A Correlation Study Between Work Hours and Student GPA

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1. Executive Summary

1.1 Abstract:

College student’s lives are generally filled with much more activity than just studying and getting good grades. Because most students must pay for some or all of their college, they need to hold and maintain jobs. Since these jobs inevitably take much of the student’s time, their grades may begin to suffer. This report investigates how grade point average, or GPA, is affected by the number of work hours. It is the contention of this report that the less amount of work a students does the higher their GPA will be.

1.2 Methods:

A survey was used to obtain information about student’s daily college life. Some of these questions on the questionnaire included aspects of the student’s work schedule, number of children, class schedule, GPA amongst other information. After obtaining the data, a Chi-squared test and a relative risk analysis was performed.

1.2 Conclusions:

Our early estimates produced say that there is no correlation between our different groups. This meant that one of the groups did better in classes. After using the relative risk analysis, we found that those individuals who worked more than 10 hours a week had a slightly higher probability of getting better grades.
2. Introduction

College students today have very busy lifestyles. They have many responsibilities throughout their daily lives one of which is very important, tuition. Colleges across the country are raising their tuitions so expensive bills are becoming a daily hassle for college students. To pay for these expenses, college students must take a number of actions such as taking out loans, earning scholarships and picking up a job. One of the biggest responsibilities a college student faces is earning good grades. Without decent grades, a college education is almost worthless. For most people, earning good grades takes time and effort. While effort varies from person to person, time is a little harder to come by. Earning money will take much of the student’s time, which will lessen the amount of time available to study.

Therefore, it stands to reason that with less work to do, a student would have more time to study and therefore earn better grades. To determine how much work hours relates to grade point average or GPA. After asking students various aspects of their daily life via a questionnaire, we were able to examine and correlate data to answer this question. Using two different test methods, the chi-squared test and the relative risk test, were able to determine whether or not students who worked 10 or less hours a week have higher GPAs than students that work more than 10 hours a week.

3. Data Collection Techniques

To obtain the data necessary for this project, we randomly picked students from around the Youngstown State University campus and had them fill out a questionnaire. This questionnaire contained questions such as: hours worked, number of jobs, GPA, number of credits, age, residence, amongst other pieces of information. A total of 70 questionnaires were filled out. From these forms, each person’s GPA and their corresponding number of work hours were recorded. From this data, we tested our hypothesis.

There are several limitations to the data collection procedures. Firstly, a varied sample is hard to achieve. There are many types of majors at YSU some harder than others. If all our information came from one major or even on type of major, our data might not represent a true college population. Another limitation of this type of data collection procedure is that is not possible to verify whether or not the participants are giving truthful answers. The participants might not realize how precise the data needs to be so they embellish a little on some of the data such as the GPA category.
4. Summary of Data

The data is arranged in two groups A and B.

Group A = # of people who work 10 hours or less
Group B = # of people who work more than 10 hours

Codes for GPA

GPA of 1.00 = 1.0 – 1.5
GPA of 2.00 = 1.6 - 2.0
GPA of 3.00 = 2.1 – 2.5
GPA of 4.00 = 2.6 – 3.0
GPA of 5.00 = 3.1 – 3.5
GPA of 6.00 = 3.6 – 4.0

Table 4.1

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean GPA</th>
<th>Std. Dev. GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>18</td>
<td>4.8889</td>
<td>1.2314</td>
</tr>
<tr>
<td>B</td>
<td>52</td>
<td>4.7308</td>
<td>1.1735</td>
</tr>
</tbody>
</table>

Figure 4.1: Frequency of the hours of Group A (1.00) and Group B (2.00)
Figure 4.2: Frequency of GPA
5. Analysis

Two different tests were used to examine this data, the Chi-squared test and the Relative Risk analysis.

Chi-Squared Test

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GPA &gt; 3.0</strong></td>
<td>12 (12.7)</td>
<td>36 (35.7)</td>
<td>48</td>
</tr>
<tr>
<td><strong>GPA &lt; 3.0</strong></td>
<td>6 (5.7)</td>
<td>16 (16.3)</td>
<td>22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>18</td>
<td>52</td>
<td>70</td>
</tr>
</tbody>
</table>

H₀: There is no relation between variables A and B.
H₁: There is a relation between variables A and B.

d. f. = (c-1)(r-1) = 1
Decision Rule: If $\chi^2 > \chi^2_{\alpha}$ or p-value < $\alpha$, the $H_0$ is rejected.

$\alpha = .05$

$\chi^2_{\alpha} = 3.84$

$\chi^2 = \sum (O_i - E_i)^2 / E_i \sim \chi^2 (r-1) (c-1)$

$\chi^2 = (12 - 12.7)^2/12.7 + (36 - 35.7)^2/35.7 + (6 - 5.7)^2/5.7 + (16 - 16.3)^2/16.3 = .0625$

$\chi^2$ is not greater than 3.84 and $.1 < p-value < .9$ therefore, we do not reject the $H_0$.

Relative Risk Analysis

<table>
<thead>
<tr>
<th>GPA&gt;3.0</th>
<th>A</th>
<th>B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA&gt;3.0</td>
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<tr>
<td><strong>Total</strong></td>
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<td>52</td>
<td>70</td>
</tr>
</tbody>
</table>

$RR = \frac{a(b+d)}{b(a+d)} = .926$

6. Conclusions

Summary of Results

From the Chi-Squared Test, we found:

$\chi^2 = (12 - 12.7)^2/12.7 + (36 - 35.7)^2/35.7 + (6 - 5.7)^2/5.7 + (16 - 16.3)^2/16.3 = .0625$

$\chi^2$ is not greater than 3.84 and $.1 < p-value < .9$ therefore, we do not reject the $H_0$.

Since we do not reject the hypothesis this means that there is sufficient evidence that there is no relation between Group A and Group B. This means that there is no relationship between the two variables. We can now gather from this data that there is at least some difference between these two groups. We believed that there would indeed be a difference between these groups.

Our next step was to perform a relative risk analysis to determine if Group A was more likely to get above 3.0 GPA. After performing the analysis, $RR = .926$. This result showed that although the groups have a difference, they are still very closely related. If
anything, Group B is more likely to get above 3.0. This is not what we predicted. Therefore, our null hypothesis is incorrect.

The number of hours may still be a determining factor in GPA but other factors may limit people’s grades. For instance, a student who doesn’t work many hours during the week may very well be involved in other activities, which may conflict with study time. Activities and responsibilities such as children, extra credit hours, and extra-curricular activities may take up much of a non-working student’s time. Therefore, there are two main factors that may have interfered with our test results. The first problem was the inability to directly isolate individuals with just a few work hours from those who work many. Another factor that may have helped our research is a larger population size. With a larger population, a more accurate study could have been performed.

Looking towards the future several different aspects of a student’s daily life could be studied and a larger population could be obtained. With these added aspects a more reliable, thorough examination could be accomplished.