Academic achievement in first generation college students: The role of academic self-concept

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Abstract: This study examined whether verbal and math self-concepts could help explain the academic performance of first generation college students. Participants were 167 ethnically diverse students at an inner city, commuter, open-enrollment, four-year university in the southwestern United States. Results indicated that students with lower verbal and math self-concepts had lower grade point averages. Furthermore, there were ethnic differences among first generation college students in grade point average with Whites performing better than African Americans and Latinos. In addition, Asians and Latinos had higher math self-concept than African Americans. The potential for academic self-concept as an important factor in increasing the academic performance of first generation students is discussed.

Keywords: first generation college students, academic achievement, math self-concept, verbal self-concept

I. Introduction.

First generation college students—those whose parents did not graduate from college—have a more difficult time successfully completing college than other students. First generation college students receive lower grades (Chen, 2005), earn fewer academic credits (Pascarella, Wolniak, Pierson, & Terenzini, 2003), and are less likely to graduate from college (Martinez, Sher, Krull, & Wood, 2009) than students whose parents attended and graduated from college. However, a definitive reason for why first generation college students have poorer academic performance than other students has not been discovered. One hypothesis for the lower levels of achievement among first generation college students is that they have lower academic self-concepts than other students.

Self-concept can be defined as an individual's evaluation of self that is based on his or her experiences and interpretations of those experiences (e. g., I am good at math; Schunk & Pajares, 2005). Shavelson, Hubner and Stanton (1976) were among the first to assert that self-concept is both multifaceted and hierarchical. Self-concept is multifaceted "in that people categorize the vast amount of information they have about themselves and relate these categories to one another" and is hierarchically arranged "with perceptions of behavior at the base moving to inferences about self in sub areas (e.g., academic-English, science, history, math), then to inferences about self in general" (Marsh & Shavelson, 1985, p. 107).

Self-concept becomes more differentiated with age. As individuals get older, moving from childhood to adolescence and the college-aged years, they are better able to determine their strengths and weaknesses in specific areas (e.g., math, English, social skills). This study focuses on academic self-concept, specifically math and verbal self-concept. The primary goal of this study is to determine whether math and/or verbal self-concept influences the academic achievement of first generation college students.

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A. Achievement among First Generation College Students.

Numerous researchers have observed lower academic achievement among first generation college students as compared to non-first generation students (e.g., Engle, 2007; Majer, 2009; Martinez et al., 2009; Pascarella et al., 2003). To illustrate, Chen (2005) found first generation college students had lower grade point averages (GPA) than non-first generation college students. Furthermore, Martinez and colleagues (2009) found that a lower grade point average was much more likely to cause a first generation college student to drop out of college than it would other students. In other words, students who were not first generation in college were more likely to persist in the face of poor academic performance. Other researchers have found similar findings, namely that belief about one's academic abilities affects academic performance, which in turn affects persistence and retention in college (Vuong, Brown-Welty, & Tracz, 2010).

Lower academic achievement and lower rates of persistence among first generation college students may stem from a variety of sources. In general, first generation college students are less academically prepared to enter college. They often have taken fewer higher level mathematics courses while in high school (Chen, 2005). In addition, first generation college students tend to perform worse on academic placement tests (Chen, 2005; Martinez et al., 2009). However, it is important to note that first generation college students are still less likely to graduate from college, even after taking into account their academic preparation before arriving in college, their performance while in college, and various types of demographic information (Chen, 2005; Strayhorn, 2006). Other possible explanations for the lower achievement of first generation college students may lie in reduced time for studying and interacting with faculty (Engle, 2007), which may be a result of higher rates of employment while in college within this population (Chen, 2005).

B. Ethnicity and Achievement.

A number of empirical studies have demonstrated that Latinos and African Americans have lower academic achievement in college than their White peers whether or not they are first generation college students (e.g., Culpepper & Davenport, 2009; Good, Masewicz, & Vogel, 2010; Walton & Cohen, 2011). Much research on this "achievement gap" notes significant differences between the academic achievement of African Americans and Whites from pre-kindergarten (e.g., Yeung & Pfeiffer, 2009) to college (e.g., Walton & Cohen, 2011) and beyond (e.g., Taylor, 1995). While there is less research focusing on the achievement of Latino students, research also shows that Whites generally have higher academic achievement than Latinos (Good et al., 2010; Reardon & Galindo, 2009). Generally, research demonstrates that GPA does not differ between Asian and Whites students or that Asians have higher achievement than Whites (Konstantopoulos, 2009).

C. Academic Self-Concept and Academic Achievement.

Overall academic self-concept is a cognitive and affective evaluation of the self that can influence actual academic performance. Academic self-concept has generally been shown to be related to grade point average among university students (Choi, 2005; Gerardi, 2005; Lent, Brown, & Gore, 1997). Among a sample of African Americans at a historically Black college, for example, higher academic self-concept was related to higher GPA (Awad, 2007). Further, Choi found that more specific types of self-concept (self-concept for the particular course examined, e.g., mathematics) was more predictive of GPA than general academic self-

concept. A meta-analysis that included 69 data sets also found a significant relationship between math and verbal self-concept and math and verbal academic performance in the general college student population (Möller, Pohlmann, Köller, & Marsh, 2009). These findings suggest that examining verbal self-concept and math self-concept instead of general academic self-concept may be more predictive of college grade point average.

Some researchers (e.g., Caslyn & Kenny, 1977; Garg, 1992) have found that a student must first do well in school to have a high academic self-concept, while others (e.g., Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2005; Valentine, DuBois, & Cooper, 2004) support the notion that a high academic self-concept is necessary before a student can do well in school. Research evidence exists for both sides, suggesting the relationship between academic achievement and academic self-concept is probably reciprocal (Hamachek, 1995; House, 2000; Pinxten, Van Damme, & D'Haenens, 2010). Indeed, in their meta-analysis of 128 studies, Hansford and Hattie (1982) found an average correlation of .21 between various self-measures and measures of achievement and performance. Therefore self-concept likely both influences and is influenced by academic achievement.

D. The Current Study.

The purpose of this study is to further elucidate the relationship between academic self-concept and academic achievement for first generation college students, specifically to understand whether math or verbal self-concept can help explain why the academic performance of first generation college students is not similar to that of their non-first generation peers. Furthermore, it examines ethnic differences in verbal and math self-concept as well as GPA in a rarely studied population, namely students at an open enrollment, four-year institution. Identifying malleable factors, such as math and verbal self-concept that can influence the relationship between generational status and achievement is the first step in the development of interventions that can improve first generation college students' academic performance. We hypothesize that verbal and math self-concept scores will both be related to GPA for this sample of first generation college students. In addition, we hypothesize that there will be ethnic differences in verbal and math self-concept scores, as well as GPA.

II. Methods.

A. Participants.

The current study included 167 (48 African American, 86 Latino, 14 White, and 19 Asian) first generation students (see Table 1). One hundred thirty-three (79.6%) of the first generation college students were female. The mean age for the sample was 23.97 years (SD= 8.56). All participants were enrolled in courses at a 4-year public university in the southwestern United States.

B. Materials.

Demographic information. A demographic questionnaire was administered to assess participants' age, ethnicity, gender, income and self-reported grade point average. Participants reported income and grade point average as ranges coinciding with a score on a scale, not specific numbers (e.g., income of 2 = between $25,000 and $40,000). One potential limitation of this study is the fact that students reported their own grade point

averages. However, researchers (Herman, 2003; Noftle & Robins, 2007) have found college students have moderate to highly reliable ratings of self-reported grade point average.

*Self-concept***.** The Self Description Questionnaire III (SDQ-III) was designed to measure the self-concepts of late adolescents and young adults, and was created in response to a need for high quality measurement instruments with a strong theoretical basis that provide support for the multidimensionality of self-concept (Marsh, 1989). The SDQ-III is based on the Shavelson model of self-concept, which supports the notion that self-concept is both multifaceted and hierarchical (Shavelson, Hubner, & Stanton, 1976). The SDQ-III contains 136 items and measures 13 facets of self-concept (Marsh & O'Neill, 1984). Each facet is measured by 10 to 12 items, with responses ranging from 1 (*definitely false*) to 8 (*definitely true*). Half of the items are negatively worded (Marsh, 1989). Scores reported in this study are percentiles calculating from a norming sample of 2,436 respondents (Marsh, 1989). The SDQ-III assesses four areas of academic self-concept (math, verbal, general academic, and problem solving), eight areas of nonacademic self-concept (physical ability, physical appearance, relations with the same sex, relations with the opposite sex, relations with parents, spiritual values/religion, honesty/trustworthiness, and emotional stability), and general self-concept. For the purposes of this study, we only used data from the math self-concept subscale and from the verbal self-concept subscale. Sample items from the math self-concept subscale include, "I have hesitated to take courses that involve mathematics", "I have generally done better in mathematics courses than other courses", and "I am quite good at mathematics." Sample items from the verbal self-concept subscale include, "In school I had more trouble learning to read than most other students", "Relative to most people, my verbal skills are quite good", and "I can write effectively."

Marsh (1989) provides strong psychometric support for the SDQ-III, including scores of reliability, correlations with external criteria, and self-other agreement. Scores of internal consistency range from $\alpha = .74$ to $\alpha = .95$ for the subscales of the SDQ-III. Studies of discriminant validity are extensive. For example, the relationship between one's math self-concept score and math achievement score has been noted as $r = .58$, $p < .01$ and the relationship between one's verbal self-concept score and English achievement score has been noted as $r = .42$, $p < .01$ (Marsh & O'Neill, 1984). For this sample, both math ($\alpha = .94$) and verbal ($\alpha = .84$) self- concept scores were reliable.

C. Procedure.

Institutional Review Board approval was given for the study prior to data collection. Participants were recruited through introductory and upper level psychology courses that offered extra credit for participation in research studies. Invitation to participate in this study was posted on a psychology study board website and students volunteered to become participants, thus resulting in a convenience sample. At the beginning of study participation, participants were asked to sign an informed consent form and then complete the various questionnaires.

III. Results.

Means, standard deviations and correlations of the variables of interest are included in Table 1. Percentile scores for verbal and math self-concept are in the average range indicating that the sample did not have abnormally high or low self-concept scores. Correlations were calculated to analyze basic relations among study variables. Verbal self-concept and grade

point average were correlated ($r = .25$, $p < .01$), indicating that those with higher verbal self-concept scores had higher grade point averages.

Table 1. Means, standard deviations, and correlation table of main study variables

Variable	M	SD	1	2	3	4
1. SES	2.02	.83	--	-.08	-.09	.04
2.Verb. SC	51.18	30.28		--	-.03	.25*
3.Math SC	33.67	27.18			--	.14
4.GPA	5.05	1.29			.	--

* $p < .01$, *Note.* SES of 2.02 = between \$25,000 -\$40,000 per year; GPA of 5.05 = GPA between 2.51 and 3.0.

Hierarchical linear regression analyses were conducted to determine whether verbal and math self-concept scores predicted GPA (see Table 2). In the first step, socioeconomic status and ethnicity were included due to previous research findings that suggest their relation to academic achievement (Leventhal & Brooks-Gunn, 2000). Of these two only ethnicity was a significant predictor of GPA, $F (2, 156) = 4.57$, $p < .05$. In the second step, verbal and math self-concept were examined as a predictor of grade point average. The results indicated those who had higher verbal and math self-concept were likely to have higher GPAs, $F (2, 154) = 5.85$, $p < .01$.

Table 2. Hierarchical regression summary for ethnicity, verbal and math self-concept predicting GPA

Variable	B	SEB	β	R^2	ΔR^2
Step 1				.06*	
SES	.02	.13	.01		
Ethnicity	-.31	.11	-.23**		
Step 2				.12**	.07**
SES	.06	.12	.04		
Ethnicity	-.29	.10	-.22**		
Verbal SC	.01	.003	.22**		
Math SC	.01	.004	.15*		

Note. *$p < .01$, ** $p \leq .001$

To better understand the impact of ethnicity on achievement and academic self-concept for first generation students, additional analyses using a univariate analysis of variance (ANOVA) and multivariate analysis of variance (MANOVA) were completed. First, ethnic differences in GPA were analyzed and demonstrated significant variability in GPA due to ethnicity using ANOVA, $F (3, 160) = 3.54$, $p < .05$. Post hoc examination using Hochberg's GT2 due to the unequal ethnic group sizes demonstrated that Whites had higher GPAs (M = 6.07, SD = .73) than African Americans (M = 4.98, SD = 1.34) and Latinos (M = 4.87, SD = 1.31). The effect size was $r = .25$. No other ethnic differences were significant. In addition, the relations between ethnicity and verbal and math self-concept scores were examined using MANOVA. Box's test of equality of covariance was not significant, Box's M = 14.05, $F(9, 160) = 1.50$, $p = .141$, suggesting that the assumption of homogeneity of variance had been met. Further analysis of homogeneity was examined with Levene's test of equality. Verbal self-concept did not violate the assumption of homogeneity of variance, therefore Pillai's Trace, which is robust when sample sizes are unequal, was used to further

examine the relations between verbal self-concept and ethnicity. There was a significant effect of ethnicity on verbal self-concept, $F(3, 163) = 3.77$, $p < .05$, partial eta squared =.06. Post hoc analysis using Hochberg's GT2 to examine the data revealed no significant differences in verbal self-concept scores based on ethnicity.

When examining math self-concept, Levene's test of equality was significant, $F(3, 163) = 5.022$, $p < .01$, suggesting that the assumption of variance was violated for math self-concept, for that reason, further analyses with math self-concept were conducted using Kruskal-Wallis. The overall Krusall-Wallis score was significant, H = 11.93, $p < .01$ suggesting ethnic differences in math self-concept scores. Further exploration was conducted using Mann-Whitney with a Bonferonni correction so that significance would be indicated for $p < .008$. Both Asians, U = 220, z = -3.29, $p < .001$, M= 43.51, SD =23.20 and Latinos, U = 1443, z = -2.88, $p = .004$, M = 36.90, SD = 29.12 had higher math self-concept scores than African Americans (M = 28.78, SD = 25.16). Whites' math self-concept scores (M = 32.36, SD= 28.04) did not significantly differ from the other ethnic groups' scores.

IV. Discussion.

This study demonstrated that higher verbal and math self-concept scores are related to better academic achievement for this ethnically diverse sample of first generation college students. This study shows that factors like having little confidence in one's abilities such as writing effectively, comprehending well when reading, or solving math problems are related to lower academic performance. Perhaps focusing on improving one's beliefs about these abilities would also lead to improved achievement in college.

As found in other research (e.g., Masewicz & Vogel, 2010), Whites have higher GPAs than African Americans and Latinos, even among a first generation college student sample where the achievement gap is still an issue. When examining ethnic differences in verbal self-concept scores, no clear ethnic differences could be found, however there were differences with regard to math self-concept scores. Asians and Latinos were found to have higher math self-concept scores than African Americans. Whites' math self-concept scores did not differ from other ethnic groups and were only higher, though not significantly higher than African Americans scores. Past studies have shown that African American students are less likely than White and Asian students to have access to advanced math and science courses while in high school (May & Chubin, 2003; Tyson, Lee, Borman, & Hanson, 2007), so it is not surprising that African American first generation college students have lower perceptions of their math self-concepts than Asians but surprising were the lack of difference between African Americans and Whites as well as the presence of significant difference between African Americans and Latinos. Future research should be conducted to examine these relationships further in first generation college students as it appears that their math self-concepts differs from the general college population.

The findings in this study indicate that first generation college students who have high verbal and math self-concept scores are also likely to have higher academic achievement. University personnel can use this information to assist first generation students in being more successful in their academic endeavors. Gerardi (2005) suggests that positive academic self-concept may be particularly important for overcoming the poorer academic preparation of minority, lower SES populations such as the one in this study. If we know that higher verbal and/or math self-concept is related to academic achievement, then interventions can be utilized to focus on these factors. There are a number of interventions that can be conducted in order to improve the academic self-concepts of first generation college students. Positive interaction between faculty and students is related to higher self-concept (Cokley, 2000;

Cokley et al., 2004). Specific interventions could include faculty calling students by name, personally inviting students to their office hours, having lunch/coffee with individual or small groups of students, and noting signs of improvement in performance or effort by students. Furthermore, if faculty members arrive just 5 to 10 minutes earlier for class, they will have time to greet individual students and ask questions such as how they are feeling about the course material or if they have any concerns about the class. Osborne and Jones (2011) note other interventions that can be used by faculty and administrators to assist in the development of academic self-concept. They discuss a variety of ways to improve academic self-concept including: 1) empowering students by allowing them to have some control in the academics such as giving them choices in selecting readings or assignments; 2) demonstrating how the material is relevant to real life which engenders interest; 3) giving constructive and individualized feedback; and 4) developing a sense of community and caring in the academic space. Many of these interventions can easily be worked into how classes are taught and how faculty members interact with their students.

Because first generation college students are most at risk as they are transitioning into college (Engle, 2007), it is necessary to begin intervention as soon as they begin college. A low grade point average has a much more negative impact on first generation students than other students, such that they are more likely to drop out of college without a degree when performing poorly (Martinez et al., 2009). This suggests that first generation students must experience academic success early in their college careers in order to graduate. Interventions for first generation college students during high school and throughout college that challenge them in academic courses while also facilitating academic success and building in encouragement would work to improve verbal and math self-concept, which would in turn, create greater success in college (Osborne & Jones, 2011).

V. Directions for Future Research and Conclusion.

It is important to note that the students of this sample attended an ethnically diverse university and many are first generation college students who are also likely to have learned English as a second language. The uniqueness of this sample may account for the lack of significant findings when examining verbal self-concept. Researchers should specifically examine the impact of verbal self-concept for those who are native English speakers and those who have learned English as a second language separately to determine whether there are distinct differences in the relationships. Furthermore, we were unable to examine gender as a moderator of the relationship between math and verbal self-concepts and first generation status due to the low number of males among the participants. Examining gender in the future would be useful due to the fact that math and verbal self-concepts often vary by gender (Furnham, 2001; Heller & Ziegler, 1996; Marsh &Yeung, 1998; Steinmayr & Spinathm, 2009). It is important to note that there are a variety of reasons other than academic self-concept that may make successful academic achievement less likely, including such factors as inadequate high school preparation; however belief in oneself as being academically able is a valid intervention target that can be obtained with small efforts on the part of faculty.

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