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# Cognitive and Non-Cognitive Factors

## Affecting the Academic Performance and Retention of Conditionally Admitted Freshmen

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**Abstract**

**The purpose of this study is to determine the extent to which cognitive and non-cognitive measures predict academic success for conditionally-admitted students enrolled in a comprehensive public university. Stepwise multiple regression analyses reveal that one cognitive variable (high school grade point average) and two non-cognitive measures (realistic self-appraisal and understanding and coping with racism) are the three best predictors of first semester grade point average (GPA) for conditionally-admitted freshmen students. Practical implications for admission counselors are revealed in the findings.**

The academic success and retention of students, particularly during their first year, are major concerns for colleges and universities (Noble and Sawyer, 1987; Ting, 2001; Sander, Pike and Saupe, 2002). Stakeholders are increasingly attentive to the academic success of students as a measure of the effectiveness of higher education. This, in addition to the inclusion of underprepared students (e.g., the conditional admit or the special admit) to the pool of incoming freshmen by many colleges and universities, has intensified the retention concerns of college and university administrators and researchers. (Pascarella & Terenzini, 1991: Mclaughlin, 2006).

These concerns continue to challenge researchers exploring student characteristics that contribute to academic success. According to recent studies, the leading contributing factors to students' academic success include cognitive measures such as high school class rank (Noble and Sawyer, 1987; Hood, 2000) high school GPA (McLaughlin, 2006), and standardized test scores (Adebayo, 1993; Noble & Sawyer, 2002; Pascarella et al., 1981).

Although cognitive measures such as high school grades, class rank and standardized test scores have been found to predict academic success of regular admit students (i.e., students who meet admission requirements), our understanding of how these measures can accurately predict the academic success of students with lower college entrance examination scores, lower high school percentile ranks, and lower GPAs remains unclear. Can measures that predict academic success and retention of regular admit students precisely predict academic success of conditional admit students? This study sought to increase understanding in this area using multiple regression analyses.

## Predicting Academic Success

There is extensive research on student academic success and persistence, especially among freshmen (Tinto, 1975; 1993; Pike & Saupe, 2002; McLaughlin, 2006; Tracey & Sedlacek, 1989). According to Tinto's (1993) conceptual framework, academic performance and persistence are impacted by student characteristics that are measured by levels of academic preparation in high school and college admission test scores. This assumption may explain why the College Admission Index is based, for the most part, on cognitive measures. The results of some studies (e.g., McLaughlin, 2006; White & Sedlacek, 1986; Tracey & Sedlacek, 1989; Boyer & Sedlacek, 1988) have confirmed that cognitive variables, such as high school GPA, high school percentile rank and college admission test scores, predict the academic success of college students.

Refined studies assessing the impact of admission test scores and academic performance in high school on college students' academic performance at the end of the freshman year have found admission test scores to be a reliable predictor of first-year GPA (Pascarella et al, 1981; Bean & Bradley, 1986). House and Keeley (1997) also found composite scores on standardized tests, such as the American College Testing (ACT), were a reliable predictor of college success for Native-American students. Rodriquez (1996) found similar results for Mexican-American students. Since most research endeavors have used cognitive variables to predict the academic success of traditional students, this study would go beyond the data if it were to generalize the results of those studies to the academically high-risk student population, especially the special/conditional admit students.

Various studies differing in focus, design, sampling procedures and measurement techniques have explored cognitive variables that affect the academic performance and retention of academically high-risk students: first generation (Riehl, 1994; Ting, 1998); specially admitted (Houston 1980; Sedlacek, 1991); disadvantaged/low income (Ting, 1997; Boyers & Sedlacek, 1988); and ethnic minorities (Tracey & Sedlacek; 1984, Trippi & Steward, 1988; Hood, 1992). Overall, these studies have generated contradictory results. Hood (1992), for example, found that the ACT composite score was not a significant predictor of academic success among 409 African-American students. His study found

high school percentile rank to be the best cognitive predictor among his sample. In his study of 54 first-generation and low- income students in a Midwestern public university, Ting (1998) also found that the ACT composite score was not a significant predictor of academic success as measured by students' GPA in the first semester.

Because the results of studies assessing the impact of cognitive variables on the academic performance of freshmen have found mixed results (Houston, 1980; Riehl, 1994; Ting, 1998; 1998; Hood, 1992), there is a growing concern that cognitive variables alone cannot adequately predict the academic success of underprepared freshmen (e.g., Arbona & Novy, 1990; Hood, 2000; Ting, 2001; Pike and Saupe, 2002). Many studies have confirmed that a combination of cognitive and non-cognitive measures, such as School Aptitute Test scores and psychosocial variables, better predict first-year grades of at-risk students than cognitive measures alone (Ting, 1998; Hood, 1992; Pascarella and Terenzni, 1991; Sedlacek, 1991). In his 1992 study, Hood also explored the extent to which cognitive and non-cognitive variables predict first-semester GPA of African-American male students. He found that successful leadership experience and demonstrated community service were stronger predictors of academic success, which are consistent with findings by Sedlacek (1986) and Ting (1998).

Ting (1998) used the Non-Cognitive Questionnaire (NCQ),a psychosocial instrument designed to predict the academic performance and retention of college entrants, and ACT composite scores to predict the academic performance of under-prepared students and found that both cognitive and psychosocial measures were important in predicting the academic performance of first-generation and low-income freshmen. His study found successful leadership experience and demonstrated community service to be the best predictors of GPA for first-generation and low-income students. Sting found that two non-cognitive variables—successful leadership experience and demonstrated community services—were stronger predictors of second semester GPA than cognitive variables. He further concluded that cognitive variables were stronger predictors of first-semester GPA than non-cognitive.

In their studies, Trippi and Steward, 1988; Fuertes, Sedlacek and Liu, 1994, found that self-concept and self-appraisal were the best predictors of academic success for both European-American and African-American students. In another study, Tracey and Sedlacek (1989) found two non-cognitive variables, community service and realistic self-appraisal, to be the best predictors of academic success for Asian Americans.

Although cognitive measures such as high school grades, class rank and standardized test scores have been found to predict academic success of regular admit students (i.e., students who meet admission requirements), our understanding of how these measures can accurately predict the academic success of students with lower college entrance examination scores, lower high school percentile ranks, and lower GPAs remains unclear. Can measures that predict academic success and retention of regular admit students precisely predict academic success of conditional admit students?

Based on the past studies, two research questions formed the basis for this study: (1) Does the level of student preparation in high school as measured by high school percentile rank, college admission test scores and high school GPA predict the academic success (i.e., GPA) of conditionally-admitted students during their first semester? (2) Are non-cognitive variables better predictors of academic success of conditionally-admitted students than cognitive variables? In the current study, a combination of cognitive and non-cognitive variables were used to predict the first-semester cumulative GPA of students admitted to a public comprehensive university in the Midwest in fall 2006 via the conditional admit route.

**Conditional Admission Program**

The university which serves as a setting for this study started its conditional admission program in fall 2004. Furthermore, the institution requires that admitted students have completed 16 units of state-approved college preparatory curriculum consisting of four units of English with an emphasis on writing skills, three units of mathematics and social sciences, two units of science (one must be a laboratory course in biology, physics or chemistry), one unit of visual/performing arts, and three units of electives.

Applicants must score 21 or higher on the ACT (or SAT equivalent) and have an admission index score of at least 100. The index score uses high school percentile rank, class size and the national percentile rank of the ACT score to calculate an applicant's Combined Percentile Index. The institution's Conditional Admission Program is designed for students who do not meet the above regular admission standards to the university but based on their performance on standardized tests or high school GPA, may be admitted on a conditional basis. Students admitted to the Conditional Admit Program must sign a learning contract. Students with a first semester GPA of 2.5 or greater are removed from academic probation and are fully admitted, while those with a first semester GPA of 2.0-2.49 continue to participate in the program during the spring semester. Students with a first semester GPA of less than 2.0 are suspended from the university.

Approximately 2,601 freshmen were enrolled at the university in fall 2006 when the study was conducted. The average ACT composite score of incoming regularly admitted freshmen was 22.63, and their mean cumulative high school GPA was 3.1. Almost nine out of 10 freshmen (69 percent) graduated from in-state high schools. Eighty percent of incoming freshmen picked the university as their first choice.

## Methods

### Participants

In fall 2006, as part of the campus-wide student retention initiatives, the Office of Admissions administered the NCQ to all conditional admit applicants for the first time. This study consisted of a sample of 147 freshmen admitted in fall 2006 through the Conditional Admissions Program.

Completed data were obtained for 143 individuals. Sixty-one percent of the participants were females. Seventy-eight percent were white. African–American students accounted for 11 percent. As Table 1 shows, participants had an overall average ACT composite score of 18, and an overall high school percentile rank of 79.0. The average high school GPA of the cohort was 2.16. The mean cumulative high school GPA of the subjects was 2.78. Sixty-five percent of the group earned a cumulative GPA of 2.0 or higher at the end of their first semester. The mean scores of participants on each of the non-cognitive variables are shown in Table 1.

While conditional admit students differ in background characteristics from the regular admit students, it is important to note that their retention rates also differ from those of regular admit students. Table 2 compares the fall-to-spring semester retention rates of regular admit and conditional admit students from fall 2004 to fall 2006. Overall, fall-to-spring retention rates are higher among regular admit students than conditional admit students.

**Table 1. Means and Standard Deviations of Criterion and Predictor Variables**

| Variables | Mean | SD | Range |
|---|---|---|---|
| Cognitive Variables | | | |
| GPA (first-semester) | 2.16 | 0.94 | 0-4 |
| High school class rank | 79.00 | 11.50 | 0-100 |
| ACT (composite) | 18.00 | 1.39 | 0-36 |
| High school GPA | 2.78 | 0.37 | 0-4 |
| Non-cognitive Variables | | | |
| Realistic self-appraisal | 9.90 | 1.80 | 4-14 |
| Understanding and coping with racism | 17.5 | 2.13 | 15-25 |
| Preference for long range goals | 8.63 | 1.50 | 3-13 |
| Positive self concept | 18.90 | 2.31 | 17-27 |
| Availability of a strong support person | 13.50 | 1.75 | 3-15 |
| Successful leadership experience | 9.11 | 1.57 | 3-13 |
| Demonstrated community service | 5.50 | 1.45 | 2-8 |
| Acquired knowledge in a field | 4.50 | 0.74 | 2-8 |

**Table 2. Fall-to-Spring Retention Rates of Conditional and Regular Admit Students (Fall 2004-Fall 2006)**

| | Regular Admits | | Conditional Admits | |
|---|---|---|---|---|
| | N | Spring Returns | N | Spring Returns |
| Fall 2004 | 1287 | 88% | 149 | 75% |
| Fall 2005 | 1324 | 86% | 161 | 74% |
| Fall 2006 | 1371 | 88% | 136 | 73% |

## Instrument

Data for this study were obtained from responses to the NCQ (Tracey and Sedlacek, 1984). Previous research (Tracey and Sedlacek, 1984; 1989) validate the reliability and internal consistency of the NCQ in measuring the eight non-cognitive dimensions listed previously. The instrument uses eight psychological variables claimed to explain academic success of college students (Sedlacek 1991; Tracey and Sedlacek, 1989; Ting, 1998 ). The eight non-cognitive variables included in the NCQ are:

1. **Positive Self Concept:** Students who have a positive self-concept and know their strength and weaknesses.

2. **Realistic Self-Appraisal:** Students can reflect from a realist self-appraisal system to modify their behavior.

**Table 3. Correlation Matrix for Dependent and Independent Variables**

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Cumulative GPA | - | -17 | .36** | .21* | -.08 | .18 | -.12 | .07 | .08 | .39 | -.06 | .11 |
| 2 | ACT-composite | | - | - .57** | 0.1 | .23** | .08 | -.04 | -.09 | .11 | -09 | .11 | .01 |
| 3 | High school GPA | | | - | .40** | .26** | -.05 | -.06 | .09 | .01 | .05 | -.02 | .14 |
| 4 | High school class rank | | | | - | -.02 | .00 | .04 | .13 | .03 | .08 | .09 | .07 |
| 5 | Positive self-concept | | | | | - | .47** | .19* | .25** | .19* | .15 | .06 | .10 |
| 6 | Realistic self-appraisal | | | | | | - | .35** | .27** | .05 | .13 | .08 | .04 |
| 7 | Dealing with racism | | | | | | | - | .20* | .19* | 13 | .08 | -0 |
| 8 | Long range goals | | | | | | | | - | .09 | .15 | .21* | .03 |
| 9 | A strong support person | | | | | | | | | - | .01 | .01 | .03 |
| 10 | Leadership experience | | | | | | | | | | - | -.06 | .15 |
| 11 | Community services | | | | | | | | | | | - | -.03 |
| 12 | Acquired knowledge in a field | | | | | | | | | | | | - |
| *Correlation is significant at the 0.01 level (2-tailed) | | | | | | | | | | | | | |
| **Correlation is significant at the 0.00 level (2-tailed) | | | | | | | | | | | | | |

3. **Understanding and Coping with Racism:** Students understand their positions in the multicultural society and are capable of coping with racism.

4. **Preference for Long Range Goals:** Students prefer long-range goals to short term/immediate needs.

5. **Availability of a Strong Support Person:** Students have identified and received assistance from a strong person when they need help.

6. **Successful Leadership Experience:** Students have successful leadership experience in extracurricular activities.

7. **Demonstrated Community Service:** Students are engaged in services and identify with a cultural, racial or geographical group.

8. **Acquired Knowledge in a Field:** Students are familiar with information and knowledge to learn in a field and have developed unusual and/or culturally related ways to learn in a given subject or field.

## Data Analyses

Data analyses were carried out using SPSS, a widely-used software program for statistical analysis. Two kinds of analyses were employed in this study: (1) Pearson correlation coefficient among independent and dependent variables were examined, and (2) stepwise multiple regression analyses were carried out to determine which independent variables are better predictors of the dependent variable.

## Results

Table 3 displays the correlation matrix for the cognitive and non-cognitive variables. Inspection of the intercorrelations among cognitive variables as measured by high school GPA, ACT composite scores, and high school class ranks reveals, as expected, some positive and significant relationships.

The correlation matrix shows a fairly positive correlation coefficient between high school GPA and class rank (r = .40) for the cohort, indicating that as high school GPA increases in value, so does class rank. Table 3 also shows a statistically significant negative correlation coefficient (r = -.57) for the association between ACT composite score and high school GPA, i.e, the values of one variable decreases as the other increases. The negative correlation between ACT composite score and high school GPA reveals that an applicant with a high GPA and low ACT score is accepted into the conditional admit program. Also, an applicant with a high ACT composite score and low GPA is accepted into the program. Also noteworthy is the fairly positive correlation (r = .36) between first semester GPA attainment of conditionally admitted freshmen and their high school GPA.

Although the relationship is fairly weak, one non-cognitive variable, realistic self appraisal, has a statistically significant correlation (p = .000) with first semester GPA of conditionally admitted students (r =. 18). These findings are consistent with some earlier studies conducted among at-risk

college students (Tracey & Sedlacek, 1989; Houston, 1980). Positive self concept is negatively correlated to high school GPA (r = . 26).

It is interesting to note the weak positive correlation (r = .10) between high school class rank and ACT composite score among conditional admit students. While these findings are contradictory to some of the earlier empirical studies conducted among regular admit students, it is important to note that these two variables are often used by the university to form a selection index. The fact that high school percentile rank is dependent on the quality of the student's high school may explain the weak association between ACT composite scores and high school class rank among the study population.

Perhaps equally important are the non-cognitive variables that are significantly correlated to each other. For example, positive self-concept (i.e., know one's strength and weaknesses) is fairly correlated with realistic self-appraisal (r = .47). This relationship is statistically significant (p = .000). Not surprisingly, realistic self-appraisal is also fairly correlated with understanding and dealing with racism (r = . 35), and realistic self-appraisal is statistically correlated with preference for long range goals (r = .27), suggesting that conditional admit students who can modify their behavior are more likely to prefer long-range goals to short-term/immediate needs.

## Regression Results

As Table 4 reveals, one cognitive variable (high school GPA) and two non-cognitive measures (realistic self-appraisal and understanding and coping with racism) are the best predictors of academic success of conditionally admitted students during their first semester. It is evident that high school GPA, which accounted for 14 percent of the variance in the first semester GPA of the cohort, is a stronger predictor of first semester GPA of conditionally admitted students. The data depict that the combination of a cognitive variable (high school GPA) and a non-cognitive variable (realistic self-appraisal) were better predictors of first semester GPA of conditionally admitted freshmen than high school GPA alone. The combination of both variables accounted for 17 percent compared to the 14 percent contributed by high school GPA to the variance in the prediction of first semester GPA of the subjects. A combination of the three best predictor variables —high school GPA, realistic self-appraisal and understanding and coping with racism contributed the largest portion of the explained variance (21 percent) for student GPA at the end of the first semester.

**Table 4. Predictors of First-Semester Grade Point Average of Conditionally Admitted Students**

| Predictors | R | R Square | Beta |
|---|---|---|---|
| High school GPA[a] | .37 | .14 | .29 |
| Realistic self-appraisal[b] | .42 | .17 | .30 |
| Understanding and coping with racism[c] | .46 | .21 | -.23 |

[a.] Predictor: (Constant), High school GPA. [b.] Predictors: (Constant), High school GPA and realistic self-appraisal. [c.] Predictors: (Constant): High School GPA, realistic self-appraisal and understanding and coping with racism.

## Discussion

The goal of this study was to better understand the cognitive and non-cognitive variables that predict academic success of conditionally-admitted students at the end of their first semester. The study found that not all cognitive variables influence academic performance of at-risk students. Through regression analyses it was concluded that high school GPA was a significant predictor of first-semester GPA of conditionally-admitted students. These findings suggest that high school GPA of conditional-admit applicants should carry more weight than class percentile rank and ACT composite scores in the formation of a selection index for at-risk freshmen. The addition of two non-cognitive variables (realistic self-appraisal and understanding and coping with racism) results in a noteworthy gain in explained variance, suggesting that students' realistic appraisal and ability to understand and deal with racism influence their academic success during the first semester.

Based on the results of this study, it is recommended that a new admission selection index be developed for at-risk applicants—one based on an applicant's high school GPA, self perceived realistic self-appraisal, and understanding and coping with racism. Providing special support services focusing on enhancing realistic self-appraisal of conditional/special admit students may increase their academic success, especially during the first semester.

This study has revealed a statistically significant correlation between realistic self-appraisal and ability to understand and cope with racism (r = .36). Orientation programs and freshman seminars for at-risk students may be tailored to develop students' realistic self appraisal. Incorporating the appreciation of cultural diversity into the student success courses may be particularly beneficial for at-risk ethnic minority students. Developing an atmosphere in which at-risk students can succeed is also the task of

faculty. Faculty may design their instructional activities with a strong emphasis on enhancing students realistic self-appraisal and other non-cognitive attributes

### Limitations

While this study has a broad range of policy implications, it is important to underscore its limitations. First, the study is limited to only one cohort of conditionally-admitted students in a single year. Therefore, caution must be taken in generalizing these results to lower ability students at other comprehensive universities. Secondly, it remains unclear if cognitive variables are better predictors of students' GPA in the second semester than in the first.

The results of this study should assist admission counselors in making the most constructive and reasonable admission decisions for the growing number of at-risk students who are yearning to go to college. The conclusion from this study is that admission counselors cannot rely exclusively on cognitive variables for predicting academic success of at-risk students. Future research is needed to further examine how programs that are already in place in many colleges and universities (e.g., freshman seminars, mentoring programs, diversity programs and faculty didactic initiatives) could be modified to enhance psychosocial attributes that complement cognitive elements in our understanding of academic success and retention of at-risk college students.

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