Does Employment During the School Year Affect a Student's High School GPA?

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Econ 4990, Senior Seminar in Economics

M, W 12:30-1:45

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3/9/2014

Abstract

Using data from the Alfred P. Sloan Study of Youth and Social Development, this paper examines the effects of employment during high school on a student's GPA through the use of two OLS regression equations. The first regression uses an indicator variable for whether the student is currently employed or has been employed during that school year. The second regression uses a measure of the specific number of hours the student works per week as the independent variable of interest. The results indicate that employment positively affects GPA; specifically, a working student had a higher GPA by approximately 0.2 points compared to a non-working student. The coefficient for the number of hours worked per week was small and statistically insignificant, indicating that there is no significant effect of the number of hours worked on GPA. Given that GPA is important in determining a student's future success, it is important to research the ways in which it may be affected by work.

I.   Introduction

The effects of high school employment on academic success have been a topic of great ambiguity for decades. In order to examine this topic, it is first important to understand the history of high school employment. The first time the Bureau of Census reported employment figures separately for in- and out-of-school teenagers was in 1940; at that time, only 4% of 16-year old males and 1% of 16-year old females were both employed part-time and attending school. By the 1970's, we saw these rates rise to 27% and 16%, respectively. Not only did we observe an increase in rates of employment, but also in the number of hours being worked per week. For example, in 1960, only 44% of 16-year old males who were both employed and in school were working more than 14 hours per week. By 1970, this proportion had increased to 56%. Females of the same age experienced a similar rise from 34% to 46% over this time period (Steinberg).

Yet, in later and more recent years, we have witnessed a decline in this rate of employment. For example, in 1988, data from the National Longitudinal Survey of Youth (NLSY) indicated that roughly 66% of high school juniors and 75% of high school seniors were employed at some time during the school year. These students were working 18 and 23 hours per week, respectively (Oettinger). By 1997, the NLSY reported that only 60% of high school juniors and 66% of high school seniors were employed at some point during the school year, indicating that the rate of employment among high school students had declined. Similarly, we saw the number of hours worked per week fall; for example, the NLSY claimed that high school seniors were working only 18 hours per week in 1997 as opposed to 23 hours in 1988 (Rothstein). Further evidence of this decline can be seen in an article published by the U.S. Bureau of Labor Statistics (2008). This article indicates that the number of students between the ages of 16 and 17 years old who were both enrolled in school and employed was only 21% in 2007, although it had been 31% in 2000. The Bureau of Labor Statistics (BLS) suggests that this recent decline may be due a variety of aspects, such as what they refer to as "greater school pressures." For example, the BLS claims that the recent increase in the number of students enrolled in Advanced Placement classes can be considered a "greater school pressure." The BLS also suggests that this more recent decline between 2000 and 2007 could be due to the slow

recovery of employment following the recession of 2001, the decrease in real wages for teens, and the decrease in the demand for teens in restaurants and retail.

Since we originally witnessed a rise in the percentage of students working while in high school, yet have recently experienced a decline in this rate, it is essential to understand the overall effects of employment on academic achievement. More specifically, it is important to research and understand the effects of work on high school GPA, as this is one of the most influential determinants of "the quality of both post-secondary institutions into which students who continue schooling are admitted, and entry-level jobs obtained by students who join the full-time labor force straight from high school" (DeSimone). In other words, a student's GPA is known to be a direct factor in determining that student's future education or occupation. Despite the ambiguous results of studies regarding this topic, additional research can only further help to explain and understand the ways in which high school GPA is affected by employment. As stated in a study conducted by Herbert W. Marsh and Sabina Kleitman (2005), "high school experiences provide an essential platform for academic and non-academic accomplishments, further education, and adult life. It is important to investigate factors that enhance or interfere with students' ability to perform at their best while in high school." If further studies are not conducted to determine the true effect of employment on GPA, it is possible that we will miss out on what may prove to be additional important and influential information regarding one of the most crucial indicators of future success, whether that success be in terms of higher education or full-time occupation.

Using data from the Alfred P. Sloan Study of Youth and Social Development, I ran two separate OLS regressions in order to determine the effect of employment on GPA. The first equation uses a dummy variable for work that is equal to 1 when the student is either currently employed or has been employed during that current school year, and 0 otherwise. The second equation uses a variable that measures the average total number of hours a student works per week, including weekends. To account for the possibility that GPA may be affected in a positive or negative way up until a certain point and then the effect may change thereafter, a hours squared variable was also included in this regression. My results indicate that being employed has a significant, positive effect on GPA. When the variable "work" was measured by whether or not the student was employed, the coefficient indicated that students who were employed had a higher GPA by roughly 0.2 points as opposed to those who were not working. My research also

indicated that the specific number of hours being worked per week had no significant effect on a student's GPA.

This paper is organized into five additional sections. Section II considers 4 different theories of how employment may affect GPA and explains the reasoning behind each possible effect. Section III describes previous literature on this topic, and is organized based on which of the different theories mentioned in Section II their research supports. Section IV describes the data used for my research and includes the definitions of all the variables used in my regressions. Section V explains my empirical approach and explains the results derived from my regressions. Finally, section VI states the main conclusions based on my results and explains the limitations of my research that may affect the results.

II.   Theory

Empirical studies regarding the effects of employment on GPA have produced various results and, therefore, have caused the topic to be continuously debated. This debate consists of four basic theories: that employment has a negative effect on GPA, that employment has a positive effect on GPA, that employment has a positive effect on GPA up until a certain number of hours worked and then a negative effect thereafter, and that employment has no effect on GPA. Due to the variations in results among previous studies, it is important to investigate the relevant information regarding each of these theories.

On one side of the argument, there are those who tend to believe that employment detracts from the amount of time spent on academics. This may be due to the fact that a student's job can reduce the amount of time he or she allocates toward studying, either as a result of the direct reduction in time available or the fact that employment may cause students to choose leisure over study during their free time. Also, employment may affect the productivity of a student's study time due to fatigue from work (Oettinger). Therefore, those who consider these to be the direct consequences of employment believe that employment has an overall negative effect on a student's GPA. Those who support this theory may also reason that teen-employment "does not educate or properly prepare students for adult occupational roles" and "fails to foster the psychological maturity or development necessary for adult employment," thereby disregarding the argument that teen employment may be beneficial at least in the sense that it prepares students for real-world employment after they have completed their education (Warren).

On the other hand, some believe that working teaches time-management and creates "attitudes, behaviors or characteristics that lead to academic success" (DeSimone). Specifically, those who take this stance claim that working during high school "promotes responsibility, punctuality, and reliability" and that it "develops valuable work skills and builds character and self-confidence" (Warren). Employment may also increase the productivity of study time somewhat indirectly as it may lead to an increased motivation or "future-orientedness," such as for those who plan to attend college (Oettinger). A study conducted by Bowles and Gintis (1976) noted the existence of a congruency between the personality traits rewarded by employers and those rewarded by teachers. Specifically, they found that traits including perseverance, dependability, and consistency, which are considered beneficial in the workplace, are at least partially correlated with a student's GPA, thereby indicating that these characteristics are beneficial from an academic standpoint as well.

There are also those who believe that the effects of employment are mixed. Rather than believing that employment always harms or always helps academics, some believe that employment will increase a student's GPA up until a certain number of hours, known as the threshold point, after which GPA will begin to decline. However, there is no clear consensus in terms of where exactly the threshold number of hours lies. Rather, supporters of this approach simply claim that the overall general effect of hours on GPA will result in a U-shaped function where the specific threshold number of hours can be determined by finding the inflection point of the quadratic effect of the number of hours worked (Marsh, 2005).

Finally, there are those who believe the theory that employment does not actually have a significant effect on a student's GPA, positively or negatively. This belief may be fostered from the idea that the positive and negative effects of employment cancel each other out, thereby preventing any change in academic achievement from occurring.

III.   Previous Literature

Studies conducted previously on this topic have derived results that are supportive of three of the four aforementioned theories, thereby making the true effect that much more uncertain. There did not seem to be any prior research providing evidence of a solely positive effect of employment on GPA; rather, any positive effect experienced only lasted up until a

certain point, and was then followed by a decline in GPA, thereby following the threshold theory.

The theory that employment ultimately has a negative effect on GPA has received support from several studies (see, for example, Eckstein and Wolpin 1999; Steinberg, Greenberger, Garduque, and McAuliffe 1982). Marsh (1991) conducted a study in which he ran multiple OLS regressions in order to examine each of 22 senior and postsecondary outcomes. He found that, while working during the summer had no negative effects overall, working during the school year did have negative effects. Specifically, Marsh found that the effects of working followed a linear function in which the more hours worked, the greater the negative effect on academic achievement. The only positive effect of employment that he discovered was that it reduced the likelihood of unemployment during the two years following high school graduation. Another study conducted by Ruhm (1997), which specifically focuses on how high school employment affects future economic attainment, also provided support for a negative effect of employment on educational attainment as a whole. Ruhm also used an OLS regression in which he found that, while hours worked for seniors had a positive correlation with future earnings, fringe benefits, and occupation, a higher number of hours worked also caused these students to achieve less academically than their counterparts. He found that, for females specifically, working an excess of 20 hours per week had a large negative effect on academic achievement.

A study conducted by Jane H. Lillydahl (1990) provided support for the threshold theory. Using data from the 1987 National Assessment of Economic Education Survey, she found evidence indicating modest levels of employment lead to an increase in GPA at first, but after a certain number of hours, GPA began to decline. She used a two-stage least squares estimation and estimated four separate regressions models for junior and senior high school students. Each of these four models included a different proxy for academic achievement as the dependent variable; these proxies were GPA, verbal Scholastic Aptitude Test (SAT) score, Math SAT score, and Standardized Test of Economic Literacy (TEL) score. While her results were not statistically significant for the verbal SAT score, math SAT score, or TEL score, her results did show that hours worked had a positive effect on GPA up to approximately 13.5 hours of work per week followed by a decline in the effect after this point. She believed this was most likely due to the fact that students who were working a greater number of hours were more likely to be absent from school, spend less time on homework, and therefore have an overall lower GPA. A

study conducted by Quirk et al. (2001) also provided support for the threshold theory. However, they found that students working fewer than 12 hours, rather than 13.5, performed better academically than those who were unemployed. After 12 hours of work, their academic performance was affected negatively.

Ronald D'Amico (1984) found evidence in support of the belief that employment actually fails to have a significant effect on a student's academic success. In this study, D'Amico used class rank as his measure of academic achievement. After analyzing the effects of part-time employment on variables including the amount of time dedicated to studying, free-time at school, class ranking, etc., he concluded that while maintaining a job was associated with a decrease in study time and/or a lack of free-time at school, it did not ultimately effect class rank. Therefore, D'Amico's results indicate that employment does not tend to affect, either positively or negatively, a student's academic success. Gerald S. Oettinger (1999) also conducted a study in which he included person fixed effects and found evidence that GPA was not affected by weeks or hours of employment throughout the school year.

Rothstein (2007) found results similar to D'Amico and Oettinger in that there was no significant effect of work on academic success. However, her approach was much different than that of the previous researchers. Unlike any of the other studies, Rothstein controlled for possible endogeneity. She believed that if there were a certain unobservable variable, such as ability, that was related to both GPA and hours of work, this would create a biased coefficient. To account for this, she took an instrumental variables approach to estimate the true effect of current hours of work on GPA. She chose to use two instruments, local unemployment and high school wage rate. Rothstein originally ran an OLS regression, which produced results indicating only a small negative effect on GPA. After employment was instrumented, this effect became not only small, but also statistically insignificant. This caused her to conclude that GPA was not affected by employment.

Although Rothstein was the only study to control for possible endogeneity, no previous studies, including Rothstein's, have accounted for the issue of simultaneity bias. In fact, none of the previous studies even mentioned the possible and likely issue of simultaneity between GPA and employment. While these studies examine the effect of employment on GPA, it is also important to consider that GPA may be impacting employment. While I was unable to control for

this issue, I still believe it is important to acknowledge that it is likely present. Further discussion regarding this issue will be covered in section VI of this paper.

Previous studies have provided results in support of three of the four theories: that employment negatively affects GPA, follows a threshold pattern, or has no effect on GPA. Specifically in the case of the threshold theory, results indicated that the average number of hours after which GPA begins to decline is typically low, roughly between 10 to 15 hours per week. However, my results provide support for the theory that employment positively affects GPA. Given that the data I used was more recent than most of the previous studies (with the exception of Rothstein's 2007 study), my results may be more indicative of the current effects of high school employment on GPA. This study may provide important new insight into this area as it uses this more current data to run two separate regressions, one to simply measure whether or not a student is employed, and one to include the specific number of hours with an hours-squared variable to account for any errors in measurement.

IV. Data and Variable Definitions

The data for my research comes from the Alfred P. Sloan Study of Youth and Social Development, a longitudinal study of adolescents conducted in the United States between the years of 1992 and 1997. The participants were chosen from 33 public schools (13 of which were high schools) from 12 different locations across the United States. The observations were made at the individual level using an experience sampling method, an in-depth interview, and a series of questionnaires. The sample consisted of 1,214 focal students selected from 6th, 8th, 10th, and 12th grade. However, for my research, the data collected for 6th and 8th graders was dropped from the sample, considering these grades are not included in high school, and thus irrelevant in terms of my research question. Any observations that had missing data for the included variables, which are described below, were also dropped from the data. In the end, the sample size used consisted of 392 high school students in the 10th and 12th grades.

Table 1 presents the summary statistics of my data. In order to understand the implications of these statistics, it is important to understand how they are defined. The dependent variable, GPA, is a measurement of the student's grades on their most recent report card on a 4.0 scale, where mostly A's is marked as a 4 and mostly F's is marked as a 0. For this sample, the average GPA was a 3.24. The key variable is employment, which is measured in two ways: as a

dummy variable indicating whether or not the student is currently employed or was employed during this school year, and as an hours variable (hours_weekly) accompanied by an hours-squared variable to prevent measurement error (hours_weekly2). The hours variable is on a scale of 0 to 45, meaning the maximum number of hours a student worked according to this scale is 45 hours per week (including weekend work). The average number of hours being worked was 12.6 per week, with roughly 50% of the sample currently employed or employed at some point during that school year.

There are also several demographic variables (listed as African_American, Hispanic, Native_American, and female), which are dummy variables equal to 1 if the student is of that race/gender, and 0 otherwise. The student's mother's and father's education (mothers_ed_level and fathers_ed_level, respectively) are dummy variables equal to 1 if that respective parent received a Bachelor's degree or higher, and equal to 0 otherwise. Roughly 43% of the student's had a mother with a Bachelor's degree or higher, and roughly 45% of the student's had a father with a Bachelor's degree or higher. There are also two variables that are used to measure the student's study ethic and methods: the total amount of effort the student puts into his or her classes (total_effort=1 if the student tries their hardest in every class they are enrolled in, 0 if not) and a homework variable where the minimum number of hours a student spent on homework per week was zero, and the maximum was 17. The average number of hours spent on homework was around 6 hours per week. There are also several variables used to measure the parental influence on the student's study ethic: whether the student has a curfew (no_curfew=1 if the student does not have any set curfew, 0 if they do), whether the student is often rewarded with privileges for good grades (privilege=1 if yes, 0 if no), and whether the student has privileges limited for poor grades (limit_privilege=1 if yes, 0 if no).

Variables are also included to represent the number of times students have missed or skipped classes. The variable accounting for classes skipped measures how many times the student skipped individual classes (rather than the entire day) during the first half of this school year. Originally, this variable was measured as a series of dummy variables based on the range of times the student had skipped; for example, once to twice, three to six times, etc. However, I found that the only result showing any statistical significance occurred when the student skipped ten or more times. Therefore, I kept only this one dummy variable, and omitted the others, to measure the effect of skipping ten or more days on GPA. The variable measuring absences was

originally measured in this way as well, with specific dummy variables for ranges of times, but I chose again to create it as one dummy variable measuring whether or not the student had missed four entire days of school for any reason in the first month of the year. It was equal to 1 if the student had missed four or more days, and zero otherwise. Although it would have been preferable to have data regarding absences from more than just one month, the only data included was for January of that year.

I also accounted for the amount of time students spent on activities unrelated to studying or employment. The first of these variables is a measure of the specific number of hours spent on extracurricular activities through the school per week, including sports, clubs, etc. The minimum number of hours was 0 and the maximum was 20 hours per week. The amount of time spent on community service (outside of any extracurricular activities through the school) is measured by a dummy variable (volunteer) that is equal to 1 if the student does community service activities at least once during the week and 0 if they do not. The variable to measure how often the student talks on the phone is measured the same way, with a dummy variable (telephone) equal to 1 if the student talks on the phone at least once during the week, and 0 otherwise.

The next two variables measure the number of hours the student spends watching TV and playing videogames per day (tv_twoormore and videogames_twoormore, respectively); each variable is a dummy variable equal to 1 if that student spends two or more hours on that particular activity per day, and 0 otherwise. Originally, each variable was divided out into a larger series of dummy variables accounting for various ranges of hours spent per each activity; however, both results proved statistically insignificant when measured in this way, so I chose to measure them in this manner instead. While TV still turned out to be small and statistically insignificant, the effect of videogames was large and significant when measured in this manner, indicating that students who spend more than two hours per day on videogames have a lower GPA than those who spend less than two hours per day. However, we must consider that, as evidenced by the summary statistics, only around 5% of the sample claimed to play videogames two or more hours per day, as opposed to 40% claiming to watch TV for two or more hours per day. This may partially explain why the results indicate such a strong significant effect of videogames; if a few students out of this 5% have very low GPAs, it may cause this effect to seem much larger than it really is.

Finally, there is a variable to measure whether or not the student participates in any other activities with some frequency (other_activities), including activities such as going to the pool, park or gym, reading for fun, taking sports lessons outside of school sports, or partaking in any other classes/lessons, such as music, art, and dance. Any other hobbies the student may partake in are included in this variable, which is equal to 1 if they participate in any of these activities at least once a week, and 0 otherwise.

V.   Empirical Approach and Results

To estimate the effect of employment on GPA, I ran two separate OLS regressions. Both equations included robust standard errors. Robust standard errors were used because they allow for students who went to the same high school to have error terms that are correlated so as to pick up underlying effects that may be the result of attending that specific high school. Given that data was drawn from 13 high schools over 12 different locations, it was important to use robust standard errors. The first equation can be seen below:

$$GPA_{it} = \beta_0 + \beta_1 work_{it} + \beta_2 African\_American_i + \beta\ b_3 Hispanic_i + \beta_4 Native\_American_i + \beta_5 female_i + \beta_6 privilege_{it} + \beta_7 limit\_privilege_{it} + \beta_8 mothers\_ed\_level_{it} + \beta_9 fathers\_ed\_level_{it} + \beta_{10} no\_curfew_{it} + \beta_{11} total\_effort_{it} + \beta_{12} skip\_tenplus_{it} + \beta_{13} absent\_some_{it} + \beta_{14} homework_{it} + \beta_{15} extracurricular_{it} + \beta_{16} volunteer_{it} + \beta_{17} telephone_{it} + \beta_{18} videogames\_twoormore_{it} + \beta_{19} tv\_twoormore_{it} + \beta_{20} other\_actvities_{it} + e_{it}$$

This first equation was run with the inclusion of all of the previously mentioned variables, with the exclusion of the hours and hours-squared variables. In other words, the first regression only accounted for whether or not the student was currently employed or had been employed during that school year, not the specific number of hours they worked. The second equation used all of the aforementioned variables, but excluded the dummy variable for work and instead used the hours and hours-squared variables. The hours-squared variable was included so as to prevent any measurement errors.

The results for the first equation, which included the dummy variable for employment, can be seen in Table 2. First, it should be noted that the R^2 value, for both equations, was equal to 0.52. This indicates that roughly 52% of the variation in GPA can be explained by each of my

models. The most important result to consider is that of the key independent variable "work" on employment. This result indicates that the students who were currently working or had worked during that school year had a significantly higher GPA than non-workers, specifically by 0.2 points. Therefore, these results provide support for the theory that employment, when considering simply being employed and not the specific number of hours worked, has a positive effect on a high school student's GPA.

When running the second regression, which includes the hours and hours-squared variables, we see the same general results in terms of significance and size for all of the previously included variables. However, the results of the hours and hours-squared variables proved extremely small and statistically insignificant. In other words, these results showed that there was no effect of the number of hours worked per week on a student's GPA. For example, this implies that we would not see a significant difference in effect on GPA from a student working 15 hours per week compared to a student working only 5 hours per week.

There were also several other results that were surprising, or simply interesting, to consider. Given that the results for both equations had nearly identical coefficients and the same level of statistical significance, we will focus on the results of the first equation specifically and significance will be measured at the 5% level. The results show that the coefficient for the demographic variable "African_American" was statistically significant and positive, indicating that students of this race tended to have higher GPAs than white students by 0.22 points. However, while Hispanic and Native American students also had statistically significant results, they instead tended to have much lower GPAs when compared to white students. Specifically, Hispanic and Native American students had lower GPAs than white students by 0.59 and 0.46 points, respectively. It is important to note that the majority of the students (318 out of 392) were white, so the proportion of non-white students may not be large enough to examine the true effect of race on GPA. Also, the results for female were statistically significant and showed that females tended to have higher GPAs than males by about 0.14 points.

From the summary statistics, we saw that about 43% of the student's surveyed had a mother with a college degree or higher, and about 45% had a father with a college degree or higher. Given this similarity, it is interesting to note that the effect of a mother having a Bachelor's degree or higher was very small and insignificant, yet the effect of a father having a Bachelor's degree or higher was large and highly significant. Specifically, students who had a

father with a Bachelor's degree or higher had a higher GPA by roughly 0.45 points compared to those who did not. A study conducted by Davis-Kean (2005) provided support for the theory that parental education levels indirectly and positively affect a student's academic achievement. He claimed that the parents' education level influences how they structure the home environment and the way they interact with their children. Overall, the higher the education, the higher the level of expectations they maintain when it comes to their individual student's academic achievement. These higher parental expectations are correlated with students having higher GPAs. However, no research as of yet has provided evidence indicating that the father's education exclusively has a strong effect, while the mother's does not. Therefore, it is uncertain why the results for my variables measuring mothers' and fathers' education levels were so different.

Students who were given privileges tended to have higher GPAs than those without privileges by roughly 0.23 points, while students with limited privileges tended to have lower GPAs by roughly 0.81 points than those who did not have their privileges limited. While it is expected that privileges for good grades would lead to a higher GPA due to an increase in incentive, it may seem strange that limiting privileges for poor grades actually leads to a lower GPA. However, this may be due to the fact that the students who tend to have their privileges limited are the ones who are already doing poorly in school in the first place; in other words, these students may have lower GPAs to begin with. Therefore, we cannot say that limiting privileges necessarily leads to lower GPAs. When considered this way, it makes sense that we would see lower GPAs for students with limited privileges. In the same sense, those who may be given rewards for good grades may be the students who have better grades to begin with, so we also cannot conclude that privileges directly leads to higher grades.

Another variable that had an unexpected result was homework. Whereas most people would expect additional hours spent on homework to have a positive effect on GPA, my results indicated that the effect was not only statistically insignificant, but also extremely small. However, it is important to note that this result is likely due to the fact that students who spend more time studying may actually be different in many unobserved ways, such as ability, thereby making it difficult to determine the true effect of studying on GPA. Rather, the only way to actually determine the importance of studying on GPA would be to design a random experiment

in which students are identical in every way, but are forced to study different amounts while still behaving the same in others areas, including: attendance, hours of sleep, drinking habits, etc.

Stinebrickner and Stinebrickner (2007) conducted a study that takes the approach of a real-world situation that is the closest we may get to this aforementioned experiment. Although their study specifically focuses on GPA among college students, it is still helpful in understanding the true effect that studying and homework may have on a student's academic achievement in high school. They used an instrumental approach in which the instrument is designed so that students fall into one of two groups: those who have a randomly assigned roommate who brought a video gaming system at the beginning of the year and those who have a randomly assigned roommate who did not. They then used time-use diaries that were collected multiple times per year, which included documentation of study time among students. These diaries indicated the assignment of a roommate with a video gaming system was correlated with students studying significantly less per day, on average, than those without a roommate with a video gaming system. These time-use diaries also allowed them to obtain information about other college behaviors, including attendance, drinking, sleeping, employment, etc. Given that there was no evidence that having a roommate with a video game influenced these behaviors, they were able to conclude that the two groups of students were very similar in all dimensions that may affect grade performance, with the exception of study-effort. They found that grades were significantly lower, on average, for the group that studied less, thereby indicating that studying does have an important effect on grade performance. Given that my model was not able to account for such unobserved differences in students, this may be the reason that the homework variable proved small and insignificant. Had I been able to address studying in the same manner as Stinebrickner and Stinebrickner, my results may have been much different.

Finally, the difference in the effects of students watching two or more hours of TV per day compared to those playing videogames two or more hours per day was also interesting. While we see that playing videogames has a strong and significant negative effect on GPA, we do not see a large or significant effect of watching TV on GPA. However, from the summary statistics you can see that only roughly 5% of the sample claimed to play videogames two or more hours a day, which is an extremely small percentage of the already small sample. Thus, in order to determine the true effect of videogames on GPA, it would be helpful to have a much larger sample size.

VI.   Conclusions and Limitations

Overall, my results indicate that simply being employed has a positive effect on a student's GPA. In other word's, working students, whether employed currently or previously during that school year, had a higher GPA than non-working students. Specifically, working students had a higher GPA, on average, by about 0.2 points. Therefore, my data provided support for the theory that working has a positive effect on a student's GPA. However, when factoring in the number of hours being worked on average per week, my results indicate that there are no statistically significant differences among students' GPAs. In other words, those students working a higher number of hours did not have significantly different GPAs than those working a lower number of hours.

When considering these results, there are several limitations that must be noted. First, as mentioned previously, I was not able to account for any issues concerning simultaneity. Specifically, I believe that simultaneity bias is likely present between employment and GPA. While this study is measuring the effects of employment on GPA, it fails to account for the fact that there may be reverse effects in the sense that GPA may also affect employment. For example, it is possible that students who have a lower GPA are more inclined to seek out employment. These students may feel that they would not succeed in college, and therefore wish to go straight into employment rather than continuing their education further after high school graduation. Similarly, a student who has a high GPA may be less inclined to work because they plan on attending college after graduation. Since I was unable to address this issue of simultaneity, it is possible that there may be bias in this coefficient, although the direction is uncertain.

Given that GPA is only measured for the student's latest report card, the implications of the effect of employment on GPA are limited. There is no measure of, for example, last semester's GPA to serve as a comparison to this semester's GPA. In other words, if the student did poorly last semester and was not working, and then did poorly again this semester while working, it is likely that there are underlying factors contributing to this student's low GPA rather than just employment. Having a previous record of a student's GPA would greatly help to understand the true effects of employment on GPA, specifically for any students for which there was a point in high school when they were unemployed as well as a time when they were

employed. With this information, comparisons between the period of unemployment versus the period of employment would provide valuable insight into the true effect of work on GPA.

Another issue is that the sample size being considered is relatively small. The larger the sample size, the more precise the estimates are; therefore, it is likely that my estimates may not be as accurate as would be desired. For example, when looking at the results of the videogames variable, I found that it was statistically significant and had a large negative effect; however, only 5% of the students claimed to play videogames two or more hours per day. Given that the sample being considered is only 392, 5% would only be around 19 students. Therefore, just a few of these students having significantly low GPAs may possibly cause this strong negative effect to be found.

Also, the specific type of employment of the students is unknown. It is likely that a job requiring a large amount of manual labor may cause a student to be much more fatigued and less inclined to stay up studying then a student with, for example, a job at which they are sitting down for the majority of the time. In other words, it may be the case that different types of employment have largely different effects on students' GPAs. Therefore, it would be beneficial to know the specific type of job the student has. As of yet, there have not been any studies that were able to account for this issue.

Finally, there is a variable that I was not able to include in this paper that may have had substantial effects: parental income. As I was unable to include this variable in my research, it is likely that there is some omitted variable bias. Parental income may largely affect the likelihood that a student is employed; for example, a student who has parents with a very low income or parents that are unemployed may be more inclined to work so as to provide financially for their family, save up money for college, etc. In the same sense, those students who have parents with a very high income may be less inclined to work as their parents are more likely to be able to pay for college and other finances, such as food, clothing, housing, etc. Therefore, it would be beneficial to have the parental income levels so as to account for any influence this may have on a student's selection to work.

TABLE 1: SUMMARY STATISTICS

Variable	Mean	Standard Deviation	Minimum	Maximum
gpa	3.24	0.9	0	4
hours_weekly	12.6	12.22	0	45
hours_weekly2	307.91	443.35	0	2025
work	0.49	0.5	0	1
African_American	0.087	0.28	0	1
Hispanic	0.087	0.28	0	1
Native_American	0.015	0.13	0	1
female	0.56	0.5	0	1
mothers_ed_ level	0.43	0.5	0	1
fathers_ed_ level	0.45	0.5	0	1
no_curfew	0.11	0.31	0	1
privilege	0.42	0.49	0	1
limit_privilege	0.36	0.48	0	1
total_effort	0.24	0.42	0	1
skip_tenplus	0.1	0.3	0	1
absent_some	0.1	0.3	0	1
homework	5.84	5.01	0	17
extracurricular	4.85	5.75	0	20
volunteer	0.13	0.33	0	1
telephone	0.87	0.33	0	1
videogames_twoormore	0.046	0.21	0	1
tv_twoormore	0.4	0.49	0	1
other_activities	0.87	0.33	0	1

TABLE 2: REGRESSION 1 RESULTS (WORK DUMMY VARIABLE)

	Coefficient	Robust Standard Error	t-stat	P-value
work	0.20	0.06	3.15	0.002
African_American	0.22	0.10	2.21	0.028
Hispanic	-0.59	0.15	-3.90	0.000
Native_American	-0.46	0.20	-2.33	0.020
female	0.14	0.07	1.96	0.051
mothers_ed_level	-0.08	0.09	-0.79	0.430
fathers_ed_level	0.44	0.09	4.88	0.000
no_curfew	-0.15	0.11	-1.38	0.168
privilege	0.23	0.07	3.23	0.001
limit_privilege	-0.80	0.08	-9.76	0.000
total_effort	0.16	0.07	2.28	0.023
skip_tenplus	-0.64	0.16	-4.09	0.000
absent_some	-0.42	0.12	-3.37	0.001
homework	0.006	0.01	0.94	0.345
extracurricular	0.007	0.01	1.44	0.150
volunteer	0.16	0.09	1.81	0.072
telephone	-0.13	0.11	-1.23	0.218
videogames_twoormore	-0.37	0.19	-1.90	0.058
tv_twoormore	-0.004	0.07	-0.06	0.952
other_activities	0.12	0.09	1.27	0.205
_cons	3.18	0.15	21.57	0.000

TABLE 3: REGRESSION 2 RESULTS (HOURS PER WEEK)

	Coefficient	Robust Standard Error	t-stat	P-value
hours_weekly	0.007	0.008	0.91	0.365
hours_weekly2	-0.0002	0.0002	-1.02	0.309
African_American	0.22	0.10	2.23	0.026
Hispanic	-0.61	0.16	-3.90	0.000
Native_American	-0.47	0.17	-2.66	0.008
female	0.14	0.07	1.93	0.055
mothers_ed_level	-0.09	0.10	-0.86	0.389
fathers_ed_level	0.44	0.09	4.64	0.000
no_curfew	-0.14	0.11	-1.32	0.187
privilege	0.22	0.07	2.99	0.003
limit_privilege	-0.81	0.08	-9.61	0.000
total_effort	0.17	0.07	2.40	0.017
skip_tenplus	-0.63	0.16	-3.93	0.000
absent_some	-0.42	0.13	-3.29	0.001
homework	0.004	0.01	0.59	0.556
extracurricular	0.006	0.01	1.21	0.229
volunteer	0.19	0.09	2.17	0.031
telephone	-0.11	0.11	-0.96	0.335
videogames_twoormore	-0.40	0.20	-1.99	0.047
tv_twoormore	-0.01	0.07	-0.19	0.848
other_activities	0.14	0.10	1.47	0.143
_cons	3.23	0.16	20.80	0.000

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