THE DEVELOPMENT OF A BIOGRAPHICAL INVENTORY FOR USE IN THE PREDICTION OF FIRST-YEAR COLLEGE SUCCESS

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ABSTRACT

This study utilized an originally developed biographical inventory, the Behavioral Indicators of Future Performance (BIFP), to establish valid non-cognitive variables predictive of initial college success. The BIFP was administered in 2005 to college freshmen entering their first semester and included a final sample of 393 men and 295 women. Each of 308 variables on the BIFP was assessed for its relationship to college success, defined as a 3.0 Grade Point Average, in both developmental and cross-validation samples. Thirty-seven variables were significantly correlated with college success. When used together, these 37 variables were more highly correlated with first semester GPA than the SAT. Findings can ultimately be used to increase the predictive validity of the college selection process.

INTRODUCTION

What makes a successful person? Vince Lombardi observed, "The difference between a successful person and others is not a lack of strength, not a lack of knowledge, but rather in a lack of will" (The Official Site of Vince Lombardi, n.d.). He recognized, as do so many of us, that motivation may be the most important factor in determining success. In the field of research, however, motivation and biographical factors conceptually related to success cannot be directly measured and are difficult to manipulate as variables. Therefore, a limited number of studies have successfully linked such factors to success in specific areas. In the educational environment, a student's motivation, success orientation, and network of support can surpass the importance of writing and reading skills. However, colleges and universities do not currently acknowledge such factors in their selection process, which is intended to choose students most likely to succeed at their school. Most colleges and universities limit their admission decisions to the traditional *cognitive* predictors of academic success, usually high school grade point average (GPA), scores on standardized tests such as the SAT, and high school rank (Aiken, 1964). The purpose of this study is to identify *non-cognitive* predictors of college success by researching biographical information, and its relationship to students' performance in their first semester of college. The findings of this research can ultimately increase the predictive ability and fairness of admission decisions in colleges and universities.

Although traditional cognitive measurements can predict college success to some degree, problems remain with each. For example, many colleges use high school GPA as a primary predictor of future academic success. While this may appear logical under the assumption that past academic performance is the best predictor of future academic performance, this assumption is flawed because high school GPAs are not nationally standardized. Students may attend a high school that is more challenging than others, and a qualified student who graduated from a top-ranked high school could be rejected because of a GPA lower than that of other applicants who graduated from a less rigorous high school. An additional problem is that high schools use varying scales to measure GPA, with some schools choosing to assign additional weight to honors and advanced placement courses, and others choosing not to weight these courses or weigh them differently.

A problem with the use of high school rank in college selection is that many high schools do not rank, resulting in missing data for such applicants. In addition, because some high schools are more

competitive than others, it is more difficult for a student to obtain higher rankings at a more competitive high school. As a result, this variable is biased against those students graduating from more competitive high schools. It can be argued that this bias punishes students for challenging themselves (in attending a more competitive high school), a message that those who work in higher education would almost certainly disagree with as a matter of principle.

Standardized tests such as the SAT also have many problems as predictor variables. Studies have shown the SAT to be culturally and statistically biased against minorities and other non-traditional students (those not from upper to middle socio-economic backgrounds) (Freedle, 2002). The test also accounts for only a small portion, 15 percent, of what it is intended to predict, first year college GPA (Lemann, 1999). Taken together, the traditional cognitive variables explain only 25 percent of variation in first-year success. To continue to use these methods in college selection when we know of their shortcomings encourages neglect and denial of the motivational and biographical factors associated with success.

One possible tool that may fill the void left by current measures is the use of biographical data (biodata) in the selection process. It is believed that one can use past performance to predict future performance using biodata, past biographical accounts of experiences and events (Gunter, Furnham, and Drakely, 1993). Biographical inventories are surveys that assess an individual's biographical history, as well as considering that person's attitudes, expectations, and preferences. When used in selection, biographical inventories have been shown to be less biased against minority groups than cognitive ability tests (Beasely and Sease, 1974). Using this type of survey or questionnaire to evaluate college applicants would encourage a more fair and accurate selection process.

A number of studies have shown that several variables other than academic characteristics are associated with success in college. Larose, Robertson, Roy, and Legault (1998) argue that the frequency and quality of the interactions between students and their faculty are related to higher levels of college success. Other variables related to college success are the ability to adapt to the college environment, personal motivation, and students' relationships with their peers (Larose et al., 1998). In addition to these findings, Aiken (1964) suggests that students who withdraw from classes are less motivated to achieve than students who do not withdraw.

A study conducted by Naumann, Bendalos, and Gutkin (2003) at Midwestern University implies that first-generation college students rely more heavily on motivational factors in order to succeed than do second-generation students. These results were not surprising given "first-generation students did not typically have the same sources of support throughout their educational careers as did second-generation students" (Naumann, Bendalos, and Gutkin, 2003, p. 8).

The study conducted by Larose et al. (1998) found that behavioral scales, based on nonintellectual learning dispositions, were actually better predictors of college success (measured by GPA) than were the SAT and high school rank. Additionally, within ethnic minority populations, correlations between biographical inventories and GPA have been higher than the correlations obtained by the SAT (Beasley and Sease, 1974).

It is clear that non-cognitive variables play a role in college success, and these variables can be measured with biographical inventories. Thus, in order to discover several different non-cognitive predictors of college success and build on past research, a biographical inventory was developed to assess college freshmen at a four-year liberal arts college, The College of New Jersey (TCNJ). The biographical inventory was generated by Kirnan, Tsui, and Stephens (2006), and is called the Behavioral Indicators of Future Performance (BIFP). The BIFP was developed using multiple sources of information: an intensive examination of past studies and other relevant literature was performed; interviews were conducted with 15 college students (4 juniors, 4 seniors, 6 sophomores, and one recent graduate) as well as 13 subject matter experts who averaged 16 years of working in higher education (Kirnan, Tsui, and Stephens, 2006); and notes were recorded for each interview and later analyzed for common themes. Themes extracted included time management, personal characteristics, distractions, maturity, level of support, realistic expectations, goal setting, responsibility, and writing ability.

The research team[1] then created an eight-page draft of the BIFP survey composed of 45 items, which were created based on the extracted themes and grouped into eight variable categories: (1)

Expectations, the extent to which the student has a realistic view of what the first year of college will demand; (2) Academic Preparedness, the extent to which the student has acquired academic skills needed for college; (3) Technological Savvy, technological skills and knowledge of the student; (4) Independence, the ability for the student to be self-reliant; (5) Distractions, factors unrelated to college work that interfere with academic success; (6) Ease of Adjustment, extent to which the student can adapt to a new environment and is open to new experiences, also including the available social support of the individual; (7) Personal Habits, the extent to which the student has displayed a good work ethic in school and/or in employment; and (8) Success Orientation, the extent to which the student has a desire to succeed (Kirnan, Tsui, and Stephens, 2006).

Once the draft of the BIFP was completed, it was assessed by two focus groups consisting of 12 freshmen at TCNJ, 4 male, 8 female; 7 Caucasian, 5 of an ethnic minority. They completed the BIFP and wrote down any comments or questions they had. Two facilitators then led a discussion with each group in which participants were asked for feedback on items. Based on the focus group proceedings, changes and revisions were made when necessary (Kirnan et al., 2006).

The purpose of the current research is to analyze each item of the BIFP for its ability to predict college success using a correlational method. Each item will be retained, reworded, or eliminated from the BIFP depending on its ability to predict success. A total biodata score will be derived from those items that demonstrate an acceptable correlation with success.

Specifically, researchers hypothesized that the BIFP biodata score would correlate with early college success. In addition, they assumed that the BIFP score would provide incremental validity when combined with traditional cognitive predictors such as SAT and high school rank. Finally, the team predicted that these findings would cross-validate to a hold-out sample, showing some shrinkage but still yielding a correlation between the BIFP score and success, and a unique contribution in prediction relative to traditional measures.

METHOD
Participants
The sample for the study consisted of traditional freshmen entering TCNJ in fall 2005. Community Advisors (CAs) distributed the BIFP to participants in the freshman dormitories one week after the start of classes, September 7, 2005. Questionnaires were returned via inter-campus mail. In order for each BIFP to be analyzed, it had to be completed with identification information and include a signed informed consent. A response rate of 64 percent was achieved as 715 of the distributed questionnaires were returned as usable. Twenty-seven of these 715 were eliminated for some specific deficiency. This resulted in a final usable sample of 688 TCNJ freshmen and a final return rate of 62%.

The resulting sample was composed of 393 men (57.1% of the sample) and 295 women (42.9% of the sample). The mean age of participants 10 days into the fall semester was 18.02 (SD = 0.28), with the age of two participants missing. The ethnic origin of participants was 79.2% Caucasian, 7.5% Hispanic, 6.4% Asian, 4.5% African American, and 1.5% participants of other ethnic origins; 6 (0.9%) participants did not report their ethnicity. The SAT verbal scores ranged from 360 to 800 (M = 624.64, SD = 78.03) and SAT math scores ranged from 400 to 800 (M = 649.66, SD = 77.18), 12 of these scores were missing. Unfortunately, high school GPA was not available for the sample from TCNJ's student records. The fall semester GPA, or first semester GPA of participants, ranged from 1.20 to 4.0 (M = 3.20, SD = 0.58). Credits earned within the fall semester ranged from 8 to 20 (M = 15.36, SD = 2.05).

Materials
A total of 1,250 BIFP surveys were used, including consent forms, debriefing forms, and self-addressed return envelopes, included to ensure confidentiality and increase the likelihood of return. In addition, the Residence Life CAs who administered the questionnaires were provided with 50 large envelopes, instructions for administering the survey, and a supply of sharpened pencils (Kirnan et al., 2006).

Procedure

After CAs were briefed on the purpose and told how to administer the surveys, they distributed the questionnaires in the freshman dormitories at TCNJ during the third week of the fall 2005 semester. In order to improve returns, a pizza party was promised to the floor with the highest return rate (Kirnan et al., 2006).

Identification numbers were assigned to each survey and entered into the electronic database. Any information that could identify participants was removed from the surveys to ensure confidentiality. The data of all 688 college freshmen were then entered. Admissions information (SAT-Verbal, SAT-Math, High School Rank), first semester performance data (GPA and number of credits), and demographic information (Kirnan, Tsui, and Stephens, 2006) for participants were obtained through the TCNJ student database and merged with the survey data.

A new variable was then created for college success. Success was defined as obtaining a GPA of 3.0 or above. Thus, participant GPA was recoded into a new variable of success with GPAs of 3.0 and above considered successful, and GPAs of 2.9 and below unsuccessful. A GPA of 3.0 is an unusually high cutoff to determine college success. Normally, college success may be defined by a GPA above a 2.0 because anyone who does not achieve a 2.0 is placed on academic probation. At TCNJ, college success needed to be defined by a GPA of above 3.0 because of limited variance and because average GPA of the sample was 3.2. This higher average GPA required an adjustment in the defined level of success.

The full database was then randomly divided into a developmental sample and a cross-validation sample using the random number generator technique in SPSS. Through statistical analyses, the two samples were determined equivalent in terms of relevant variables. T-tests revealed no significant mean differences for high school rank, SAT-Verbal, SAT-Math, age, first-semester college GPA, or first-semester earned credit hours; and Chi-square tests revealed no significant differences in the distribution of gender or ethnic groups across the two samples (Kirnan et al., 2006).

The developmental sample was statistically used to analyze each item and establish weights for the responses (Kirnan et al., 2006). Where a distinction could be drawn between high success rates and low success rates, answers were weighted and then recoded. If there was no difference between an item's responses and success rates, the entire BIFP item was eliminated because the item was unable to predict college success within this study. Where there were differences between responses and success rates, weights were established and items recoded to maximize the differences in success rates.

The recoded item responses were again analyzed using Chi-square correlations, assessing their relationship to college success. If the items did not come close to marginal significance ($p < .10$), they were rejected. Remaining significant/marginally significant recoded variables were then assessed with the cross-validation sample. Items that were not significant after cross-validation were rejected as predictors. Thus, the remaining items were the significant non-cognitive predictors from the BIFP on college success in both developmental and cross-validation samples. A biodata score was derived by adding together the items which were found to be significant in both samples.

RESULTS

Inter-correlations were calculated between the predictor variables of SAT-V, SAT-M, high school rank (referred to henceforth as HSRank) and biodata score as well as with the criteria of first semester college success and first semester GPA. All predictors except HSRank correlated significantly with success. Additionally, SAT-V, SAT-M and biodata all correlated significantly with each other. These results were found in both the developmental and cross-validated samples and appear in Table 1.

The unique contribution of the biodata score above the prediction of traditional cognitive measures is shown in the multiple regression results that appear in Table 2. When all four predictors are introduced to the equation, only biodata and SAT-M contributed significantly to the explanation of initial success. The standardized beta weights demonstrate the relative weight of each predictor, with biodata score being given the greatest weight. Again this was true for both the developmental and cross-validation samples.

DISCUSSION

We expected that unique items on the BIFP would yield significant correlations with success. The results supported this hypothesis. Thirty-seven variables yielded significant correlations in both the developmental and cross-validation groups. These 37 items fell into five of the eight categories of BIFP questions including expectations, academic preparedness, independence, distractions, personal habits, and success orientation. When combined into a single biodata score, the correlation with success was significant and stronger than that of traditional measures, thus supporting Hypothesis 1.

Whether unique variance would predict first-year success was the focus of Hypothesis 2. An examination of the inter-correlations in Table 1 confirms that while the SAT-V and SAT-M are highly inter-correlated, the biodata score is unique as demonstrated by its low correlation with traditional high school measures. However, a more definitive demonstration of the unique contribution of the biodata score is revealed in the multiple regression analysis, where the biodata account for the most substantial portion of explained variance as shown in the standardized beta coefficients.

The demonstration of a statistically significant relationship with success is enhanced when this relationship can be replicated in another sample. This research used a developmental and cross-validation sample to test the validity of the biodata score. While shrinkage is expected, the biodata score continues to show a strong, distinct prediction of first-year success in the both the correlations and the regression using the cross-validated sample.

An examination of the individual items that comprised the biodata score provides further proof of the construct validity of the BIFP. For example, Question 19 assessed a student's realistic expectations of college and had a significant correlation with success. This item asks students to list the ways they obtained information about TCNJ and other colleges. Participants who used more resources had higher rates of college success in their first semester. There are several possible explanations for these findings. Such behavior suggests a higher level of interest and subsequent commitment on the part of the student. Also, students who acquire more information are likely to develop a greater sense of what to anticipate from their college experience, which leads to more realistic expectations. This concept has been researched extensively in business, and has often been correlated with employee satisfaction and tenure (Wanous, 1977).

Taking more difficult classes and receiving academic honors or awards were also significantly related to success. BIFP Question 4, which asked what types of classes students took while in high school, was significantly correlated with success in the developmental and cross-validation samples. Students who took Advanced Placement and Honors courses had a higher rate of success than those who did not take these rigorous courses. Additional analyses confirm that colleges and universities should consider high school class choices and honors awards during the admissions process.

Question 1 on the BIFP assessed participants' independence and their ability to perform several tasks simultaneously. The more time students devoted to course work when high school juniors and seniors, the higher the correlation with college success. There is also a significant negative relationship between increased employment hours during school and success. This suggests that students who work longer hours for an employer have less time to dedicate to their school work, and their grades are negatively affected.

Distractions also negatively affected participants' rates of success. Question 37 assessed how many hours per week students, when in grammar school and when in high school, engaged in various activities. Watching television, talking on the phone, and text messaging all had a significant negative relationship with college success. This suggests that students who spend too much time on distracting activities did not have enough time left for their academic work.

Question 12 measured positive and negative personal habits to assess their relationship to college success. Positive personal habits in the developmental and cross-validation groups included planning ahead, making schedules, working ahead of assignments, and getting nervous about upcoming tests. Statistically significant personal habits negatively related to college included working just enough to get passing grades, sleeping during class, and being absent, all assessed by BIFP Question 12. These results display the importance that personal habits have in relation to success in college.

Answers to Question 25 were significantly related to academic success. This question measured student expectations for their GPA after the first college semester. Higher expectations were associated with higher success. The items discussed in this section of the paper appear in the Appendix.

EVALUATION

The strengths of this study are that the sample size achieved was large; 688 total surveys were analyzed with a response rate of 68%. The sample was representative of the entire population of entering freshman at TCNJ, and included a wide variety of majors. Statistical analyses of the data were thorough. Every variable judged significant in the developmental sample needed to be cross-validated before it could be considered a valid predictor of college success. This conservative approach limits the number of variables determined to be significant, but significantly increases the likelihood that the results can be replicated and generalized to other institutions.

The operational definition of "success" was a cause for concern. College success as we mentioned earlier was defined as a GPA of at least 3.0. This is an unusually high cutoff for determining success, but the average GPA of the whole sample was 3.2. A higher average GPA requires a rise in the defined level of success. Typically, a GPA above a 2.0 may define college success because anyone who does not achieve a 2.0 is placed on academic probation. At TCNJ, college success had to be defined by a GPA of above 3.0 because of the limited variance and high mean GPA. This could create complications in attempting to generalize the results of this study to other colleges. This could be overcome by adjusting results for different GPA variations from college to college. A college or university simply would have to conduct a finalized BIFP study to determine which biographical factors, if any, are predictive of institutional success.

The length of the BIFP, which consisted of 45 questions, including many subsets of questions, was another concern. In the early stages of research, a long and comprehensive questionnaire is often necessary because one assumes that many questions will be eliminated. However, fatigue may set in as participants try to complete such long questionnaires. An additional limitation of the study was the presence of some unrealistic, and therefore invalid, responses. Some responses were inaccurate because of how questions were worded; others, because of lazy answering or "yea-saying," the tendency to answer in a socially desirable way. Because of these limitations, many questions will be reworded or eliminated to increase the accuracy of future administrations.

A lack of response variance also limited results. This may be the result of participants answering in a socially desirable manner. By present-day standards it is appropriate for individuals to accept others of all backgrounds. This norm may have been the reason no Ease of Adjustment items, that included questions regarding participants' openness to new experiences and acceptability of others who may be very different, were significant predictors of success. A lack of response variance was also likely to be the reason no Technologically Savvy questions were found to be significant.

FUTURE RESEARCH

The results of this research could be applied to the college selection process after the BIFP is further refined. Biographical inventories such as the BIFP are less vulnerable to the problems that the traditional methods of college selection face. The SAT predicts only about 15 percent of the variance of freshman grades and the test is biased against ethnic minorities (Lemann, 1999). A student's GPA is highly dependent upon the difficulty of the curricula of the high school that they attend, and different high schools use different scales to measure GPA. Using a finalized BIFP in admissions would encourage more equal and less biased selection, and increase the predictive validity of the process. Such a survey would also be useful for departments and advisors to understand what factors are related to student's success in college. This could make support from advisors and other faculty more easily available to students who have an increased need.

Future studies could be done with new college freshman samples. In addition, this current study could be continued, using the same participants' GPA for the entire academic year. The informed consent that each participant granted for the purposes of this research allows access to all future grades.

Researchers could determine if the BIFP predicts not only first semester college GPA but overall college academic success.

CONCLUSION

The results of this study strongly suggest that biographical inventories would be useful in the college selection process and as a tool for college advisement. SAT scores, GPAs, and high school rank all have proven limitations when used to predict college success. Colleges must be open to newer, more valid measures of predicting college success. The biodata score used in this study was a better predictor of college success than the SAT, one of the most widely used instruments in the college admissions process. This research confirms previous findings; Vince Lombardi would agree that certain biographical information can far outweigh "a lack of knowledge" when it comes to success at any level.

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ENDNOTES

[1]The research team for this study consisted of 13 students from one section of course PSY 492: Senior Research Roundtable with Professor Kirnan. Along with the two authors, the following students were also a part of this team: Andrea Brandt, Russ Bucholc, Kamille Dawkins, Greg Escamilla, Jenna Fasulo, Nicholas Kenny, Emily Macina, Ngoc Ngo, Jenna Stephens, and Jessica Vogt.   We would like to thank them for their hard work and contributions. We would also like to thank our faculty sponsor, Professor Kirnan, who created the biographical inventory on which this paper is based. Her extensive research in this field and desire to immerse students in her projects as part of the learning process made this paper possible.

APPENDIX

19. During your college search process, which of the following did you use to obtain information/learn about TCNJ and other schools? Check **all** that apply

	For TCNJ	All Other Colleges
Campus tour	_____	_____
Information session	_____	_____
Spoke w/ alumnae/alumni	_____	_____
College student	_____	_____
College staff/teacher/coach	_____	_____
Sat in on class	_____	_____
Attended organized event (sporting, lecture, theater, art, or music)	_____	_____
Overnight visit	_____	_____
School website	_____	_____
Other website	_____	_____
Published college guidebooks	_____	_____
Information mailed to me	_____	_____
College fair	_____	_____
HS counselor/teacher/coach	_____	_____

Other(specify:_____)

4. How many of the following courses did you take in high school? (Place the number of courses in the space provided.)

_____AP (Advanced Placement) courses   _____Honors Courses

(don't need to have taken exam)

1. During junior and senior years of high school, approximately how many hours a week did you devote to each of the following activities? Record N/A if not involved, otherwise report the number of hours devoted during peak seasons or when maximum involvement was necessary. (Place number of hours in the space):

____in course-related work (reading, homework, papers, projects, studying, etc.)

____in paid employment during the school year (including babysitting and other informal jobs)

37. When you were growing up, on average how many hours a week did you engage in the following activities?

Activity	# Hours during elementary and middle schools	# Hours during high school
Watching television		*Not significant*
Talking on phone/texting		*Not significant*
Reading for school		
Reading for pleasure		

12.   Thinking about your experiences in junior and senior year of high school how frequently did you engage in the following behaviors? Using the 1 to 5 scales at the right, indicate the extent to which you engaged in these activities by circling:

(0) **Not Applicable** (1) **Never** (2) **Rarely** (3) **Occasionally** (4) **Frequently** (5) **Always**

Planned ahead	0	1	2	3	4	5
Made a schedule for myself	0	1	2	3	4	5
Worked ahead on an assignment	0	1	2	3	4	5
Got nervous about taking a test	0	1	2	3	4	5
Worked just enough to get a passing grade	0	1	2	3	4	5
Slept during class	0	1	2	3	4	5
Absent from work	0	1	2	3	4	5

Table 1

Inter-correlations of Predictor and Criterion Variables in Developmental and Cross-Validated Sample

Sample	SAT-V	SAT-M	HSRank	Biodata	Success	Final GPA
Developmental						
SAT-V	----	.61*	.03	.31*	.31*	.37*
SAT-M		----	-.02	.23*	.29*	.37*
HSRank			----	-.10	.01	-.06
Biodata				----	.40*	.48*
Cross-Validated						
SAT-V	----	.49*	.07	.28*	.29*	.37*
SAT-M		----	.06	.09*	.23*	.34*
HSRank			----	-.04	-.05	-.06
Biodata				----	.35*	.45*

*p < .001.

Table 2

Multiple Regression Results and Standarized Beta Weights in Developmental and Cross-Validated Sample

Sample	B	t	R	R^2
Developmental				
Biodata	.380	6.88*	.58	.34*
SAT-V	.116	1.66		
SAT-M	.261	8.85*		
HS Rank	-.013	-0.24		
Cross-Validated				
Biodata	.376	6.51*	.53	.28*
SAT-V	.100	1.45		
SAT-M	.223	3.41*		
HS Rank	-.062	-1.13		

*$p < .001$.