

# **Examining the Correlations between College Student Employment Status, Employment Purpose, and College Academic Performance**

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June 10<sup>th</sup>, 2021

## **Abstract**

*This paper examines the correlation between paid employment while attending school and academic performance as measured by grade point average at an American liberal arts university. After collecting data through an optional online survey distributed to students at the university, said data is used in multiple OLS models testing the relationship between student working status and GPA. It is found that a student's employment status while in school has no statistically significant effect on GPA. However, it is also found that students who indicate in the survey that they "need" to work out of financial necessity suggestively receive approximately 0.1-0.2 lower GPAs than other working students, and therefore the purpose of employment for a working college student may be correlated with changes in academic performance.*

## **I. Introduction**

When young adults enter college, they may choose from a number of ways to spend their free time outside of schoolwork. They can join clubs, play sports, tend to their social lives, and/or get jobs. For about 70% of college students in the United States, these activities include the latter option of gaining employment in a paid position (Carnevale and Smith, 2018). However, this presents a problem for students who work or are considering working: how does a student allocate time and effort between working at a job and their schoolwork? Given that working a job presumably takes up a portion of an employed student's time, how does this decision to work effect the academic performance of a student? Students who achieve higher GPAs in school may enjoy more favorable outcomes in the labor market or in other post-graduate opportunities, while simultaneously employment while in school may lead to better labor market outcomes through experience based human capital improvements. Furthermore, students may be working for many different reasons, whether that be for disposable income, paying tuition, living expenses, and/or for pre-professional experience. However, participating more in either a job or schoolwork may come at a cost of performance in another, leading to different labor market outcomes after a student graduates.

This paper intends to unravel this relationship between employment and schooling for university students by examining the correlation between student employment and academic performance as measured through grade point average. Specifically, I examine how the status of being employed is correlated with student grade point averages at a public, 4-year university. To do so, I use OLS regression estimates and online survey data gathered from students at Western Washington University in Bellingham, WA. By using the survey data and proposing multiple models that control for the background of students as well as their surveyed purpose for working, it is found that the status of being employed is not a statistically significant predictor of college academic performance as measured in GPA. However, I find that of the students who work, students who must work because of financial necessity (such as to pay living expenses, finance student loans, pay tuition, etc.) receive approximately 0.179 lower GPAs than students who work for other reasons such as disposable income or pre-professional experience. While this relationship cannot be concluded to be causal as there are likely other unobserved influences on GPA endogenous to the model proposed, I speculate that the decrease in GPA for students who work out of financial need is due to the difference in how different working students perceive work as either a substitute or complement to school.

## II. Literature review

There has been extensive work examining the various influences on college student academic performance. These influences can be separated into two categories: individual characteristics related to student ability and motivation, and various characteristics about a student's material circumstances that are fixed. In the latter category, the effect of these many of these variables can easily be controlled for by including measurements of them in the analyses. Among these, it has been found that race, sex, family income, and the characteristics of the high school one comes from all may help predict college GPA (Betts and Morell, 1999). In the other category, measurements that may be signaling the ability and motivation of a student such as prior academic achievement and standardized test scores in high school have also been found to accurately predict college GPA (Cohn et al., 2004).

However, when trying to examine the effect of employment while in school on college academic performance, determining a causal relationship is difficult because the decision to work may be highly influenced by the various other factors that predict GPA. For example, are students who come from low-income families more likely to have a lower GPA because of their background, or because they have to work to finance their schooling and thus have less time to focus on school? Or on the other hand, for students who both work and maintain high GPAs, the negative effect of work may be underestimated if their high levels of motivation cause them to have a high GPA regardless of their working status. In other words, known factors that accurately predict GPA may also be correlated with the decision to work, confounding the identification of causal relationships between the various variables affecting academic performance. Due to this endogeneity problem, it is no surprise that only a relatively small amount of research has been conducted to examine the relationship between working while in college and student academic performance compared to the extensive research covering other predictors.

In the small amount of work that exists examining this relationship, it is generally found that increases in hours worked is associated with decreases in GPA. For example, Kalenkoski and Pabolina (2010) find through the use of the National Longitudinal Survey of Youth of 1997 that an increase in the number of hours worked by students is correlated with a decrease in grades, in addition to finding that financial factors such as the cost of attending a university and the financial support received by a student's parents influence a student's inclination to work. The authors point out that this presents an endogeneity problem, as students who are willing to work to pay more for higher cost universities may be more motivated to achieve higher grades, resulting in an underestimation of the negative effect of work on GPA. That is, different universities with varying costs and difficulty may have diverging correlations between working hours and GPA because of the different types of students that elect to attend them, and therefore the relationship between GPA and working hours may vary based on the school in question.

While a benefit of such studies that use large sets of data across multiple universities may be in more generalizable findings than those that examine only one university, using data from only one university may allow for more controlled variables in a more homogenous population.

In another paper, Wenz and Yu (2010) also examine the effect of employment while in school on college academic performance. Their work differs from Kalenski and Pabolina (2010) in that Wenz and Yu's data looks at only one institution, and it allows for measurement of individual fixed effects by surveying the same students over multiple years. Furthermore, their data includes survey responses providing the stated motivations of a student's employment. By including student motivations for work in their model, Wenz and Yu aimed to reduce the endogeneity problem by separating students who primarily work for paying tuition, disposable income, gaining career specific skills, gaining general experience, or other reasons. While this may account for some of the selection bias that is inherent to the work-GPA relationship, these categories of motivation exclude many students who may work out of financial need but not to pay their own tuition. That is, the only need-based working motivation included in their data was working to pay tuition, while need-based work may be to finance other student costs such as living expenses. For example, a student may have her tuition paid by parents or financial aid, but they still are forced to work to pay living expenses. Thus, their data does not include a way adequately separate the effect of work on GPA for students who work for financial need and students who work for other reasons. Regardless, without including motivation in their model, they find that being employed in a paid position increases student GPA a fixed amount of 0.07 points, and that each hour of work those employed students work decreases student GPA by 0.007 points. When including survey responses on student motivations for working, the statistical impact of working at all on GPA becomes conditional on a student's working purpose. They find that only two motivational reasons for student work change the effect of employment status on GPA: students who work for career specific skills relevant to their future careers earned 0.04 higher GPAs than others, while students who work for general career experience earn 0.05 lower GPAs. Notably, working for paying tuition was not found to significantly effect predictions of GPA.

This research builds upon this prior work to further examine the relationship between work and college GPA. It will focus on only one university to attempt to better control for the unobserved differences in ability and motivation that may be prevalent between students across different universities as discussed by Kalenkoski and Pabolina (2010). Furthermore, to build upon the research of Wenz and Yu (2010), motivations for student employment will be accounted for in the data, model, and analysis. However, the motivations of students will be simplified into two categories of students: those who choose to work and those who work out of financial need of any form. This is an improvement over the prior research in that the survey format allows for separation of the correlation of work for students who work

out of financial necessity of any kind (whether it be paying tuition, living expenses, medical purposes, etc.) whereas Wenz and Yu (2010) only account for students who work to pay tuition.

### III. Data Description

Data were collected through an online survey distributed at Western Washington University (WWU) in Bellingham, Washington. WWU is public university with 16,142 students, 96% of which are undergraduate students. The university offers a wide range of academic programs, with 41% of students in the university's College of Humanities and Social Sciences, 16% in the College of Business and Economics, 16% in the College of Science and Engineering, and the remaining 27% of students in college's related to education, arts, environmental, and interdisciplinary studies. The university's student body is 57.5% female, and 26.9% of students are non-white. The average time to degree is 4.3 years. (Western Washington University, n. d.)

The 17-question survey was distributed on student social media pages (Facebook and Reddit) as well as by various professors to their undergraduate classes. The 17 questions the survey comprised of are provided in Appendix 1. Participation was open to all students, including postgraduate students. The first 13 questions of the survey were designed to identify student academic performance and characteristics of students unrelated to employment that may have an effect on their GPA. These questions asked students their age, race, gender, college GPA, high school GPA, SAT score, family income, parents' education, Major, student course load and studying time. The last four questions examined the working characteristics of the students. Students were asked how many hours they usually work in a given quarter, whether they are employed by WWU, their average wage while attending WWU, and finally a question to determine the purpose of their employment. The final question of the purpose of their employment asked the following<sup>1</sup>:

*What is the main purpose for your employment?*

- A. *I don't need to work, I do so primarily for other reasons (disposable income, work experience, social reasons)*
- B. *I need to work to support myself financially (paying tuition, financing student loans, living expenses, etc.)*

103 total students responded to the survey. *Table 1* gives descriptions of the variables created as a result of the data that will be used in the analysis, as well as means and standard deviations for each variable. SAT scores were converted from ACT scores such that measurements of pre-college assessments by students could be uniform. Conversions were made by using the 2018 ACT/SAT

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<sup>1</sup> The "main purpose" question was added to build upon the findings of Yu and Wenz (2010) discussed within the literature review section of this report. Specifically, this question was designed to reveal the motivations for student employment and how it interacts with the relationship between work and GPA.

Concordance Tables given by ACT, inc. (ACT, 2018). Additional demographic, academic, and work characteristics of the students surveyed is displayed in *Table 2*. The majority of students surveyed were women, and 6 of the 103 total respondents reported their gender as non-binary. Those surveyed were predominantly white, with only 21 of the total respondents being non-white, and 12 of those 21 non-white students being of mixed race. The students' class statuses were predominantly junior and senior, with 13 students being sophomores and 6 being freshman. 81.55% of students had at least one parent with a form of college degree. 58.25% of students' family income (excluding their own income) was greater than \$100,000 per year.

More than two-thirds of the total surveyed students reported that they usually are employed and work more than 0 hours per week during a given academic quarter. Of these 71 students who reported employment, 43.7% of students work in a paid position given by the university. Interestingly, 83.3% of female students work, while only 51.5% of male students work. Furthermore, 64.4% of the working female students reported they need to work, while only 45.5% of male students reported they need to work. The percentage of students who work varies greatly according to race, however this may be due to the lack of observations of for each category of race (i.e., 100% of Hispanic students surveyed reported working, but there are only two Hispanic students in the sample).

Average student GPAs according to various characteristics and purpose of work are given in *Table 3*. Average GPAs for those who work are very similar to those who do not work, and this trend generally recurred regardless of the demographics and background of the students. Furthermore, the difference in GPA between non-workers and workers is statistically insignificant for every variable provided in *Table 3*. However, the difference in GPA between non-workers and workers is marginally insignificant for two of the given variables: students who “need” to work, and students who are employed by Western Washington University<sup>2</sup>. While the difference in GPA between non-working and working students is insignificant regardless of category, it is noteworthy that the average GPA of students who reported they need to work to support themselves financially was 0.15 lower than for students who reported working for other reasons.

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<sup>2</sup> An OLS regression estimated that students who work for financial need receive 0.131 lower GPAs than non-working students, with a p-value of 0.126. As for being employed by Western Washington University, another OLS regression estimated that students who work for WWU receive 0.145 higher GPAs than non-working students, with a p-value of 0.103.

It is also worth pointing out the noticeably higher average GPA of freshman and sophomore students<sup>3</sup>. Due to the timing of this research being during the COVID-19 pandemic, the students in their first and second years of attendance at WWU (freshman and sophomores) have taken a larger portion of their courses online. From the academic spring quarter of 2020 through the spring quarter of 2021, WWU has offered students the option of either accepting a rank grade (traditional ABCDF grading impacting a student's overall GPA) or a Pass/No-Pass grade that does not affect GPA. The default option of the two has varied throughout the pandemic, but students attending classes during this time-period could selectively choose which courses to accept rank grades in at a point during a given quarter. Rational students thus may have chosen to only accept rank grades in classes in which they performed well. Given that freshman and sophomores of this sample have had a higher portion of their classes taking place during the pandemic, they therefore may be more likely to have higher GPAs than junior and senior students who had taken classes at the university prior to the pandemic when rank grading was required for almost all courses. More simply, any relationship between work and GPA may be different for first- and second-year students compared to junior and seniors because of the varying proportion of online classes each group of students has taken.

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<sup>3</sup> The difference in average GPA between the freshman/sophomore group and the junior/senior group was found to be significant at the 10% level, meaning that students of freshman or sophomore class standing suggestively receive 0.24 higher GPAs than students of junior and senior class standing.



Table 1: Variables and Descriptive Statistics

Variable	Description	Mean	Observations
<i>age</i>	the age of a student (in years)	21.31 (1.82)	103
<i>gpa</i>	the grade point average of a student at WWU	3.44 (0.43)	103
<i>highgpa</i>	the high school grade point average of a student	3.51 (0.43)	100
<i>sat</i>	the SAT score of a student (converted from ACT score if needed)	1288.56 (236.51)	72
<i>otherrace</i>	= 1 if student's race is non-white	0.20 (0.40)	103
<i>fe</i>	= 1 if student is female	0.56 (0.50)	103
<i>educpar</i>	= 1 if student has at least one parent with a 4-year college degree or higher form of education	0.73 (0.45)	103
<i>fresh</i>	= 1 if student is a freshman	0.06 (0.24)	103
<i>soph</i>	= 1 if student is a sophomore	0.13 (0.33)	103
<i>jun</i>	= 1 if student is a junior	0.27 (0.45)	103
<i>sen</i>	= 1 if student is a senior	0.54 (0.50)	103
<i>busin</i>	= 1 if the student is in the College of Business and Economics	0.33 (0.47)	103
<i>human</i>	= 1 if the student is in the College of Humanities and Social Sciences	0.32 (0.47)	103
<i>sci</i>	= 1 if the student is in the College of Science and Engineering	0.16 (0.36)	103
<i>work</i>	= 1 if student works in an employed position outside of class	0.69 (0.47)	103
<i>wwuemp</i>	= 1 if student is employed by WWU	0.30 (0.46)	103
<i>need</i>	= 1 if working student student responded as "needing" to work	0.39 (0.49)	103

Standard deviations given in parenthesis.

Table 2: Demographics, Class Status, and Major of Students

Variable	Total Observations	Percent Workers	Percent of Workers who "Need" to Work
Number of respondents	103	68.9%	43.7%
<u>Gender</u>			
Female	54	83.3%	64.4%
Male	43	51.2%	45.5%
<u>Race</u>			
White	82	68.3%	57.1%
Asian	6	83.3%	20.0%
Black or African American	1	0.0%	0.0%
Hispanic or Latino/a	2	100.0%	100.0%
Mixed Race	12	66.7%	62.5%
<u>Class Status</u>			
Freshman	6	50.0%	33.3%
Sophomores	13	61.5%	36.4%
Juniors	28	75.0%	47.6%
Seniors	56	69.6%	61.5%
<u>College</u>			
Art	4	75.0%	66.7%
Business	34	70.6%	41.7%
Education	4	75.0%	66.7%
Environmental studies	7	85.7%	66.7%
Humanities	33	78.8%	65.4%
Science	16	50.0%	62.5%
other	2	0.0%	

Table 3: Mean Student Grade Point Averages

Variables	All Respondents	Non-workers	Workers
Number of respondents:	103	32	71
<b><u>Mean GPAs</u></b>			
All Students	3.44 (0.43)	3.47 (0.46)	3.42 (0.42)
White students	3.49 (0.39)	3.55 (0.38)	3.47 (0.4)
Non-White Students	3.23 (0.52)	3.12 (0.63)	3.28 (0.49)
Parent's highest form of education less than a college degree	3.35 (0.46)	3.32 (0.53)	3.36 (0.44)
Parent's highest form of education more than a college degree	3.49 (0.42)	3.52 (0.41)	3.47 (0.41)
Students who "need" to work			3.36 (0.41)
Students who don't "need" to work			3.51 (0.43)
Students employed by WWU			3.54 (0.42)
Freshman and Sophomores	3.64 (0.35)	3.72 (0.28)	3.6 (0.39)
Juniors and Seniors	3.40 (0.44)	3.39 (0.49)	3.40 (0.42)

Standard deviations given in parenthesis. The difference between means for working and non-working students is statistically insignificant for all given variables.

#### IV. Empirical Model

The following models examines the relationship between paid employment hours and student academic performance. *Function 1* models this interaction in the simplest form:

$$\text{Function 1: } gpa = \alpha + \beta_1 work + \epsilon$$

Where *gpa* is the cumulative grade point average of a student attending Western Washington University, and *work* is a dummy for students that are employed in a paid position during most academic quarters<sup>4</sup>.

*Function 1* examines a basic relationship between work and GPA. While there may be a true causal effect between working during an academic quarter and GPA, this research intends to only examine a correlative interaction. That is, because many students elect to work while in school, then therefore there is likely unobserved and unmeasurable variables that make predicting a causal model difficult due to endogeneity. While it may be argued that students who work consequently have less time to put into academics and thus working should have a negative correlation with GPA, the modeling of this relationship in *Function 1* does not account for the other various influences on student academic performance. These influences include the fixed background of a student (race, gender, family and upbringing) or personal traits that students' hold related to ability and motivation. Because many of these influencers are likely correlated with both GPA and working hours, they can either cause overestimates or underestimates of the negative correlation between working hours ( $\beta_1$ ) and GPA depending on which variables are included in the model. For example, students who work may be doing so because they are highly motivated and can handle both working and school at the same time. Because desirable cognitive traits such as motivation may be positively correlated with both GPA and working, failing to account for these traits in the model may result in an underestimation of the negative correlation of work and GPA. Conversely, students who don't work may be more likely to come from more educated and thus wealthier parents, and these students may also be more likely to get higher GPAs. In this alternate case, parental income may be negatively correlated with working while positively correlated with GPA, thus leading to an overestimate of the negative effect of working hours on GPA. Because these biases can lead to inaccurately high or low estimates of the variables in the *Function 1*, these influences must be accounted for to better understand the relationship between working and GPA.

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<sup>4</sup> The dummy *work* was used rather than variables for different numbers of student working hours to simplify the regression for the data set being used. This is possible because if working hours has a negative effect on student GPA, then any number of hours of work should reveal this relationship.

Given this and the data set being used for this research, an alternative model may be more informative at predicting student academic performance while untangling the influence of working from other pressures related to the background and ability of a student:

$$\text{Function 2: } gpa = \alpha + \beta_1 work + \beta_2 wwuwork + \beta_3 educpar + \beta_4 otherrace + \beta_5 highgpa + \beta_6 busin + \beta_7 sci + \beta_8 fresh + \beta_9 soph + \beta_{10} junior + \varepsilon$$

Where *gpa* is college student cumulative grade point average, *work* is a dummy for students that are employed in a paid position during most academic quarters, *wwuwork* is a dummy for students who are employed by Western Washington University, *educpar* is a dummy for students who have at least one parent with a Bachelor's Degree or higher form of education, *otherrace* is a dummy for students who did not answer "White" as their race in the survey, *highgpa* is student high school GPA, *busin* and *sci* are dummies for the major of the student, and finally *fresh*, *soph*, and *junior* are dummies for the class standing of a student being a freshman, sophomore or junior respectively. The reference group for this model are students that do not work, do not have one parent with at least a four-year degree, are white, they are in any of the colleges of the university that are not the College of Business and Economics or the College of Science and Engineering, and they are of senior class standing.

Inclusion of these variables for this model (and the following model) were determined due to the small sample size of the data from this study, as only 103 responses were collected. Some variables (such as student SAT score) were omitted due to a low number of responses to the questions that would lead to an even smaller sample size. The dummy *wwuwork* was also included to account for students who work for the university, as they may receive more complimentary working schedules for their academics when compared to students employed outside the university. When controlling for the family background of students, the highest education level of a student's parents was used rather than a student's family income to reduce redundancy of the variables, as both family income and parents' education are correlated and presumably have a similar positive predictive effect on GPA. Parent's education was more evenly distributed across the sample and proved to be a better predictor of GPA than parental income, thus it is used in the model<sup>5</sup>. As for race, non-white students tended have lower GPAs than white students, and

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<sup>5</sup> An OLS regression estimated that having at least one parent with a college degree or higher form of education results in a 0.145 higher GPA with a p-value of 0.195, while a student's family income (excluding their own personal income) exceeding \$100,000 resulted in a 0.047 higher GPA but with a much greater p-value of 0.633. Therefore, even though there are no statistically significant correlations between either variable and GPA, parent's education was included in the model as it is a more statistically accurate method of predicting college GPA for this data set.

there were only 21 non-white students. Thus, to gain an accurate OLS estimate with the limited set of observations, the variable of race was simplified into *otherrace*. Dummies for the discipline of a student's college at WWU were created to account for differences in course difficulty and structure across various majors. Students outside of the College of Business and Economics and the College of Science and Engineering are in less quantitative fields and they tended to have higher GPAs, thus they are used as part of the reference group.

While *Function 2* may have the improved estimated effect of work on GPA compared to *Function 1*, *Function 2* still fails to address how the effects of motivation and ability influence the relationship between student employment and GPA. As stated earlier, the fact that students can elect to work or not creates an endogeneity problem. That is, students who work because they are highly motivated may elect to work, while other students who are less motivated may also work but because they have a financial necessity to, and the relationship between work and GPA may be different for both types of students. Thus, to better control for the different purpose of work for different students, a third and final model that includes student purpose for work may more accurately predict the effect of working on student GPA:

$$\text{Function 3: } gpa = \alpha + \beta_1 work + \beta_2 need + \beta_3 wwuworke + \beta_4 educpar + \beta_5 otherrace + \beta_6 highgpa + \beta_7 busin + \beta_8 sci + \beta_9 fresh + \beta_{10} soph + \beta_{11} junior + \varepsilon$$

Where all the variables are the same as *Function 2*, but now there is a dummy variable to account for the answer to the “What is the purpose for your employment?” question described in the Data Description section. The variable *need* is equal to 1 conditional on two parameters: the student must have a job, and they must have answered “I need to work to support myself financially”. Including this variable allows for the separation of the effect of employment for students who elect to work (*work* = 1, *need* = 0) and students who are forced to work (*work* = 1, *need* = 1)<sup>6</sup>.

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<sup>6</sup> The reference group for *Function 3* is the same as the reference group for *Function 2*.

## V. Results

The OLS estimate for *Function 1* using the given survey data is provided in *Table 4*. An OLS estimate was used because the model is trying to predict whether working at all is correlated with GPA, and thus a linear model can provide a simple insight into that relationship.

*Table 4: OLS Regression Estimate of Function 1*

			Observations:	103
Variable	OLS Coefficient	P-Value	Std. Error	
Dummy for Working ( <i>work</i> )	-0.0457	0.633	0.0954	
Intercept	3.4730	0.000	0.0811	

The regression for *Function 1* estimates that a student's employment status has no statistically significant effect on GPA. As stated earlier, this is due to the lack of controls for other variables that may be correlated with both a student's GPA and their working status. Thus, an OLS estimates for *Function 2* that controls for more variables is given in *Table 5*.

*Table 5: OLS Regression Estimate of Function 2*

			Observations:	100
Variable	OLS Coefficient	P-Value	Std. Error	
High School GPA ( <i>highgpa</i> )	0.2900**	0.010	0.1099	
Dummy For Educated Parents ( <i>educpar</i> )	0.0184	0.879	0.1203	
Dummy for Non-White Students ( <i>otherrace</i> )	-0.2354	0.111	0.1464	
Dummy for Freshman Class Standing ( <i>fresh</i> )	0.2651*	0.054	0.1360	
Dummy for Sophomore Class Standing ( <i>soph</i> )	0.1278	0.244	0.1089	
Dummy for Junior Class Standing ( <i>jun</i> )	-0.0956	0.326	0.0968	
Dummy for College of Business and Econ. ( <i>busin</i> )	-0.0586	0.535	0.0941	
Dummy for College of Sci. and Eng. ( <i>sci</i> )	-0.0150	0.924	0.1571	
Dummy for University Employment ( <i>wwuemploy</i> )	0.1554	0.124	0.1000	
Dummy for Working ( <i>work</i> )	-0.0836	0.451	0.1104	
Intercept	2.4857	0.000	0.3826	

Notes: \* Indicates significance at the 10% level

\*\*Indicates significance at the 5% level

Although most of the coefficients for the OLS estimate of *Function 2* are statistically insignificant, many of those that are insignificant are marginally insignificant, indicating that if the sample size of this survey had been larger then they may have provided proof of relationships. That being said, this regression showed that high school GPA is the strongest predictor of college GPA, as a 1-point

increase in high school GPA estimates an increase to college GPA of 0.29 points. This is unsurprising and congruent with most other research of predictors of college GPA. The regression also suggests that being a freshman results in a 0.2651 higher GPA than seniors. Given the nature of freshman courses due to the timing of this survey explained earlier in the Data Description section of this report, this result was also to be expected. While none of the other variables were statistically significant, the results for the effect of being non-white were suggestive that white students earn 0.2354 higher GPAs than non-whites with a p-value of 0.111. If more observations were gathered to allow for more distinguishing between races in the regression, the effect of race would likely become more significant. Interestingly, being employed by the university is suggestive of a 0.1554 increase in GPA with a p-value of 0.124. As stated earlier, this might be because students who are employed by the university enjoy more compatible working schedules and conditions with school.

Most important for this research, working at all in a paid employment position was found to have a statistically insignificant impact on GPA, even when controlling for these variables that are intended to eliminate some of the bias of student ability and background. This is likely due to the lack of adequate control for a student's motivation and ability to perform well in both school and academics. Two working students may have the same background and academic history, but the impact of work for both students could be different due to unobserved traits related to their ability to handle both a job and school at the same time. That is, different students may have a positive or negative relationship of work and GPA, thus when the estimate of the regression is insignificant as a result of it trying to reconcile these polar correlations.

To better control for this endogeneity problem, *Function 3* was applied to the data. The OLS regression estimate for *Function 3* intended to better incorporate the motivations for a student's decision to work is given in *Table 6*.



Table 6: OLS Regression Estimate of *Function 3*

			Observations:	100
Variable	OLS Coefficient	P-Value	Std. Error	
High School GPA ( <i>highgpa</i> )	0.2767**	0.014	0.1100	
Dummy For Educated Parents ( <i>educpar</i> )	-0.0192	0.876	0.1230	
Dummy for Non-White Students ( <i>otherrace</i> )	-0.2596	0.080	0.1465	
Dummy for Freshman Class Standing ( <i>fresh</i> )	0.2662**	0.027	0.1186	
Dummy for Sophomore Class Standing ( <i>soph</i> )	0.1347	0.231	0.1118	
Dummy for Junior Class Standing ( <i>jun</i> )	-0.1048	0.263	0.0931	
Dummy for College of Business and Econ. ( <i>busin</i> )	-0.0916	0.299	0.0877	
Dummy for College of Sci. and Eng. ( <i>sci</i> )	-0.0176	0.914	0.1617	
Dummy for University Employment ( <i>wwuemploy</i> )	0.1669	0.103	0.1012	
Dummy for Working ( <i>work</i> )	0.0103	0.934	0.1246	
Dummy for needing to work ( <i>need</i> )	-0.179*	0.077	0.1001	
Intercept	2.5789	0.000	0.3859	

Notes: \* Indicates significance at the 10% level

\*\*Indicates significance at the 5% level

When the variable *need* is added to the regression, the variable *work* now represents the difference in GPA between working students who do not “need” to work and non-working students. Given that *work* is statistically insignificant, this data set thus does not provide sufficient evidence that students who work for reasons other than financial need receive different GPAs from non-working students, holding all else constant. On the other hand, the variable *need* represents the estimated difference in GPA between working students who work for financial need and students who work for other reasons. Among working students, working for financial need is highly suggestive of a notable drop in GPA of -0.179. For context, this decrease in GPA as a result of working out of financial need is equivalent to the estimated reduction of a student’s high school GPA of 0.6469.

While this is an interesting finding, *need* is only revealing the correlations between motivations for work and GPA among working students, thus more testing was conducted to examine the difference between non-working students and students who work for financial need. It was found that there is not sufficient evidence that working for financial need results in a decrease in GPA compared to non-working students. However, this result was only marginally insignificant, with a p-value of 0.15. Given this, with a larger and more robust data set to give more observations and more control variables, there may indeed be a significant difference in GPA that results from working for financial need when compared to non-working students. Additionally, the p-values for nearly every variable (except *highgpa*) decreased in

*Function 3* compared to *Function 2*, indicating that *Function 2*'s variables were biased due to the omission a working purpose from the model.

Why do students who have no choice but to work suggestively receive lower GPAs than students who choose to work? Assuming students have a strong understanding of their own abilities, I theorize that it is due to different students seeing work as either a compliment or substitute to time and effort spent on school. Students who work because they choose to likely do so knowing that working will not decrease the amount of time and effort they have available to allocate to schoolwork. Their choice to work indicates that they probably are more able and/or motivated than other students, thus the presumably negative effects of work on GPA are offset by their higher levels of ability and/or motivation. More simply, these students complement their schooling with work because they know they can simultaneously perform well in both. On the other hand, students who work because they must out of financial need likely have more common levels of ability and motivation, and thus the negative effect of working on time and effort to put into schoolwork results in lower GPAs for these students compared to other working students. It is not that students who need to work are always less able/motivated than students who choose to work, it is that these students are likely more comparable to the average student because they did not sort themselves into the working category out of choice, thus the loss of time and mental resources due to having a job results in them earning lower grade point averages.

However, it may also be argued that *need* is really revealing the negative effect on GPA that is the result of a less advantageous family background. Students who need to work to support themselves financially presumably come from a poorer or less educated family that cannot support the student as much financially. Students who come from less educated parents may have worse academic performance in college, thus if *need* is proxy variable for a poorer family background, it is not really revealing a true effect of the purpose of work on GPA. If this is indeed the case, then *need* should be negatively correlated with family income or parent's education. Yet in this data this was not the case, as *need* is only weakly correlated with both family income and parent's education. That being said, due to the small sample size of this data set, the statistical uncertainty of most of the estimates in *Function 3*'s OLS regression, and this possible alternative explanation for the results, I conclude that working out of financial necessity is not a strong estimator of college academic performance, but rather a suggestive influence. Given that both being a full-time student and/or working a job often require substantial amounts of time and effort, and given that time and effort are required to succeed in academics, there must exist an identifiable causal relationship in some form.

## VI. Conclusion

This research explores the relationship between college student grade point average and working in a paid employment position while attending school. The relationship is examined by testing a small set of online survey data with OLS regression models. While other papers have found only small correlations between GPA and a student's employment status, it is found here that merely being employed in a paid position has a statistically insignificant effect on student academic performance as measured by GPA. That is, there is not sufficient evidence from the given survey data that working is correlated with a change in college student GPA. However, it is found that among students who are employed, working for the purpose of serving financial needs is suggestively correlated with a 0.179 decrease in college GPA, which equivalent to the correlative effect of a 0.6469 drop in High School GPA. Furthermore, when including the collected data for the motivations of students' employment, almost all the rest of the estimators of college GPA included in the model become more accurate. This indicates that adding student motivation for employment to a predictive model of student academic performance reduces the selective bias that complicates identification of the effect of work on GPA.

While this research does find a suggestive negative correlation between working out of financial necessity and college GPA among working students, it does little to reveal why this correlation occurs, or whether working at all has a positive or negative effect on GPA for different students. Are students who work out of financial need suggestively less successful students than other working students because they are less able, or is it because they generally work different jobs or work more hours that consequently detract from the quality of their schoolwork? Furthermore, do students who work for financial need receive lower GPAs than non-working students? Neither of these questions can be conclusively determined from this data set. Another complication of this paper's findings is in its reliance on a small amount of survey data. That is, the survey data used in this paper may be high in measurement error due to its method of survey being an optional online form, and because only 103 total students replied. The students who are willing to reply to optional online surveys may be different from other students on an unobserved measure, thus introducing more bias to the data. In sum, given the findings of this paper and its methodology, I find that including the surveyed motivations/purpose for working can reveal possible correlations between those motivations and academic performance, while it must also be noted that identifying these correlations does little to explain the underlying causes of higher or lower GPAs indicated by the correlations.

A follow up experiment that could identify with more clarity a causal relationship between student employment and student academic performance could be conducted. To reduce the endogeneity problem of students of different types selecting into working, an instrumental variable could be used that

is strongly correlated with student working hours and not student academic performance. However, it is hard to speculate on what such a variable could be, as many factors that determine a student's working status and working hours play some role in determining their GPA. Determining a true causal relationship would take a larger and robust data set, many accurate measurements of the different variables that may influence student GPA, and a strong instrumental variable for student working hours.

Despite the difficulty in accurately identifying a causal relationship, I offer speculation that the cause of the found correlation in this paper is due to the difference in how students see work in relation to schoolwork. I propose that students who work for reasons other than financial need see work as a compliment to school, and select into working only if they know they have the ability to handle both school and work at the same time. On the other hand, students who work out of financial need may see work as a substitute for their time and effort available to spend in school because they are forced into working and therefore have less cognitive and temporal resources for their schoolwork. Under this theory, the loss of a student's cognitive and temporal resources due to substituting working for school results in them receiving lower grades than other working students. Additional research with a larger and more robust data set could be conducted to test this theory. With more data, sub-group testing of students of different amounts of working hours and students of different backgrounds could be conducted to examine the given substitute/compliment theory. That is, further testing of these various factors that may be correlated with student motivations for work possibly could reveal significant causal effects between working, conditions causing students to work, working hours, and college student academic performance.

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## **Appendix 1: Online Student Survey**

1. How old are you? (Years)
  - ☐ (Open response)
2. What is your class standing?
  - ☐ Freshman
  - ☐ Sophomore
  - ☐ Junior
  - ☐ Senior
3. What is your Western Washington University Cumulative GPA? (Please answer to 2 decimal points. Ex: 2.96)
  - ☐ (Open response)
4. What is your race? (Please select all that apply)
  - ☐ American Indian or Alaska Native
  - ☐ Asian
  - ☐ Black or African American
  - ☐ Hispanic or Latino/a
  - ☐ Native Hawaiian or Pacific Islander
  - ☐ White
  - ☐ (Other)
5. What is your gender?
  - ☐ Male
  - ☐ Female
  - ☐ (Other)
6. What is your family's yearly income? (Excluding your own income)
  - ☐ Less than \$35,000
  - ☐ \$50,000 – \$74,999
  - ☐ \$75,000 – \$99,999
  - ☐ \$100,000 – \$200,000
  - ☐ Over \$200,000

7. What is your mother's highest form of education?
- ☐ Less than a High School Diploma
  - ☐ High School Degree or Equivalent (e.g. GED)
  - ☐ Some College, no degree
  - ☐ Associates Degree (2-year degree)
  - ☐ Bachelor's Degree (4-year degree)
  - ☐ Post-Graduate
8. What is your father's highest form of education?
- ☐ Less than a High School Diploma
  - ☐ High School Degree or Equivalent (e.g. GED)
  - ☐ Some College, no degree
  - ☐ Associates Degree (2-year degree)
  - ☐ Bachelor's Degree (4-year degree)
  - ☐ Post-Graduate
9. What was the SAT or ACT score you used for admission to WWU? (Leave blank if you did not take either test)
- ☐ (Open response)
10. What was your cumulative high school GPA? (Answer to 1 decimal point. Ex: 2.7)
- ☐ (Open response)
11. What is/are your major(s) or intended major(s)? (Write undeclared if undecided)
- ☐ (Open response)
12. How many hours per week do you usually study?
- ☐ Less than 5 hours
  - ☐ 5-10 hours
  - ☐ 10-15 hours
  - ☐ 15-20 hours
  - ☐ 20-25 hours
  - ☐ More than 25 hours

13. How many credits do you take on average at WWU per quarter? (Okay to estimate)

- ☐ Less than 8
- ☐ 8-12
- ☐ 13-17
- ☐ More than 18

14. During a typical quarter, how many hours per week do you usually work in a paid position while taking classes? (Answer 0 if unemployed)

- ☐ 0 hours
- ☐ Less than 10 hours
- ☐ 10-20 hours
- ☐ 20-30 hours
- ☐ 30-40 hours
- ☐ More than 40 hours

Note: questions 15-17 only were available to students who did not answer “0 hours” to question 14.

15. Are you employed by Western Washington University?

- ☐ Yes
- ☐ No

16. What has been your average hourly wage while attending WWU? (If you earn tips, please add that to your hourly wage)

- ☐ (Open response)

17. What is the main purpose for your employment?

- ☐ I don't need to work, I do so primarily for other reasons (disposable income, work experience, social reasons, etc.)
- ☐ I need to work to support myself financially (paying tuition, financing student loans, living expenses, etc.)