Not So Black and White: Understanding Group Differences in Academic Performance

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This study examined race and gender group differences in academic performance measures that are widely used in college admissions and personnel selection contexts. Each of the study variables (e.g., SAT, high school GPA, and college GPA) were examined over time, but the group differences in GPA were significantly lower than other assessments used in employment. The findings reveal that women across two ethnic groups performed better than men in academic outcomes that should result in a higher rate of selection success when GPA is used. The implications for personnel strategies are discussed with suggestions for future research.

Organizational decision-makers are often balancing multiple goals to include maximizing diversity and attaining desired levels of performance in both academic and work settings. Some researchers have argued that diversity and performance can be competing goals given that minority students tend to score lower on standardized tests that predict academic performance (Sackett, Schmitt, Ellingson, & Kabin, 2001) as well as cognitively-loaded tests used in personnel selection decisions (e.g., Hough, Oswald, & Ployhart, 2001). Some of the commonly used standardized tests include the SAT, GMAT, GRE, and the Wonderlic Personnel Test. Each of these assessments is intended to capture certain aspects of aptitude that are considered important for success in academic and work settings. Because these assessments are associated with ethnic group differences that reflect significant Black-White differences in test scores, it is suggested that diversity efforts may be hampered such that success rates may vary greatly for majority and minority group members (Sackett et al., 2001; Sternberg, 2006).

The group differences between majority and minority group members is important in academic and work settings because academic performance measures are used in initial screening decisions for employment (Cole, Rubin, Field, & Giles, 2007; McKinney, Carlson, Mecham, D'Angelo & Connerley, 2003; Rynes, Orlitzky, & Bretz, 1997). The SAT and high school grade point average (GPA) are the most commonly used predictors in assessing future academic performance (Hezlett, Kuncel, Vey, Ones, Campbell, & Camera; 2001; Sternberg, 2006). One of the reasons the aforementioned tests are used is that they provide information about applicants designed to predict their future performance potential. While the SAT and high school GPA are widely used in college admissions, SAT tests have come under scrutiny due to ethnic group differences in test scores that have the potential for adverse impact against African-American and Hispanic students. Research has shown that minorities (e.g., African-Americans and Hispanics) score lower on standardized tests such as the SAT than Whites (e.g., Potosky, Bobko, & Roth, 2005; Sackett, et al., 2001; Sternberg, 2006). These findings have also been reported for gender differences in test scores that favor men, yet women had subsequently higher GPAs (Keiser, Sackett,

Kuncel, & Brothen, 2016). In contrast, the differences between groups are minimal in high school GPA. Among these measures, there is still a need to understand ethnic group differences in measures that capture similar performance information. While these tests are more widely used when making selection decisions in academic contexts, academic performance namely college GPA, is more widely used in personnel contexts. Prior research has shown that college GPA is frequently used by recruiters in entry-level hiring decisions (e.g., Rynes, et al., 1997) because college GPA provides some insight into both the ability and motivational determinants of job performance (e.g., Roth & Bobko, 2000). There is recent research suggesting that ethnic group differences are likely to exist in college GPA as well. The current study seeks to explore the interrelationships of academic performance measures, whether and the extent to which ethnic group differences exist, and the implications for employment outcomes.

Academic Performance

Collectively, academic measures including SAT, high school GPA, and college GPA provide useful information about performance in academic settings that may impact employment outcomes in terms of success and occupational representation. Academic performance is primarily measured as cumulative college GPA. It is used in academics as a measure of performance from which administrators can determine the quality of study body performance for its own use as well as accreditation purposes (Romero, 2008). College GPA has greater implications in the workforce as a predictor of future performance potential in work settings. It is related to performance because it is considered to reflect job performance dimensions of ability and motivation (Brown & Campion, 1994; Rynes, et al., 1997).

College GPA is an important factor in recruiting and selection contexts in which recruiters rely on the use of GPA to make decisions about the future performance potential of job candidates. Prior research has shown that college GPA is predictive of job performance across a variety of jobs (Roth, BeVier, Switzer, & Schippmann, 1996) as well as salary range (Roth & Clarke, 1998). Because college GPA has demonstrated positive associations with job performance (e.g., Roth et al., 1996), higher GPAs are expected to be advantageous in employment settings. However, recent research has suggested that ethnic group differences in college GPA can negatively impact organizational diversity goals as well as employment success for minority candidates (Roth & Bobko, 2000). The findings from a group of studies reveal that group differences in academic measures are quite variable and needs additional research attention to understand these differences (Keiser et al., 2016; Sternberg, 2006). To the extent that college GPA is used in personnel selection and that group differences exist, minorities may be adversely affected in employment outcomes and organizations may be limited in their goals to maximize workforce diversity.

Personnel Selection

In personnel selection, there are a plethora of studies examining assessments for their predictive validity with job performance. Personnel selection involves identifying the most qualified individuals based on assessments that demonstrate predictive validity with job performance and minimize the likelihood of adverse impact in process. The most commonly used selection assessments include tests of cognitive ability, personality, and integrity (Schmidt & Hunter, 1998). These tests are popular because they are paper-and-pencil assessments that are low cost and ease of administration. Of these, cognitive ability tests are the most touted because they have the highest validity with job performance. However, cognitive ability tests are also associated with significant ethnic group differences such that adverse impact would occur against Blacks in nearly every selection scenario (Potosky et al., 2005, Schmitt, Rogers, Chan, Sheppard, & Jennings, 1997). Adverse impact occurs when selection rates for particular minority groups (e.g., race and/or gender) are less than four-fifths (4/5ths) of the selection rate of majority groups. The incidence of adverse impact is monitored in both academic and work settings for implications of fair and equal treatment of minority groups or protected classes (Guttman, 2000). The finding of group differences in some of the assessments used in selection have spurred a call by researchers to explore alternative methods and measures (Manley & Benavidaz, 2008; Outtz, 2002; Schmitt, Oswald, Kim, Imus, Merritt, Friede, & Shivpuri, 2007).

One of the key assessments examined in this study is college GPA, that may meet both goals of selection in having validity with job performance and lower group differences than standardized tests of ability. The use of college GPA in personnel selection may be advantageous for several reasons. First, GPA has demonstrated a moderate to strong relationship with job performance (Roth et al., 1996). Second, college GPA has the same benefits of paper-and-pencil assessments in its low administrative costs. Finally, GPA provides information about job applicants who have limited work experience. In selection contexts where past performance is generally the best predictor of future performance, there is very little information on newly minted college graduates other than academic performance. Hence, college GPA becomes an important factor to recruiters that reflect both ability and motivation aspects of job performance for applicants desiring employment.

Studies have shown moderate to strong correlations between college GPA and cognitive ability (Coyle, 2006), graduate school performance (Kuncel, Crede, & Thomas, 2007), job performance (Roth, et al., 1996), and salary (Roth & Clarke, 1998).

College GPA is considered to represent performance in which students have to initiate and maintain self-regulatory behaviors (Rode, Arthaud-Day, Mooney, Near, Baldwin, Bommer, & Rubin, 2005; Trank, Rynes, & Bretz, 2002). Prior research has shown that higher GPAs are associated with individuals who exert additional effort and persist on tasks even the face of difficulty (Trank et al., 2002). Thus, the use of college GPA is particularly important because it is considered to reflect both ability and motivation components captured in personnel selection assessments (Bacon & Bean, 2006, Kuncel, et al., 2005; Roth et al., 1996). To the extent that college GPA can yield predictive validity for job performance, it can be a useful tool to aid organizational decision-makers in personnel selection decisions. A large scale meta-analysis compiling the results of more than 70 studies and nearly 14,000 students further supports the relationship between college grades and job performance (Roth et al., 1996). First, college GPA demonstrated moderate levels of validity with job performance across undergraduate and graduate GPA data. Second, the validities of college GPA remained strong even after five years. Third, the validities were strong across a variety of job and industries (e.g., business, medical, education, and military). In summary, college GPA has the potential to enhance decision-making in selecting individuals most likely to perform well on the job as they have in academic settings.

Ethnic Group Differences in Performance Measures

There is a considerable body of research examining race-based group differences in assessments used in both academic and work settings. It is important to examine how these differences may affect organizational outcomes of interest. For instance, ethnic group differences have been studied extensively in SAT scores (Sternberg, 2006). The group differences in SAT scores have demonstrated that White and Asian students score higher than Black, Latino, and Native American students (Sternberg, 2006). The finding of race-based group differences in SAT has been fairly consistent in most studies (e.g., Hezlett, et al., 2001; Sackett et al., 2001; Sternberg, 2006) and has implications for the successful matriculation of minorities in higher education as well as employment outcomes. Though SAT tests have demonstrated group differences, researchers have suggested that they result in biased estimates for Black and White students such that Blacks had lower SAT scores, yet no differences resulted between the two groups in college GPA (Lawlor, Richman, & Richman, 1997). Thus, the exclusive use or heavy reliance on SAT scores would likely negatively impact the educational outcomes of minorities.

Research is somewhat limited that examines ethnic group differences in college GPA over time but is nonetheless important and timely given the implications for lower scoring groups in academic and employment outcomes (e.g., Roth & Bobko, 2000; Sternberg, 2006). The few studies that have examined minority group differences in college GPA have found that Whites generally have higher college GPAs than Black students (e.g., Roth & Bobko, 2000; Young, 1994). Roth and Bobko (2000) reported that college GPA for White students were .26 points higher than Black undergraduate students. Further, they assert that the level of group differences and adverse impact potential were likely to increase over time that were unfavorable to minority groups.

The finding of group differences in college GPA that favor majority groups and increase the likelihood of adverse impact against minorities is likely to negatively impact diversity efforts. The current study seeks to examine ethnic group differences in academic performance that has implications for employment outcomes, specifically selection success. The primary purpose of this study is to examine college GPA and ethnic group differences over time to determine whether differences are stable. Additionally, this study specifically examines the subset of college student populations that would be representative of applicant pools in entry-level screening of college graduates. The extent to which group differences exist would represent adverse impact potential and may serve as an organizational entry barrier for lower scoring groups.

METHOD

Participants and Procedure

Data were collected from two entering classes of admitted students at a large southeastern university. Applicants self-reported race and ethnicity on the college application which was used for coding in the current study. Sample 1 consisted of 1,712 students of which 73% were female. Sample 2 consisted of 1,859 students of which 69% were female. Across both samples, White and Black students accounted for 95% of the student body and thus these groups were only ones included in the analyses. Across the two samples, Whites accounted for 76% and 78% of the representation of groups in this study.

SAT data were reported directly from the College Board to the university and high school GPA was extracted from high school transcripts that were submitted as part of the college application process. For SAT, only the math and verbal sections were scored for admission resulting in scores ranging from 200 to 1600. Both high school GPA and college GPA were coded on 4.0 scale. Cumulative college GPA data were gathered over four years to examine the level and stability of changes in group differences over time. Each of these data (e.g., SAT, high school GPA, cumulative college GPA) were obtained from the Office of Institutional Research and not based on self-report data.

Analyses

First, descriptive statistics for all study variables (e.g., high school GPA, SAT, and cumulative college GPA) were calculated. Additionally, each of these study variables were also coded based on reported race or ethnicity. To calculate mean differences, the *d-statistic* (reported as *d-values)* was computed for Black and White and Male and Female students across both samples for SAT, high school GPA, and college GPA over the students' four-year tenure. The *d statistic* is commonly used and represents the mean differences between two groups (e.g., Black/White or male/female) divided by their pooled standard deviation (e.g., Hunter & Schmidt, 2004). The *d-statistic* allows one to compare the level of differences across groups in standard deviation terms. Recently, Roth and Bobko (2000) reported that Black/White mean scores in college GPA was reflected by *d*=.43, meaning the Black students score approximately .43 standard deviations lower than White students. The level of group differences (e.g., d=.43), represents a moderate effect size and would arguably result in adverse impact against Black students when college GPA is used as a screening mechanism. We have limited information about gender differences as race has been more widely studied.

RESULTS

The descriptive statistics for study variables are reported in Table 1. For sample 1, the mean SAT score was 1034 (SD=140.59) with a mean high school GPA of 3.43 (SD=.40). The results were similar for sample 2 with a mean SAT score of 1035 (SD=137.09) and high school GPA of 3.44 (SD=.41). These values were similar, though slightly lower, to Roth and Bobko's (2000) findings with mean SAT scores of 1085 and overall college GPA of 2.76 and considered representative of similar college student populations. The correlational analyses reveal that high school GPA had stronger associations with

college GPA compared to SAT. In both samples, the correlations with college GPA for SAT ranged from .20 to .30, while high school GPA relationships range from .42 to .48.

TABLE 1
DESCRIPTIVE STATISTICS AND INTERCORRELATIONS AMONG STUDY VARIABLES

Sample 1

	SAT	HSGPA	Yr 1 GPA	Yr2 GPA	Yr3 GPA	Yr4 GPA
SAT	-					
HSGPA	.20	-				
Yr1 GPA	.30	.42	-			
Yr2 GPA	.27	.43	.96	-		
Yr3 GPA	.26	.42	.94	.98	-	
Yr4 GPA	.25	.42	.93	.97	.98	
SD	104.59	.40	.87	.85	.84	.85

Sample 2

	SAT	HSGPA	Yr 1 GPA	Yr2 GPA	Yr3 GPA	Yr4 GPA
SAT	-					
HSGPA	.13	-				
Yr1 GPA	.24	.48	-			
Yr2 GPA	.22	.49	.96	-		
Yr3 GPA	.21	.48	.94	.98	-	
Yr4 GPA	.20	.48	.92	.97	.99	
SD	137.09	.41	.88	.87	.86	.87

Group Differences

Table 2 reports the mean levels of SAT, high school GPA, and cumulative college GPA over time, and *d-values* by race and gender in each of the study variables. As shown in the table, the mean SAT for Whites across both samples were 1067 and 1061, compared to 926 and 944 for Blacks. For high school GPA, mean levels were similar across White and Black students. For Whites, high school GPA was 3.44 across both samples and for Blacks, high school GPA was 3.39 and 3.40. Examining gender, the mean SAT across both samples were 1081 and 1073 for men and 1015 and 1017 for women. The GPA results yielded higher overall scores for women compared to men across all GPA levels.

TABLE 2
MEAN DIFFERENCES AND *D VALUES* IN SAT, HIGH SCHOOL GPA, AND CUMULATIVE COLLEGE GPA RACE AND GENDER

Sample 1 (N=1,716)				
	SAT	HSGPA	Yr1	Yr4
Overall	1034	3.43	2.55	2.60
White	1067	3.44	2.62	2.65
Black	926	3.39	2.33	2.43
d-values$_{RACE}$	1.01	.13	.24	.26
Men	1081	3.29	2.41	2.40
Women	1015	3.49	2.61	2.68
d-values$_{GENDER}$	.47	-.50	-.23	-.33

Sample 2 (N=1,865)				
	SAT	HSGPA	Yr1	Yr4
Overall	1035	3.44	2.58	2.62
White	1061	3.44	2.61	2.65
Black	944	3.40	2.45	2.48
d-values$_{RACE}$	.87	.10	.19	.20
Men	1073	3.30	2.39	2.37
Women	1017	3.50	2.67	2.73
d-values$_{GENDER}$	.41	-.49	-.32	-.41

The *d-values* for SAT, high school GPA, and college GPA are also reported in Table 2. As shown in the table, the *d-values* were highest for SAT scores (*d*=1.01 and *d*=.87). The *d-values* were substantially lower for high school GPA with *d*=.13 and *d*=.10 across both groups. For college GPA in sample 1, the *d-values* for year one through year four were .34, .29, .28, and .26. For sample 2, the *d-values* in college GPA were .19, .20, .21, and .20 for years one through four, respectively. There were only slight differences in the two groups, with sample 2 resulting in higher SAT and cumulative GPA levels for Blacks. Additionally, there were lower mean differences between the groups across all study variables. The mean differences in college GPA did increase over time as suggested by Roth and Bobko (2000), however, the changes were relatively low (e.g., □*d*=.05 and □*d*=.01).

The ethnic group differences in college GPA observed in the current study were significantly lower than most cognitively-loaded tests used in selection (e.g., *d*=.72 for cognitive ability; Roth, Bevier, Bobko, Switzer, and Tyler, 2001) and more in line with non-cognitive predictors ranging from .04 to .31 (e.g., Hough et al., 2001; Schmitt et al., 1997). There are general rules of thumb for interpreting *d-values*, such *d*≤.25 is considered small, *d*'s of .30 to .45 are considered moderate, and *d*≥.6 is considered strong (e.g., Roth & Bobko, 2000). Thus, the *d-values* found here in cumulative GPA were small. While there are no specific guidelines for what level of *d* adverse impact would occur, the higher the *d-value* between groups on a particular assessment, the more likely adverse impact would be expected for the lower scoring group. Overall, adverse impact would be more likely to occur for Black students when SAT scores are used and less likely to occur when GPA, high school and college are used.

When examining adverse impact based on gender, adverse impact would only occur when SAT scores were used that would favor men. Given the focus on employment contexts where GPA is more likely to be used, women would fair more favorably and may actually result in adverse impact against men if GPA were used as a primary determinant in screening contexts.

DISCUSSION

The primary purpose of the current study was to examine ethnic group differences in academic performance criteria (i.e., college GPA) that are commonly used in selection contexts. The results provide an extension of prior research that has suggested that group differences exist in standardized tests (e.g., SAT and cognitive ability tests) as well as college GPA and would likely result in adverse impact against minorities in college admissions and employment settings (e.g., Roth & Bobko, 2000; Sackett, et al., 2001). In the current study, ethnic group differences did exist in all variables but were significantly lower for high school GPA and college GPA, compared to SAT. For academic outcomes, this finding is essential when considering that high school GPA was a better predictor of academic performance than SAT tests. These findings support prior research that Black-White differences are most pronounced on standardized assessments. It is not clear why these differences are greater across all forms of standardized tests, but it warrants further investigation as a potential moderator of group differences. Given the findings of Keiser and colleagues (2016), it is also important to examine the interactions of race and gender in differences that would influence employment outcomes. The *d*-statistic does not currently assess this level of interaction. Based on the findings, gender matters when examining group differences and research examining race alone would obscure important findings and differential outcomes in terms of adverse impact potential.

The findings of the current study provided some evidence that diversity and performance need not be competing goals. Specifically, group differences in college GPA were considerably lower than other cognitive assessments yet have moderate predictive validity with job performance (e.g., β=.32, e.g., Roth et al., 1996). While it has been suggested that group differences between Black and White students may be as large as *d*=.43, the results reported here were significantly lower levels of *d*. Future research is needed to examine ethnic group differences to gain a better understanding of under what conditions these differences exist. The finding of differential performance across standardized and alternative measures of the same constructs is an issue that needs more attention (e.g., Sackett et al., 2001). There is also a need to include other ethnic groups in the examination of group differences. Prior research has shown that Hispanic-White differences also exist but the findings are mixed across studies such that there is considerable variability that represents the conditions under which these differences occur (Manley & Benavidez, 2008; McKay, Avery, & Morris, 2008).

Limitations

While the current study demonstrated smaller group differences in college GPA over time, there are limitations with the current study. First, the results were based on a single source sample that may not generalize to other population of college students that would be expected in future applicant pools. To the extent that group differences are higher, the likelihood of adverse impact could vary substantially. Additional research is needed to examine whether the results of the current study are generalizable to different university environments and work settings. Second, the current study only examined group differences that would create the likelihood of adverse impact occurring that would negatively impact minorities but the data precludes one from examining *actual* adverse impact. Adverse impact research has relied heavily on simulated data to examine the likelihood rather than the occurrence in actual decision-making contexts. Future research is needed to that includes academic performance measures along with commonly used personnel selection assessments in actual decision-making outcomes.

Implications for Future Research

Whether the group differences reported here or in prior research reflect true differences in cognitive ability, motivation, or some other aspect of performance is not known. While the current study does not examine adverse impact directly, there is a substantial body of research that has demonstrated that at most levels of *d*, adverse impact would occur (see Hough et al., 2001 for a comprehensive review). Though the *d-values* in college GPA were significantly lower than other cognitive assessments (e.g., standardized cognitive ability tests), there has been considerable variability among organizational decision-makers in

how college GPA is used (Brown & Campion, 1994; McKinney, et al., 2003). Some data from prior research has shown that recruiters' use of college GPA revealed a weak relationship between GPA and screening decisions (□=.06, SD=.20; e.g., McKinney et al., 2003) in employment contexts. This study also demonstrated considerable variability in when and how recruiters use GPA data. Thus, adverse impact potential in the current study would be expected only to the extent recruiters rely on GPA when making employment decisions. There are likely subjective measures that also influence employment outcomes that have received less attention and represent a fruitful area of research.

An interesting finding in recent research is that adverse impact occurs even when *d*=0 (e.g., Roth et al., 2006). This creates a quandary for understanding the conditions adverse impact occurred when it was not expected. One area of future research is a closer examination of the context in which adverse impact occurs. Roth and colleagues (2006) found that adverse impact is more likely to occur under certain conditions: (1) small applicant pools (<200) with small minority representation in the applicant pool (<=.10) and (2) lower selection rates (<.50). These findings highlight the need to evaluate the adverse impact context beyond the group differences observed in the assessments.

The issue of maximizing workforce diversity and enhancing selection quality are fruitful areas for future research. From a review of the research, these two issues have been studied in isolation. Diversity researchers have focused on one of two areas – trait models and power/distance relationships with a predominate focus on race and gender (Konrad, 2003), while personnel selection has focused on race and gender group differences in scores in selection assessments. Only recently have researchers begun to examine these issues collectively. One example is the recent study by McKay and colleagues (2008) that examined diversity climate as a moderator of ethnic group differences in performance. Quite interestingly, they found that not only did diversity climate impact performance for all groups, Black-White differences in performance were nonsignificant yet Hispanic-White differences emerged. Diversity and selection researchers can enhance this field of study by including organizational and environmental factors that influence performance and diversity outcomes. It is hoped that in doing so, we can be more prescriptive in promoting effective strategies for diversity management to enhance the work environment for all workers (Kravitz, 2008; Ployhart & Holtz, 2008).

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