

## **TESTING FOR RACE AND GENDER ISSUES IN COLLEGE GRADES**

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### **ABSTRACT**

This paper focuses on the issue of race and gender effects as related to course grades received by 533 students in 19 different classes at a small regional university. The results indicate that both gender and race are related to grade received. Further analysis shows that those effects may be primarily related to differences in academic ability based on using previous GPA as an indicator for academic ability.

### **INTRODUCTION**

The issue of grades can be a very sensitive topic for college instructors. Most college professors assert that the demographic characteristics of the student have no impact on the grade received. Some may admit that academic preparation and support may affect different populations differently but few are willing to test to see if demographic characteristics like race and gender significantly impact the grades received by students.

There has been a good deal of research into issues of bias based on political bias but few studies have been completed that provide a relatively easy process to see if grades are independent of race or gender at the college level. The focus of this paper is to propose a simple analysis that can be done to keep check by individual faculty to determine if there is a race or gender factor in grades earned in their classes. There is no effort to ascertain what might be causing any effect if it exists. Rather the goal is to provide a fairly simple system for checking for independence of grades and race and gender.

### **REVIEW OF RELEVANT LITERATURE**

A considerable amount of previous research has explored the relationship of student characteristics such as gender and race to academic achievement in higher education. However, the vast majority of such studies have used measures other than course grades—such as enrollment figures, degree attainment figures, and grade point averages—as the measures of academic achievement. Overall, the research suggests there is a “gender gap” in higher education in that the overall performance of women in higher education tends to supersede that of men in several respects. Namely, women are more likely than men to both be enrolled in college and receive Bachelor’s degrees (National Center for Education Statistics 2004). Women also tend to have higher grade point averages than do men [7][9][14][17][19][31]. There is no general consensus in the literature on the explanations for such observations. However, some of the commonly proposed explanations pertain to the differences between men and women’s college

work ethic [7][18][21], differences in men and women's notions of the payoffs of a college education [6][8][24] and women's levels of preparedness for college [8].

As is the case with regard to gender, much of the research pertaining to the relationship between race and collegiate academic achievement uses factors other than course grades to measure academic achievement. Overall, the academic achievement of African Americans tends to be lower than that of Caucasians in several respects. A lower percentage of African Americans than Caucasians are enrolled in college and a higher percentage of African Americans students than Caucasian students drop out of college (National Center for Education Statistics 2004). Additionally, African Americans tend to have lower grade point averages than do Caucasians [6][12][27]. There is no consensus in the literature with regard to the explanations for such findings. However, some of the commonly proposed explanations pertain to relatively lower levels of academic preparedness for college among African American college students [10], perceptions of lack of support and feelings of alienation by African American students at predominantly white institutions [13][15][29] and greater demands and stress pertaining to family related issues [6].

As stated earlier, a much more limited body of research has investigated the existence of gender effects on academic performance by examining grades received by students in college courses. Several of these studies examining the existence of gender effects fail to find any significant differences in the grades earned from courses by women and men. For instance, Borde's [3] study of several sections of an introductory marketing course, found that there were no significant differences in the course grade received by men and women. Likewise, in their analysis of grades received by freshmen in 290 different courses, Keller, Crouse, and Trusheim [16] found that there were no significant differences in the grades according to gender.

However, results from other studies suggest that there are gender effects with regard to grades received in courses—usually that women tend to receive higher course grades than men. Several studies examining grades received in college mathematics courses found that women received grades that were higher than those received by men [4][23]. Further, other research studies have yielded results indicating that women received higher grades in accounting [20] and a variety of other courses [16]. These findings are consistent with the previously referred to finding that female college students have higher overall grade point averages than male college students.

Alternatively, some studies find that men tend to perform better in a few courses [16]. In particular, the results of some studies have shown that men tend to perform better in introductory economics classes than women [1][25]. One study found that men received better grades in an introductory economics course than did women, but that those differences disappeared when the prior attitudes of the students toward economics were taken into account [2]. However, other studies have failed to find significant differences in the grades received by men and women in upper level economics classes [30].

Even less attention has been given to the relationship between race and grades received from college courses. As pointed out earlier, the vast majority of the research investigating the relationship between race and academic performance uses factors other than course grades as indicators of academic achievement. One study [28] examining the academic performances of African American and Caucasian students in developmental mathematics courses at a four-year university found revealed there was a relationship between race and the grades received in the courses. The African American students received lower grades in the two courses than Caucasian students.

## METHODOLOGY

This study is a review of grades for three different professors covering a total of 19 classes with 533 students. Two professors are male and one is female. The courses include lower level and upper level and also include three different disciplines. The results are not sufficiently large to generalize across all faculty members but rather are useful to suggest a systematic way to check for race and/or gender effects. The impetus for this study was intermittent allegations of race and/or gender bias by students at a small regional university. While none of the professors in the current study have been alleged to have discriminated, all were willing to subject their courses after the fact to the pilot study. As a result, the knowledge that their grades would be included in the study could not affect the results. None of the faculty members had any idea as to whether their course results would show an independence of effect when they chose to participate in the study. While all classes are anonymous, the faculty members realize that it might be possible to trace a particular class result to them.

This study is limited to gender and two race classifications. Other demographic characteristics could be used but these categories seem to be the most at issue. At the institution that provided the data, the vast majority of the students are either Caucasian or African-American. Other minorities make up less than five percentage of the total student body with no one group having a significant portion.

The study uses a simple Chi-Square test for Independence to check for effect of race and gender. This requires two contingency tables, one with the rows indicating the race and the columns representing grades. The second table lists gender in the rows and the columns representing the grades. In each case, the contingency table is 2 x 5 and the resulting Chi-Square test indicates whether the independence of the factors can be accepted or rejected.

The simple contingency table allows only a test for the independence of grades and either gender or race. This simple test is not sufficient because there is not a check for “ability” differences. As a result, the overall GPA of the students was added to further refine the analysis. As a result, the contingency tables became 6 x 5 with students clumped into three categories of GPA by race and gender.

Preliminary analysis indicates that there are instances where grades are not independent of gender and race when the simple 2 x 5 table is the basis of analysis. However, use of the more detailed second table indicates much more independence of the grades and gender and race. While that is helpful to the feelings of the involved professors, it may not be appropriate to use this particular categorization.

The focus of the paper is not to try to find cases of grade bias nor to clear professors of charges of bias in grading. Rather the focus is on suggesting a fairly simple procedure whereby faculty members and administrators can check to see if certain groups are being affected differently by the grades awarded. For example, a faculty member may be truly unbiased and the grades from a particular class may reject the hypothesis of independence between grades and gender or race. The focus then would be to try to discover whether alternative methods might be used that would assist the group having more difficulty with the class.

## RESULTS

The chi-square statistic tests whether two variables are independent. The null hypothesis is rejected if a relatively large chi-square value and a small corresponding p-value is observed. There are 533 observations in the sample. In Table 1, the null hypothesis is stated as:

Ho: There is no relationship between gender and grade earned, with an alternative hypothesis stated as:

H<sub>1</sub>: There is a relationship between gender and grade earned.

The contingency table and Chi-square test results are shown in Table 1. As shown the null hypothesis is rejected at the .10 level of significance. Thus we conclude there is a relationship between gender and the grade earned in the classes observed in this study.

**TABLE 1: CONTINGENCY TABLE FOR GRADES AND GENDER**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>F</b>	<b>Total</b>
<b>Female</b>	61	110	77	23	20	291
<b>Male</b>	39	77	76	20	30	242
<b>Total</b>	100	187	153	43	50	533
<b>Chi-Square</b>	8.446					
<b>Df</b>	4					
<b>p-value</b>	0.0765*					

\*Significant at .10 level

To test the relationship of race to grades earned, the null hypothesis is stated as:

Ho: There is no relationship between race and grade earned, with an alternative hypothesis stated as:

H<sub>1</sub>: There is a relationship between race and grade earned.

The contingency table and Chi-square test results are shown in Table 2. As shown the null hypothesis is rejected at the .01 level of significance. Thus we conclude there is a relationship between race and the grade earned in the classes observed in this study

**TABLE 2: CONTINGENCY TABLE FOR GRADES AND RACE**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>F</b>	<b>Total</b>
<b>Black</b>	13	36	53	15	16	133
<b>White</b>	87	151	100	28	34	400
<b>Total</b>	100	187	153	43	50	533
<b>Chi-Square</b>	22.134					
<b>Df</b>	4					
<b>p-value</b>	1.885e-4**					

\*\* Significant at .01 level

The results shown above in Tables 1 and 2 indicate that there is a relationship between gender and race for the students in the 19 sections. However, there is an important variable not accounted for in these tests. There is no measure of “academic performance” or preparation outside the courses involved. Therefore, another measure was included to further analyze the data. The students were further categorized by GPA to serve as a proxy for academic ability.

In Table 3 below, a 6x5 contingency table is constructed to show three levels of academic performance of the students. Those levels are subdivided by gender and GPA level such that the variables listed are

Female B = Female student with GPA 3.0+  
 Female C = Female student with GPA 2.0 – 3.0  
 Female D = Female student with GPA < 2.0  
 Male B = Male student with GPA 3.0+  
 Male C = Male student with GPA 2.0 - 3.0  
 Male D = Male student with GPA < 2.0

The null hypothesis now is stated as:

Ho: There is no relationship between gender GPA levels and grade earned,

with an alternative hypothesis stated as:

H<sub>1</sub>: There is a relationship between gender GPA levels and grade earned.

As shown in Table 3, the null hypothesis is rejected and we conclude that there is a relationship between gender GPA level and grade earned in the course. This tends to indicate that it is previous academic performance (which we have used as a proxy for academic ability) that is the important relationship not the gender of the student.

**TABLE 3. CONTINGENCY TABLE COMPARING GRADES AND GENDER ADJUSTED FOR GPA**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>F</b>	<b>Count</b>
<b>Female_B</b>	49	37	6	2	0	94
<b>Female_C</b>	12	68	48	7	5	140
<b>Female_D</b>	0	5	23	14	15	57
<b>Male_B</b>	24	19	7	0	0	50
<b>Male_C</b>	12	47	42	11	8	120
<b>Male_D</b>	3	11	27	9	22	72
<b>Count</b>	100	187	153	43	50	533
<b>Chi-Square</b>	267.977					
<b>df</b>	20					
<b>p-value</b>	.000**					

\*\* significant at .01 level

In Table 4 below, a 6x5 contingency table is constructed to show three levels of academic performance of the students. Those levels are subdivided by race and GPA level such that the variables listed are

Black B = Black student with GPA 3.0+

Black C = Black student with GPA 2.0 – 3.0

Black D = Black student with GPA < 2.0

White B = White student with GPA 3.0+

White C = White student with GPA 2.0 - 3.0

White D = White student with GPA < 2.0

The null hypothesis now is stated as:

Ho: There is no relationship between race GPA levels and grade earned, with an alternative hypothesis stated as:

H<sub>1</sub>: There is a relationship between race GPA levels and grade earned.

As shown in Table 3, the null hypothesis is rejected and we conclude that there is a relationship between race GPA level and grade earned in the course. This tends to indicate that it is previous academic performance (which we have used as a proxy for academic ability) that is the important relationship not the race of the student.

**TABLE 4. CONTINGENCY TABLE COMPARING GRADES AND RACE ADJUSTED FOR GPA**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>F</b>	<b>Count</b>
<b>Black_B</b>	8	8	4	1	0	21
<b>Black_C</b>	4	26	27	4	5	66
<b>Black_D</b>	1	2	22	10	11	46
<b>White_B</b>	65	48	9	1	0	123
<b>White_C</b>	20	89	63	14	8	194
<b>White_D</b>	2	14	28	13	26	83
<b>Count</b>	100	187	153	43	50	533
<b>Chi-Square</b>	268.686					
<b>df</b>	20					
<b>p-value</b>	.000**					

\*\* Significant at .01 level

## CONCLUSIONS

Based on the data available, it appears that there is a relationship between gender of the student and the grade received in these classes and the race of the student and the grades received in these classes. However, when the students are further stratified by GPA level, the results imply that the relationships may be primarily due to the academic performance level of the student rather than

the simple status of gender or race. Further analysis beyond the simple Chi-Square test for independence may yield further insights into why students of different status tend to perform differently in these classes. As stated in the introduction, our main goal is to offer a method of analysis for college instructors to use in order to test for patterns of course grades that are related to race and gender. Also, by analyzing race and gender effects for college courses in multiple fields—economics and political science classes—we add to the literature examining race and gender effects in course grades. Further, since many of the previously done studies examining gender or race effects in course grades focus on introductory courses, our project contribute to the literature examining the relationship between gender and race and grades received in upper level courses

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