Race, Late Bloomers and First-year GPA: Predicting beyond the Freshman Year

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First-year grade point average (FYGPA) is an oft-referenced outcome criterion for assessments of the predictive validity of a variety of admissions mechanisms. Unfortunately, few studies examine the relationship between FYGPA and long-term outcomes such as graduating grade point average and six-year graduation. Influenced by Wilson's (1980) late-bloomer hypothesis, this paper examines the relationship between FYGPA and graduating grade point average, honors graduation and six-year graduation. Further, the possibility of a racial differential in this relationship is examined. Using simple linear regression and logistic regression in addition to Zar's (1999) formula for comparing slopes, FYGPA is determined to bear a strong relationship with each of the dependent variables across race.

Introduction

First-year grade point average (FYGPA)[1] is a longstanding point of reference for much of the research investigating the predictive utility of the SAT – extending back more than a half century (Jones & Case, 1955). FYGPA is used across disciplines and is represented in diverse research models (Arbona & Novy, 1990a; Fincher, 1974; Hogrebe, Ervin, Dwinell, & Newman, 1983; Powell, 2003; Rothstein, 2005; Sawyer, 1986; Stumpf & Stanley, 2002; Thomas & Stanley, 1969; Zwick & Schlemer, 2004; Rebecca Zwick & Jeffrey C. Sklar, 2005). For example, DeBerard et al. (2004) investigated the influence of health and psychosocial factors on first-year performance and found that the consideration of these factors increases opportunities to identify those students that may struggle academically. Consequently, educational stakeholders are more able to develop responses to behaviors

and practices that reduce the likelihood of success. The inclusion of acquaintance-rated conscientiousness improved the prediction of FYGPA (Wagerman and Funder 2006) while the academic performance of roommates also influenced FYGPA (Sacerdote, 2001; Zimmerman, 2003). FYGPA is included as a dependent variable in research on stereotype threat (M.J. Cullen, Hardison, & Sackett, 2004) and assessments of the impact of freshman-transition programs (Grayson 2003; Noble et al. 2007).

Geiser and Sentelices (2004) found the number of Advanced Placement courses taken in high school has little influence on college FYGPA. In investigating the possibility of gender bias in Israeli university admissions practices, no gender bias was determined when using standardized admission test scores to predict FYGPA (Azen, Bronner, & Gafni, 2002). In response to the limited number of predictors used in traditional predictive validity studies, Young and Johnson (2004) determined that the addition of socioeconomic variables improved the prediction of FYGPA.

While there are a number of explanations for the continued use of FYGPA as an explanatory target, its attractiveness may be influenced by the fact that first-year average is available soon after admission for most of the admitted class. It is often based on a relatively comparable set of required courses, and…grading standards appear to be more comparable in first-year courses than in upper-division courses (Burton and Ramist, 2001, p. 9). FYGPA is also preferred because it reflects a larger number of students as many transfer to other institutions or leave university-level study after the freshman year (Rebecca Zwick & Jeffrey C Sklar, 2005). Despite the frequent use of FYGPA in research pertinent to the predictive utility of the SAT, FYGPA may be a problematic mechanism to judge the performance of all students. The research presented here is partially prompted by Wilson's (1980) "late-bloomer" hypothesis." This

hypothesis examines the possibility that the transition from high school to college…poses greater problems of adjustment for minority than for nonminority students, and that first-year performance below the level predicted from admissions scores may be due primarily to these "problems of transition" (Wilson, 1980, p. 24). While Wilson's research did not support his late-bloomer hypothesis, a considerable body of literature examines race-specific experiences in post-secondary education that influence post-secondary outcomes. For example, Smedley, et al. (1993) determined that minority status stresses were inversely correlated with FYGPA (see also Bowen & Bok, 1998; Cabrera & Nora, 1996; Eimers & Pike, 1997; Grayson, 1995; Hurtado, 1992; Schwitzer, Ancis, & Griffin, 1998; Schwitzer & Thomas, 1998; Smedley, Myers, & Harrell, 1993; Tinto, 1987). Considering this, the use of FYGPA, as a proxy for later college performance, may not be a good indicator of college readiness for minority students as their comparatively lower performance may be "halted or reversed following a transitional adjustment period" (Wilson, p.24).

As a short-term point of outcome, FYGPA is limited and more long-term outcomes such as graduation rate may be preferable because such outcomes reflect successful completion of the degree (Lawlor, Richman, & Richman, 1997). However, even a more long-term and categorical outcome like graduation rate has its limitations. Beyond the likely influence of a number of variables that are not captured in research identifying graduation rate as a dependent variable, graduation rate is limited because it "places a premium on academic persistence and probably does not differentiate very well the most promising scholars and professionals" (Willingham as quoted in Zwick 2007, p. 16).

Despite the degree to which FYGPA is referenced in the literature, there is a dearth of literature that examines the relationship between FYGPA and more long-term collegiate

performance benchmarks. It is therefore important to examine the utility of FYGPA to predict college performance beyond the first-year. If FYGPA fails to predict such performance, the fact that the SAT, or any admissions mechanism, predicts FYGPA is of little value to considerations of more extended collegiate performance. This research examines the ability of FYGPA to predict performance associated with university-level completion and whether or not the predictive validity of FYGPA differs by race.

Methodology

After Institutional Review Board approval of this project,[2] data was received from the Georgia State University's (GSU) Office of Institutional Research. Full-time students[3] entering GSU in Fall 1998 that reported Asian, Black, Hispanic, or White racial group membership were included in this analysis. Further, students must have entered GSU without any transfer credit thereby decreasing the likelihood that their performance is influenced by previous college-level instruction and experience. In order to assess the ability of FYGPA to predict later college performance, three separate statistical mechanisms are used and three dependent variables are identified. FYGPA is identified as the continuous independent variable in this research. Cumulative graduating grade point average (CPA) is the only dependent variable that is continuous while the remaining dependent variables, Honors Graduation (HG) and Six-year Graduation (6YG), are both dichotomous variables.

Linear regression using SPSS statistical software is used to examine the relationship between FYGPA and cumulative graduating gpa (CGPA) as well as to examine the amount of variation in CGPA that is explained by FYGPA. Zar's (1999) method of comparing slopes is important here because it allows us to determine whether or not there are

significant racial differences in the strength of the relationship between FYGPA and CGPA (as determined by slope).[5]

Table 1: Statistical Tests and Variables

Independent Variable	Dependent Variable	Statistical Tests
FYGPA	Graduating GPA	Linear Regression (enter method)
		Zar's Slope Comparison
	Six-Year Graduation	Logistic Regression
	Honors Graduation	Logistic Regression

Microsoft Excel was used to calculate differences between slopes. Finally, logistic regression using both Six-Year Graduation (6YG) and Honors Graduation (HG) as dependent variables is employed to examine the degree to which FYGPA predicts these two dichotomous completion outcomes (Hosmer & Lemeshow, 2000). SPSS was used for both logistic regressions as well.6 The use of all four of these measures provides a complete picture of the relationship between FYGPA and both short-term and long-term university performance among GSU students.

Results

Descriptive Summary

Scores for Black students are consistently the lowest of the four racial groups across each variable while the scores for White students are highest for FYGPA, CGPA, and HG. Asian 6YG scores were highest. Despite this fact, there is great similarity between the racial groups within each variable. The range for FYGPA was .215 and CGPA was .22. The range for the percentage of students graduating in six years was 2.692% and for graduating with honors was 5.791%.The

results of the regression analysis were significant across groups with FYGPA explaining more than 50 % of the variation in CGPA with as much as 65 % of the variation in CGPA explained for Hispanic students.

Table 2: Descriptive Summary

		Continuous Variables			Categorical Variables	
Race	Total (n=8743)	Measure	Mean	Std. Deviation	Six Year Graduates	Honors Graduates
Asian	n=1327	FYGPA	2.774	0.740	n=326 (24.567%)	n=211 (15.901%)
		CGPA	3.124	0.391		
Black	n=3097	FYGPA	2.612	0.765	n=702 (22.667%)	n=370 (11.947%)
		CGPA	2.999	0.386		
Hispanic	n=384	FYGPA	2.769	0.734	n=84 (21.875%)	n=58 (15.104%)
		CGPA	3.167	0.386		
White	n=3935	FYGPA	2.832	0.746	n=956 (24.295%)	n=698 (17.738%)
		CGPA	3.215	0.416		

Table 3: Linear Regression (FYGPA on CGPA)

Linear Regression (FYGPA on CGPA							
	Model Summary			Coefficients			
	F*	Adjusted R2	Standard Error	Slope	Standard Error	Constant	t*
Asian (n=337)	348.838, df=1,336	0.508	0.274	0.475	0.077	1.713	18.677
Black (n=732)	779.309, df=1,731	0.515	0.268	0.53	0.056	1.462	27.916
Hispanic (n=87)	162.854, df= 1,86	0.65	0.228	0.506	0.123	1.624	12.761
White (n=989)	1081.83, df=1,988	0.522	0.288	0.565	0.054	1.461	32.891

***all values significant at the .0001 level.**

Table 4: Between Group Slope Comparisons

(Zar's t values)			
	White	Hispanic	Black
Asian	-2.931*	-.666	-1.741
Black	-1.355	.542	
Hispanic	-1.354		

***p<.01**

Comparing slopes reveals that the slope of Asian and White students demonstrate a mutually significant difference indicating that increases in FYGPA are associated with significantly lower (Asian) or higher (White) increases in CGPA.

Table 5: Logistic Regression Goodness of Fit Tests with Six-Year Graduation as Dependent Variable

	Chi-square*	% Predicted Correctly		
		> 6 Years	≤ 6 Years	Overall
ASIAN	45.230	100	0	75.433
BLACK	167.020	100	0	77.333
HISPANIC	19.948	100	0	78.125
WHITE	209.101	100	0	75.705

*** DF=1, all significant at the <.0001 level**

While there is a significant interaction between FYGPA and 6YG across the racial groups included here, considerable caution is warranted in using FYGPA to predict whether or not students within each racial group graduated in six years.

Table 6: Logistic Regression Results with Six-Year Graduation as Dependent Variable

6 yr		B	S.E.	Wald*	e^B (odds ratio)	95% Confidence Interval for e^B	
						Lower	Upper
ASIAN	FYGPA	0.648	.103	39.484	1.9111	1.562	2.34
	Constant	-2.977	.311	91.914	.051		
BLACK	FYGPA	0.843	.072	138.922	2.324	2.02	2.674
	Constant	-3.536	.209	287.491	.029		
HISPANIC	FYGPA	0.851	.206	17.122	2.341	1.565	3.503
	Constant	-3.731	.629	35.151	.024		
WHITE	FYGPA	0.842	.064	173.358	2.321	2.048	2.631
	Constant	-3.617	.199	331.790	.027		

DF=1, *all significant at the <.0001 level

As indicated, each unit increase in FYGPA increases the odds of six-year graduation for each of the four groups included in this research. Although this value is lowest for Asian students (e^B=1.911), the odds of graduating in six-years nearly doubles for Asian students. The odds more than double for Black (e^B = 2.3238), Hispanic (e^B = 2.3411), and White students (e^B = 2.2311).

Table 7: Logistic Regression Goodness of Fit Tests with Honors Graduation as the Dependent Variable

	Chi-square*	% Predicted Correctly		
		Not an Honors Graduate	Honors Graduate	Overall
ASIAN	120.385	100.000	0	84.099
BLACK	343.969	99.487	1.622	87.795
HISPANIC	51.517	98.773	5.172	84.635
WHITE	440.003	100.000	0	82.262
DF=1, *all significant at the <.0001 level				

As with the prediction of six-year graduation, FYGPA also demonstrates a significant interaction with HG, although caution is again warranted in using FYGPA to predict HG status.

The logistic regression indicates that the influence of FYGPA on the prediction of honors graduation is greater than that found in the prediction of six-year graduation rate. Once again, although the increase in the odds of honors graduation per increase in FYGPA is lowest for Asian students, the odds of honors graduation more than quadruples (e^B=4.414). Further, for each unit increase in FYGPA, the odds of graduating with honors increases nearly sevenfold for Black (e^B=6.928) and Hispanic (e^B=6.653) students and more than fivefold for White students (e^B=5.015).

Table 8: Logistic Regression Results with Honors Graduation as the Dependent Variable

		B	S.E.	Wald*	e^B (odds ratio)	95% Confidence Interval for e^B	
						Lower	Lower
ASIAN	FYGPA	1.485	.158	88.314	4.414	3.238	6.016
	Constant	-6.113	.505	146.376	.002		
BLACK	FYGPA	1.936	.126	234.752	6.928	5.409	8.874
	Constant	-7.653	.400	366.701	.000		
HISPANIC	FYGPA	1.895	.318	35.620	6.653	3.571	12.396
	Constant	-7.498	1.041	51.855	.001		
WHITE	FYGPA	1.612	.091	311.782	5.015	4.193	5.998
	Constant	-6.467	.298	472.148	.002		

***DF=1, all significant at the <.0001 level**

Discussion

Taken in sum, the analyses clearly indicate that FYGPA maintains a strong relationship with the three outcome variables considered here: CGPA, 6YG and HG. As to a racial differential, there is conflicting evidence. Beginning with the results of the linear regression with CGPA as the dependent variable, the relatively higher slope for Black and White students yields a significant difference from the slope of Asian students, the lowest slope of the four groups included here. There are no significant differences between the slopes of Black, Hispanic, and White students. In this sense, FYGPA bears a relatively weaker relationship with the CGPA of Asian students

Figure 1: Slopes of Regression Equations

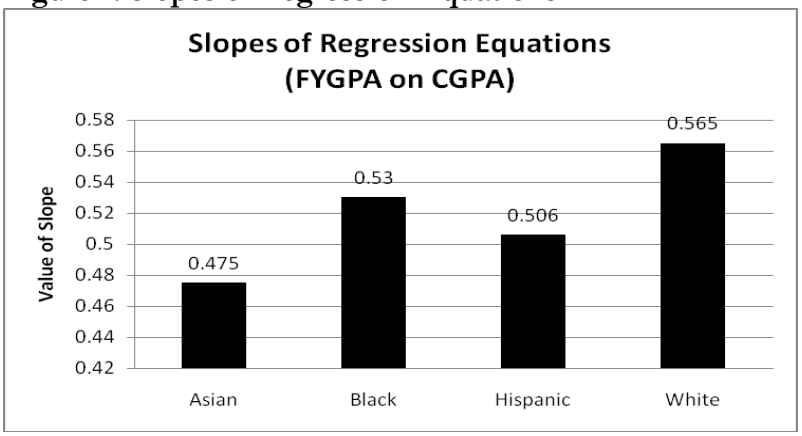
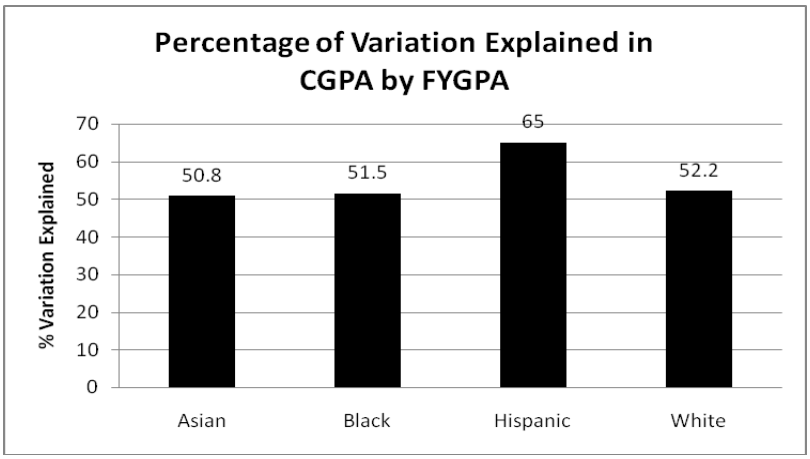


Figure 2: Percentage of Variation Explained by FYGPA

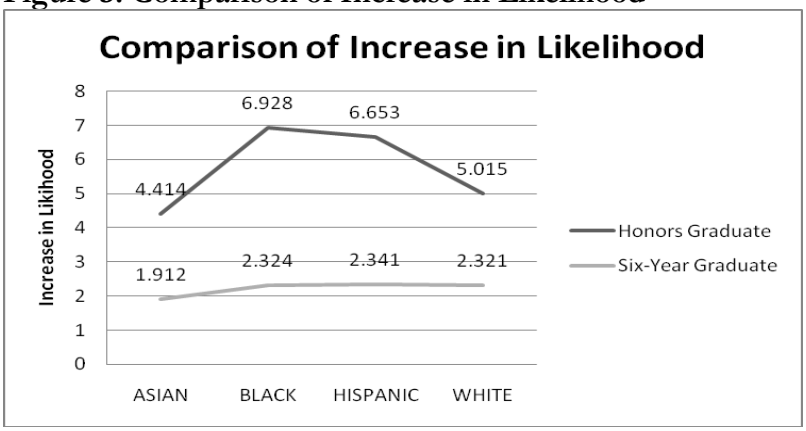


The amount of variation in CGPA explained by FYGPA demonstrates the strength of the interaction between FYGPA and CGPA. While the rate of increase in CGPA per increase in FYGPA may be significantly higher for White students as compared to Asian students as determined by Zar's t, FYGPA explains a comparable amount of variation in

the CGPA of Asian, Black, and White students (range=1.4%) with as much as 65% of the variation explained in the CGPA of Hispanic students.

The logistic regressions also reveal a significant relationship between FYGPA and both six-year graduation and honors graduation. Across racial groups, an increase in FYGPA increased the odds that students would graduate in six years and to a greater degree, graduate with honors (Figure 3).

Figure 3: Comparison of Increase in Likelihood



When attending to 6YG and HG, the results suggest that FYGPA may have slightly more utility for Black and Hispanic students, this difference is more pronounced for HG as compared to 6YG .

Overall, the results of the analyses reported here support the use of FYGPA as a predictor for long-term collegiate performance – specifically CGPA, six-year graduation and honors graduation. Comparatively speaking, FYGPA predicts the performance of Black students better than the other racial groups included in this analysis. In contradistinction, the predictive utility of FYGPA is lowest

for Asian students in both logistic regressions. Still, because of the consistent strength of the relationship between FYGPA and the outcome variables, the differences between groups is a matter of the degree of the strength of this relationship rather than the presence or absence of significant relationships. Ultimately, this analysis supports the continued use of FYGPA as a predictor for long-term college performance across race. The results do not support the "late bloomer hypothesis." Indeed, FYGPA maintains the strongest predictive relationships with the dependent variables of Black and Hispanic students, an outcome that stands in contradiction to this hypothesis.

Conclusion

The continued debate around the use of the SAT and similar standardized tests is predominately influenced by consideration of the SAT's utility in the prediction of college performance. FYGPA is perhaps the most common outcome variable used to assess the predictive validity of the SAT. The ability of the SAT to predict FYGPA is of little practical value if FYGPA does not demonstrate relationships with more important outcome criteria that are associated with the successful completion of college degrees. By including CGPA, six-year graduation, and honors graduation as outcome criteria, we are able to assess the predictive validity of FYGPA thereby extending the debate on the utility of the SAT through to college completion. Using linear and logistic regression analysis along with Zar's (1999) slope comparison, we are able to examine the comparative utility of the FYGPA across racial groups. Comparatively speaking, Asian students appear to be least well-served by the use of FYGPA and Black students appear to be best-served by the use of FYGPA. Still, considering the consistent strength of the relationship between FYGPA and the outcome measures used here, it appears that FYGPA is an appropriate predictor

across racial groups.

Notes

1. Cumulative grade point average inclusive of the first fall and spring terms.
2. IRB Protocol # H07292
3. Full-time = a minimum of twelve enrolled hours.
4. Honor's Graduation is defined here as CGPA >= 3.0
5. Zar's $t = b_1\text{-}b_2/\sqrt{(\text{residual } SS_1 + \text{residual } SS_2) / (\text{residual } df_1 + \text{residual } df_2)}$, $df = (n\text{-}2) + (n\text{-}2)$
6. Logistic regression allows researchers to examine the predictive relationship between an independent variable and a dichotomous dependent variable. Further, this procedure generates odds ratios (e^B) which offers a description of the likelihood of the occurrence of a dichotomous outcome per increases in the independent variable.

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