES

Minimum	**0**
Maximum	**28**

Mean	0.9181223
Standard Deviation	1.980605

The model variable "Puzzg" signifies the approximate number of hours the respondent spent playing Puzzle-genre games each week of the Fall 2005 semester. The data was obtained through the survey question "Complete the following sentence: In Fall 2005, I spent approximately ____ hours per week playing PUZZLE / MINDBENDER video/computer games. (Examples: Meteos, Tetris, Online Card and Board Games, Solitaire, FreeCell, Minesweeper) The predicted Puzzg coefficient is positive. Students who play puzzle games enjoy intellectual stimulation and should perform better in their math classes.

Results

$$FALL05GPA = B_0 + B_1MALE + B_2AGE + B_3SOPHOMORE + B_4JUNIOR + B_5SENIOR + B_6CREDITHRS + B_7MISSED + B_8STUDY + B_9YESAID + B_{10}JOBHRS + B_{11}YESGREEK + B_{12}SPIRIT + B_{13}DAYSDRINK + B_{14}DRINKS + B_{15}ROOMIES + B_{16}DORM + B_{17}APARTMENT + B_{18}FRATHOUSE + B_{19}FAMILY + B_{20}ACTIONG + B_{21}RPGG + B_{22}STRATG + B_{23}SPORTG + B_{24}SIMG + B_{25}PARTYG + B_{26}PUZZG + e$$

Regression:

```
Regress FALL05GPA MALE AGE SOPHOMORE JUNIOR SENIOR
CREDITHRS MISSED STUDY YESAID JOBHRS YESGREEK SPIRIT
DAYSDRINK DRINKS ROOMIES DORM APARTMENT FRATHOUSE FAMILY
ACTIONG RPGG STRATG SPORTG SIMG PARTYG PUZZG
```

Source	SS	df	MS	Number of obs =	858
				F(26, 831) =	11.06
Model	97.046507	26	3.73255796	Prob > F =	0.0000
Residual	280.541182	831	.337594684	R-squared =	0.2570
				Adj R-squared =	0.2338
Total	377.587689	857	.440592403	Root MSE =	.58103

fall05gpa	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
male	.0187009	.0469218	0.40	0.690	-.0733983	.1108
age	-.0258601	.0174851	-1.48	0.140	-.0601803	.0084602
sophomore	.1153192	.0652584	1.77	0.078	-.0127716	.2434099
junior	.2679691	.0810319	3.31	0.001	.1089178	.4270204
senior	.3497154	.0949245	3.68	0.000	.1633954	.5360354
credithrs	.0633196	.0077966	8.12	0.000	.0480162	.078623
missed	-.1156591	.0164299	-7.04	0.000	-.147908	-.0834102
study	.0020357	.0030219	0.67	0.501	-.0038958	.0079672
yesaid	.2137451	.0566513	3.77	0.000	.1025486	.3249416
jobhrs	-.0061406	.0018812	-3.26	0.001	-.0098331	-.0024482
yesgreek	-.0147519	.0537371	-0.27	0.784	-.1202282	.0907245
spirit	.0015477	.0043773	0.35	0.724	-.0070441	.0101395
daysdrink	.0324576	.0194575	1.67	0.096	-.005734	.0706492
drinks	-.0153114	.006926	-2.21	0.027	-.0289058	-.0017169
roomies	-.027427	.0204551	-1.34	0.180	-.0675767	.0127226
dorm	-.1075884	.1056147	-1.02	0.309	-.3148913	.0997146
apartment	-.0074414	.0932132	-0.08	0.936	-.1904024	.1755196
frathouse	-.1446558	.2463063	-0.59	0.557	-.6281115	.3387999
family	.0354457	.1166217	0.30	0.761	-.193462	.2643533
actiong	.0064894	.0080632	0.80	0.421	-.0093372	.0223161
rpgg	-.0005146	.0075192	-0.07	0.945	-.0152735	.0142442
stratg	-.0027067	.0182869	-0.15	0.882	-.0386007	.0331873
sportg	-.0191699	.0092377	-2.08	0.038	-.0373017	-.001038
simg	-.0308135	.0202291	-1.52	0.128	-.0705195	.0088926
partyg	-.0154562	.0239701	-0.64	0.519	-.0625053	.0315929
puzzg	-.0147921	.0105676	-1.40	0.162	-.0355345	.0059503
_cons	2.745644	.3808173	7.21	0.000	1.998167	3.49312

At 5% level, test statistic two-sided infinity degrees of freedom with 854 observations, 28 variables -1 = 1.96

$|t| > 1.96$ in:

junior
senior
credithrs
missed
yesaid
jobhrs
drinks
sportg
simg

To test for multicollinearity (when independent variables have strong relationships with one another), there are several statistics to consider. High standard errors will be present because the ordinary least squares estimator will have more difficulty estimating separate slope coefficients for variables that are highly correlated with one another.

In the model, the highest standard errors are present for the variables "dorm" and "family."

Another sign of multicollinearity is a variance inflation factor above 4.00, which is considered to be extremely high. In the model, there are two variables whose coefficients have VIFs > 4:

Variable	VIF	1/VIF
dorm	7.08	0.141270
apartment	5.00	0.200082
senior	3.73	0.267811
family	3.34	0.299351
age	2.63	0.380943
junior	2.37	0.422069
sophomore	1.92	0.520476
daysdrink	1.80	0.556513
drinks	1.71	0.586449
simg	1.52	0.659196
stratg	1.44	0.695900
actiong	1.39	0.718035
male	1.37	0.728639
roomies	1.37	0.732425
partyg	1.36	0.735500
jobhrs	1.28	0.782972
missed	1.27	0.789032
frathouse	1.25	0.801501
rpgg	1.22	0.821590
sportg	1.20	0.833379
yesgreek	1.18	0.850124
puzzg	1.15	0.866974
study	1.14	0.875765
credithrs	1.12	0.892200
yesaid	1.11	0.903065
spirit	1.05	0.952475
Mean VIF	1.96	

** denotes statistical significance at the 5% level

Robust Standard Error:

Linear regression

					Number of obs =	858
					F(26, 831) =	9.20
					Prob > F =	0.0000
					R-squared =	0.2570
					Root MSE =	.58103

fall05gpa	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
male	.0187009	.0467387	0.40	0.689	-.073039	.1104407
age	-.0258601	.0181519	-1.42	0.155	-.061489	.0097689
sophomore	.1153192	.0670497	1.72	0.086	-.0162875	.2469258
junior	.2679691	.0774784	3.46	0.001	.1158926	.4200455
senior	.3497154	.096	3.64	0.000	.1612845	.5381463
credithrs	.0633196	.0119407	5.30	0.000	.0398821	.0867571
missed	-.1156591	.0188845	-6.12	0.000	-.1527261	-.0785921
study	.0020357	.0026773	0.76	0.447	-.0032193	.0072907
yesaid	.2137451	.0544435	3.93	0.000	.1068821	.3206081
jobhrs	-.0061406	.0019509	-3.15	0.002	-.0099699	-.0023114
yesgreek	-.0147519	.0524786	-0.28	0.779	-.117758	.0882543
spirit	.0015477	.0037077	0.42	0.676	-.0057299	.0088254
daysdrink	.0324576	.0182677	1.78	0.076	-.0033988	.0683139
drinks	-.0153114	.0068075	-2.25	0.025	-.0286733	-.0019494
roomies	-.027427	.0208965	-1.31	0.190	-.0684432	.0135891
dorm	-.1075884	.0852816	-1.26	0.207	-.2749809	.0598042
apartment	-.0074414	.0685438	-0.11	0.914	-.1419807	.1270979
frathouse	-.1446558	.2220323	-0.65	0.515	-.5804658	.2911542
family	.0354457	.0953958	0.37	0.710	-.1517994	.2226908
actiong	.0064894	.0091153	0.71	0.477	-.0114022	.0243811
rpgg	-.0005146	.0068426	-0.08	0.940	-.0139454	.0129161
stratg	-.0027067	.0221005	-0.12	0.903	-.046086	.0406726
sportg	-.0191699	.0110296	-1.74	0.083	-.0408189	.0024792
simg	-.0308135	.0194161	-1.59	0.113	-.0689238	.0072968
partyg	-.0154562	.0266718	-0.58	0.562	-.0678083	.0368958
puzzg	-.0147921	.0110696	-1.34	0.182	-.0365198	.0069356
_cons	2.745644	.4077718	6.73	0.000	1.94526	3.546027

In the presence of heteroskedasticity, OLS is unbiased but standard errors are incorrect. White's test of robust standard errors is valid in the presence of heteroskedasticity.

In running the White test, the following variables are significant at the 95% level:

F-Test

Fc for infinity degrees freedom numerator (k = 28) and infinity degrees denominator (864-28-1) = 1.00

|F| > Fc for:

Bibliography