A Predictive Examination of College Student Success with Cognitive, Noncognitive, High School Engagement and College Engagement Factors

Carla M. Davey, M.Ed.
Paul A. Gore, Jr., Ph.D.
University of Utah
Introduction
College Student Success – Cognitive Predictors

- Resounding evidence of the ability to predict college performance and persistence
- High school GPA captures ~20% of the variance in college outcomes
- Standardized admissions test scores capture an additional 3-5%

Astin, 2005
College Student Success – Noncognitive Predictors

- Robbins and colleagues (2004) conducted meta-analysis and identified nine major psychosocial and study skills factors.

- Individual characteristics can capture variance beyond that captured by cognitive predictors:
  - ~8% of variance in retention
  - ~4% of variance in GPA

Robbins et al., 2004; Robbins et al., 2006
College Student Success – High School Engagement

- Maryland Adolescent Development in Context Study
  - 5 waves of data collection
  - N = 912, 51% Female, 67% African American
- High school engagement activities relate positively to GPA, educational aspirations, and educational attainment
  - Relationship mediated by high school grades and parents’ educational attainment
  - Greater engagement with variety = better outcomes

Fredricks & Eccles, 2006
College Student Success –
College Engagement

- Types of engagement, as measured by NSSE
- Purposeful engagement by college students relates positively to GPA and retention
  - May vary as a function of identity statuses
- Specific types of engagement are most predictive of 1st year GPA and retention, 4th year GPA, employment, and pursuit of graduate education

Carini et al., 2006; Gordon et al., 2008
College Student Success – Conceptual Model of Prediction

High School Engagement → Cognitive Predictors → College Engagement → College Outcomes

High School Engagement → Noncognitive Predictors → College Engagement → College Outcomes
Interrelationships

- Positive relationship between predictors
- Positive relationships between noncognitive individual characteristics and engagement
  - Ex: Athletic participation relates to self-esteem
  - Ex: School club participation relates to institutional commitment
Statement of the Problem & Research Questions

- **Purpose of this research project**
  Improve prediction of college outcomes by testing the additive predictive utility of cognitive, noncognitive, and engagement factors.

- **Research questions**
  1. How do cognitive predictors, noncognitive predictors, college engagement, and high school engagement additively predict college student outcomes?
  2. What are the interrelationships within the conceptual model?
Method
Method – Measures

- ACT College Entrance Exam
- Student Readiness Inventory
- National Survey of Student Engagement
- College Student Outcomes

Two cognitive predictors, one high school engagement variable, ten high school accomplishment variables, ten noncognitive predictors, thirteen college engagement variables, two college outcomes
## Potential Predictors of College Success

<table>
<thead>
<tr>
<th>Cognitive</th>
<th>High School Engagement</th>
<th>Noncognitive</th>
<th>College Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School GPA</td>
<td>Total activities</td>
<td>Acad discipline</td>
<td>-Class prep</td>
</tr>
<tr>
<td>ACT composite</td>
<td>Total accomplish</td>
<td>Acad self-confidence</td>
<td>-Tutoring</td>
</tr>
<tr>
<td></td>
<td>-Leadership</td>
<td>-Commitment</td>
<td>-Ideas w/faculty</td>
</tr>
<tr>
<td></td>
<td>-Music</td>
<td>-Comm skills</td>
<td>-Used electronics</td>
</tr>
<tr>
<td></td>
<td>-Speech</td>
<td>-Emotional control</td>
<td>-Rx w/faculty</td>
</tr>
<tr>
<td></td>
<td>-Art</td>
<td>-General</td>
<td>-Academic support</td>
</tr>
<tr>
<td></td>
<td>-Writing</td>
<td>determination</td>
<td>-Cope w/responsibility</td>
</tr>
<tr>
<td></td>
<td>-Science</td>
<td>-Goal striving</td>
<td>-No prep for class</td>
</tr>
<tr>
<td></td>
<td>-Athletics</td>
<td>-Social activity</td>
<td>-Challenging exams</td>
</tr>
<tr>
<td></td>
<td>-Community</td>
<td>-Social connection</td>
<td>-Problem sets</td>
</tr>
<tr>
<td></td>
<td>Service</td>
<td>-Study skills</td>
<td>-Exercise</td>
</tr>
<tr>
<td></td>
<td>Work</td>
<td></td>
<td>-Socializing</td>
</tr>
</tbody>
</table>

-Robbins et al., 2006
-Gordon et al., 2008
## Method – Data Availability and Participants

<table>
<thead>
<tr>
<th>Institution</th>
<th>Cognitive</th>
<th>HS Eng.</th>
<th>Noncog</th>
<th>College Eng.</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (n=203)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2 (n=161)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3 (n=433)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3 subset (n=68)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Data will be used to maximize sample sizes
Method – Analysis

- Data is nested in institutions
- Hierarchical linear regression
  - Simultaneous multiple regression
  - Means and slopes as outcomes (equivalent to unstandardized beta weights)
  - Predictor variables are grand mean centered
Results and Discussion
Cognitive + High School Engagement
Cognitive + High School Engagement

Average ACT utilized to control for level 2 variance
Cognitive + High School Engagement + College Engagement
Cognitive + High School Engagement + College Engagement

High School GPA .308

ACT Composite .032

Total Activities .056

1st Year GPA
Cognitive + High School Engagement + Noncognitive
Cognitive + High School Engagement + Noncognitive

- High School GPA: 0.280
- ACT Composite: 0.070
- Total Activities: 0.053
- Academic Discipline: 0.009
- Academic Self-Conf.: -0.006

Output GPA: 1st Year GPA
Cognitive + High School Engagement + Noncognitive + Sociodemographic

- High School GPA: 0.280
- ACT Composite: 0.052
- Total Activities: 0.046
- Academic Discipline: 0.007
- SES: 0.034

1st Year GPA
Cognitive + High School Engagement + Noncognitive + College Engagement

N.B.: Only subset of data from one institution utilized for full model analysis
Cognitive + High School Engagement + Noncognitive + College Engagement

- High School GPA: 0.559
- ACT Composite: 0.076
- Rx w/ Faculty: 0.164
- Total Activities: 0.087
- Academic Discipline: 0.009
- Academic Self-Conf.: -0.009
- Academic Support: -0.244

N.B.: Only subset of data from one institution utilized for full model analysis.

Sociodemographic variables were not significant.
Retention as Outcome

- Statistical tests yielded very low reliability estimates

- Secondary analysis recognized the following retention group differences:
  - Higher high school GPA and ACT scores for retained
  - Greater high school activities for retained
  - Higher academic discipline and social connection scores for those retained
  - Higher general determination scores for departed
Interrelationships – Noncognitive and High School Engagement

- **Total Activities:**
  - Communication Skills ($r = .163$, $p < .01$)
  - Social Activity ($r = .193$, $p < .01$)
  - Social Connection ($r = .211$, $p < .01$)

- **Total Accomplishments:**
  - Study Skills ($r = .139$, $p < .01$)
  - Communication Skills ($r = .153$, $p < .01$)
  - Social Activity ($r = .139$, $p < .01$)
  - Social Connection ($r = .169$, $p < .01$)
  - Academic Self-Confidence ($r = .104$, $p < .05$)
Interrelationships – Noncognitive and High School Engagement

- Accomplishments in Athletics:
  - Social Activity ($r=0.177$, $p<0.01$)
  - Social Connection ($r=0.136$, $p<0.01$)

- Accomplishments in Writing:
  - Goal Striving ($r=0.107$, $p<0.05$)
  - Academic Discipline ($r=0.121$, $p<0.05$)
  - General Determination ($r=0.134$, $p<0.01$)
  - Study Skills ($r=0.141$, $p<0.01$)
  - Communication Skills ($r=0.138$, $p<0.01$)
  - Academic Self-Confidence ($r=0.121$, $p<0.05$)
Future Directions
Ongoing Research Recommendations

- Expand analysis to test additional college student outcomes
  - 1st to 2nd year retention
  - 2nd year GPA
  - 4th year GPA
  - Graduation
- Replicate with data from additional institutions
- Addition of more sociodemographic variables
- Further modeling of partial and full mediation

Perkhounkova et al., 2006
College Student Success – Conceptual Model of Prediction

- High School Engagement
- Cognitive Predictors
- Noncognitive Predictors
- College Engagement
- College Outcomes
College Student Success – Conceptual Model of Prediction

- High School Engagement
- Cognitive Predictors
- Noncognitive Predictors
- College Engagement
- College Outcomes
Ongoing Research Recommendations

- Expand analysis to test additional college student outcomes
  - 1\textsuperscript{st} to 2\textsuperscript{nd} year retention
  - 2\textsuperscript{nd} year GPA
  - 4\textsuperscript{th} year GPA
  - Graduation

- Replicate with data from additional institutions

- Addition of more sociodemographic variables

- Further modeling of partial and full mediation

- Interrelationships
  - High school and college engagement
  - Between individual predictor variables

Perkhounkova et al., 2006
Questions?
Complete Results

For an electronic copy of the complete written results of this project, please contact:

Carla M. Davey, M.Ed.
Doctoral Candidate

carla.davey@utah.edu

This material is based upon work supported by the Association for Institutional Research, the National Center for Education Statistics, the National Science Foundation and the National Postsecondary Education Cooperative under Association for Institutional Research Grant # DG-08-404
References