Crossing the Secondary-to-College Education Border

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Pre-Collegiate Preparation, 1st Year Experience and the Need for Remediation Among New Freshmen

A Ten-Year Profile

October 2005

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Purpose of Profile

- Academic preparation and the need for remediation
- How many new freshmen are in need of remediation based on institutional placement tools?
- Disaggregate by demographic, academic, and 1st year experience
- Show trend over past ten years
- Operational impact at university and high school level
“A Crisis in Academic Preparation” (ACT, 2004)

- High school GPA up from 2.68 to 2.94 between 1990 and 2000, but mere 34% of high school graduates are ‘college ready’ to enter a 4-year institution (Greene & Winters, 2005; Perkins, 2004)
- Only 22% of ACT-tested high school graduates met college readiness benchmarks in English, math, and science (ACT, 2004)
- Nearly 80% of California high school juniors are not ready for college English (Maxwell, 2004)
- Sixty-three percent of seniors who expect to go to a 4-year college fail to master intermediate-level math concepts (NCES, 2005)
- Level of math preparation is the single most important high school curricular experience to predict college success (Adelman, 1999)
- Sixty-five percent of high school seniors spend 5 hours or less studying per week (Young, 2002)
- College dropouts are four times more likely to enroll in remedial reading, twice the rate compared to the national cohort 10 years ago (Adelman, 2004)
- Negative partial correlation of 0.67 between enrollment and achievement in 8th grade Algebra (controlling for 7th grd) in California, suggesting diluted curriculum content (Evers & Clopton, 2003)
- Proportion of students passing the AP exam dropped from 64% in 1998 to 58% in 2003 in California (CPEC, 2005)

College Readiness of Public High School Graduates in 2002

Readiness criteria are based on meeting minimum admission standards at least selective four-year colleges: 1) regular high-school diploma; 2) passing 4 years English, 3 years math, and 2 years each of natural sciences, social sciences, foreign language; 3) passing basic level on NAEP reading assessment (HSTS)

Source: Greene & Winters (2005).
Statements by the Congressional Advisory Committee on Student Financial Aid

- "Politically popular merit-based programs have been enacted in many states at the expense of increases in need-based programs." (ACSFA, 2002, p. 2.)
- "Parents’ education primarily affects the likelihood of being academically prepared, not the likelihood of attending college once prepared." (ACSFA, 2002, p. 19.)
- "Differences in [college] enrollment are largely attributable to the fact that students are from low-income families." (ACSFA, 2002, p. 19.)
- "High unmet need discourages college-qualified high school graduates from enrolling in a four-year college." (ACSFA, 2002, p. 21.)
- "The impact of unmet need on the behavior of college-qualified high school graduates is as dramatic as its impact on all high school graduates." (ACSFA, 2002, p. 23.)
- "Academic preparation does not inoculate high school graduates against the debilitating effects of unmet need." (ACSFA, 2002, p. 23.)

As a result:

- In academic year 2001-02, the ACSFA estimates that 406,000 college-qualified high school graduates from low- and moderate-income families were prevented from enrolling in a four-year college. (ACSFA, 2002, p. 27.)

Lack of Access for the College Prepared?

From anecdotes to data: It is highly unlikely that there are many qualified students unable to enter college

Source: Greene & Winters (2005), NCES (January, July 2005)
Why the Discrepancy between the ACSFA and the Numbers Reported Here?

- **The Congressional ACSFA defines** “college prepared” as “minimally qualified” based on
  - Highest score among high school GPA, class rank, NCES aptitude test, or ACT/SAT score (as used in the NCES college-readiness index (see Berkner & Chavez, 1997)
  - Thus, a GPA of 2.7 or an ACT score of 19 is considered ‘min qualified’ according to NCES index. (Greene & Winter, 2005)
  - At UNR, ACT less than 21 requires remediation; minimum admission GPA is 2.75; UNR is less selective than lower-tier 4-year CA institutions (e.g., Cal State)
  - ACSFA minimum qualification criteria are too low !!!

- **Greene Method** (Greene & Winter, 2005) apply three, more meaningful criteria to define “college prepared”:
  - Estimate of high school graduation rate based on diploma recipients reported by the US Dept of Ed CCD and adjusted smoothed 9th grade cohort estimate
  - Transcript screen based on minimum high school coursework required by least selective 4-year colleges in CA, TX, FL, NY, IL, and MI.
  - NAEP reading score of at least 265 based on representative sample from NAEP Transcript Study

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**Nevada College Continuation Rate**

% of NV high school graduates enrolled as first-time, degree-seeking college students in the fall semester immediately following graduation

<table>
<thead>
<tr>
<th>Year</th>
<th>Continuing to Postsecondary Ed</th>
<th>Continuing to UCCSN only</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>19.2%</td>
<td>32.4%</td>
</tr>
<tr>
<td>1994</td>
<td>24.5%</td>
<td>38.5%</td>
</tr>
<tr>
<td>1996</td>
<td>24.8%</td>
<td>39.7%</td>
</tr>
<tr>
<td>1998</td>
<td>24.7%</td>
<td>40.1%</td>
</tr>
<tr>
<td>2000</td>
<td>45.3%</td>
<td>32.9%</td>
</tr>
<tr>
<td>2002</td>
<td>44.7%</td>
<td>33.0%</td>
</tr>
</tbody>
</table>


College-going rate of Nevada high school graduates rises to 45.3 percent in 2000 as the Millennium Scholarship is introduced
Academic Preparation Gap of Nevada College-Going High School Graduates

*Based on regular diploma, completion of college-prep curriculum, and mastery of basic reading level (based on NAEP High School Transcript Study (HSTS)).

^Gap reflects needed preparation at least selective 4-year institutions in the country, not UNR. Computed from Greene & Winters (2005) and UCCSN (2005).

Determining the Need for Remediation

- Minimum scores on standardized tests for placement in college-level English/math

<table>
<thead>
<tr>
<th>Institution</th>
<th>ACT-V</th>
<th>ACT-M</th>
<th>SAT-V</th>
<th>SAT-M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nevada-Reno</td>
<td>21</td>
<td>21</td>
<td>510</td>
<td>500</td>
</tr>
<tr>
<td>Calif. State U.*</td>
<td>25</td>
<td>24</td>
<td>550</td>
<td>560</td>
</tr>
</tbody>
</table>

- Institutional placement tests, for example
  - Core math readiness
  - Algebra readiness
  - College math placement
  - English placement

*http://www.loa.ca.gov/analysis_2001/education/ed_04_cc_acad_prep_anil01.htm
How good is the ACT/SAT in predicting college success?

A sample of what the critics say:

- “The testocracy offers a false promise because even though there is a modest correlation between SAT scores and first-year college grades, it is truly modest.” (Lani Guinier, Harvard Law School, in Liberal Education, Spring 2005 issue)

- “What if the writing section hurts poor kids? Test scores do not predict success. Do we care about first-year GPAs?” (Theodore O’Neill, Dean of Admissions, U. of Chicago; Chronicle of Higher Education, 2/25/05)

- “Empirical research suggests the predictive validity of these tests has been overestimated… and is substantially less than students’ high school grades.” (Joseph Cuseo, Assoc. Prof., Marymount College, Limitations in the Predictive Validity of Standardized College-Admissions Tests, unpubl. paper, n.d.)

- “Standardized tests generally have questionable ability to predict one’s academic success. Standardized test scores tend to be highly correlated with socioeconomic class.” Peter Sacks, Standardized Minds: The High Price of America’s Testing Culture and What We Can Do to Change It. (Cambridge, MA: Perseus Books, 2000).


How good is the ACT/SAT in predicting college success?

….and statements from a recent study on standardized tests (Horn, 2005) published in Education Policy, a peer-reviewed journal in education:

- “Evidence suggesting that test-based [admissions] policies are not necessarily resulting in increased learning negates the guarantee that the students who make it through the pipeline do so prepared.”

- “Policy makers must place reasonable boundaries on how tests will and will not be used based on sound new evidence. They should actively involve the psychometric community in the discussion.”
How good is the ACT/SAT in predicting college success – what does the research say?

- Results from a 2004 meta-analysis* of 109 studies (149,276 students) on predicting college cumulative GPA based on predictor beta weights: (R = .58; R² = .34)
  - ACT/SAT score is strongest predictor – 16% stronger than ‘academic self-efficacy’, 43% stronger than ‘high school GPA’, 110% stronger than ‘achievement motivation’, and 336% stronger than socio-economic status (SES). [see appendix table]
  - Psychosocial and study skill factors account for 4% of the variance in college GPA beyond traditional predictors (HS GPA, test scores, SES)
  - Socio-economic status explains about 1% of the variation in ACT/SAT scores (bivariate correlation of 0.10); in contrast, high school GPA alone explains 21% of score variation.
  - Institutional commitment, social support, and social involvement show the weakest relationship with ACT/SAT scores among measured variables
  - Relationship between ACT/SAT scores and college GPA is underestimated due to variance restriction associated with excluding applicant scores of non-enrolled students
  - Performance pressure during high-stakes testing negatively affects only those most qualified to succeed, i.e., the academically strong students, according to recent research. (Beilock & Carr, 2005)


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Why the Discrepancy between Critics and Research on Standardized Tests?

- Public policy is often informed by advocacy, not scholarly research (Example: J. Kozol’s work and media coverage of it)
- Much of the research is conducted outside education, by scholars in economics, psychology, and sociology
- Criticism focuses on rhetorical or empirically unsupportable charges against testing in general, including
  - “teaching to the test” and/or narrowing of the curriculum
  - Test score inflation due to repeat use of identical tests
  - High-stakes consequence of test performance
  - Lack of promoting ‘higher order’ thinking due to multiple-choice format
  - Declining use of standardized tests in other countries
- In reality, any curriculum focus has a potential trade-off; no standardized tests are repeated identically; test performance is but one criteria in college admission; tests can be taken several times; open-ended test questions add little predictive value to estimating college academic success*; and widening access to college overseas lowers reliance on tests, but tracked curriculum systems overseas typically use more testing.

*(Bridgeman, 1991)
Does first-year GPA affect freshmen retention at UNR?

- First and second semester GPA has strongest impact on second-year retention among measured factors.
- Passing a first-year math course is second most important factor in predicting freshmen dropout or transfer-out.
- Pre-collegiate academic experience strongly correlates with first-year academic success, which in turn strongly correlates with subsequent year student persistence.
- Pre-collegiate academic preparation of Nevada freshmen does not depend on high school institutional attributes, according to recent research.

*Herzog (2005); *(see http://www.unr.edu/ia/research/index.html)

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New Freshmen in Need of Remediation

Fall 1996 through Spring 2005
(Population of all enrolled new freshmen = 15,832)

<table>
<thead>
<tr>
<th>Test Criteria Used</th>
<th>ACT/SAT ACT/SAT &amp; UNR Cal State Criteria 1st Sem at UNR* 1st Sem* 2nd Sem*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>ACT/SAT &amp; UNR Tests</td>
<td>42.9 14.5 17 64.7</td>
</tr>
<tr>
<td>Cal State Criteria</td>
<td>7.5 14.1 22.4 22.9</td>
</tr>
<tr>
<td>1st Sem at UNR*</td>
<td>9.9 9.8</td>
</tr>
<tr>
<td>1st Sem*</td>
<td>9.7</td>
</tr>
<tr>
<td>2nd Sem*</td>
<td>10.8</td>
</tr>
</tbody>
</table>

* Year 2000-2003

Including transfer courses

* First-Year Remedial Enrollment (not necessarily completion)

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*English only Math only Both English or Math
New Freshmen in Need of Remediation

- Counting freshmen who met remedial cutoff scores via institutional placement tests reduces the remedial need rate by 7.9 percentage points.
- Applying the CSU placement criteria increases the remedial need rate by 13.4 percentage points.
- One third of new freshmen enrolling in remedial courses during the first year may have done so at another institution (e.g., TMCC).
- At least one third of new freshmen in need of remedial math *never enroll* in remedial math during the first year.
New Freshmen in Need of Remediation
Fall 1996 through Spring 2005
(based on ACT/SAT and UNR placement test scores)

Overall weak correlation between ethnicity/race and remediation need (Contingency coefficient = 0.171)

New Freshmenmen in Need of Remediation
Fall 1996 through Spring 2005
(based on ACT/SAT and UNR placement test scores)

Overall weak correlation between gender and remediation need (Contingency coefficient = 0.189)
New Freshmen in Need of Remediation
Fall 1996 through Spring 2005 by Age
(based on ACT/SAT and UNR placement test scores)

Overall weak correlation between age and remediation need (Contingency coefficient = 0.101)

New Freshmen in Need of Remediation
Fall 1996 through Spring 2005 by College
(based on ACT/SAT and UNR placement scores)
New Freshmen in Need of Remediation
Fall 1996 - Spring 2005 by Largest Program Majors
(based on ACT/SAT and UNR placement scores)

New Freshmen in Need of Remediation
Fall 1996 through Spring 2005
Program Majors with Lowest Remediation Rate
(based on ACT/SAT and UNR placement scores)

*Among largest program majors
New Freshmen in Need of Remediation
Fall 1996 - Spring 2005 by Largest Feeder High Schools
(based on ACT/SAT and UNR placement scores)

New Full-Time Freshmen in Need of Remediation
Fall Semester 2000-2003 by Millennium Status (based on ACT/SAT and UNR placement scores, N = 7,775)
New Full-Time Freshmen in Need of Remediation
Fall Semester 2000-2003 by Millennium Status (based on ACT/SAT and UNR placement scores, N = 6,940)

<table>
<thead>
<tr>
<th>Millennium Status</th>
<th>Non-Millie</th>
<th>Maintains Eligibility</th>
<th>Lost Eligibility</th>
<th>Regains Eligibility</th>
<th>Continues Ineligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>725</td>
<td>1406</td>
<td>403</td>
<td>112</td>
<td>100</td>
</tr>
<tr>
<td>%</td>
<td>26.4%</td>
<td>51.2%</td>
<td>14.7%</td>
<td>4.1%</td>
<td>3.6%</td>
</tr>
</tbody>
</table>

73.6% = Millennium Students

Test date to initial fall enrollment

<table>
<thead>
<tr>
<th>Test Date to Initial Fall Enrollment</th>
<th>1 year or more</th>
<th>9 to 11 months</th>
<th>Within 8 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>837</td>
<td>723</td>
<td>2,310</td>
</tr>
<tr>
<td>%</td>
<td>21.6%</td>
<td>18.7%</td>
<td>59.7%</td>
</tr>
</tbody>
</table>

- English only
- Math only
- Both
New Full-Time Freshmen in Need of Remediation
Fall Semester 2000-2003 by High School and UNR GPA Quartile
(based on ACT/SAT and UNR placement scores, N = 7,775)

Quartile | Top | 2nd | 3rd | 4th
--- | --- | --- | --- | ---
N * = | 319 | 730 | 976 | 1178
% | 9.9 | 22.8 | 30.5 | 36.8

* HS GPA Q's

New Full-Time Freshmen in Need of Remediation
Fall Semester 2000-2003 by Peer Challenge* (based on ACT/SAT and UNR placement scores, N = 7,775)

N = 558 | 681 | 893 | 1082
% = 17.3 | 21.2 | 27.8 | 33.7

*GPA vs. GPA of other students in same classes
New Full-Time Freshmen in Need of Remediation
Fall Semester 2000-2003 by High School and UNR GPA Quartile
(based on ACT/SAT and UNR placement scores, N = 7,775)

Passed 1st Year Math Course

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Two or more</th>
<th>One</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>1134</td>
<td>2080</td>
<td>206</td>
<td>527</td>
<td>2481</td>
</tr>
<tr>
<td>35.3</td>
<td>64.7</td>
<td>6.4</td>
<td>16.4</td>
<td>77.2</td>
</tr>
</tbody>
</table>

Science Courses Taken in 1st Semester

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Two or more</th>
<th>One</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>1134</td>
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<td>6.4</td>
<td>16.4</td>
<td>77.2</td>
</tr>
</tbody>
</table>

New Full-Time Freshmen in Need of Remediation
Fall Semester 2000-2003 by Pre-Matriculation Experience
(based on ACT/SAT and UNR placement scores, N = 7,775)

Summer Courses Taken Prior to Initial Matriculation

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Earned AP or IB Credits in High School</th>
</tr>
</thead>
<tbody>
<tr>
<td>282</td>
<td>2932</td>
<td>112</td>
</tr>
<tr>
<td>8.8</td>
<td>91.2</td>
<td>3.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>English only</th>
<th>Math only</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3</td>
<td>14.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.1</td>
<td>7.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>English only</th>
<th>Math only</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.4</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.2</td>
<td>6.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>English only</th>
<th>Math only</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.4</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.1</td>
<td>7.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
New Full-Time Freshmen in Need of Remediation
Fall Semester 2000-2003 by Load and Living Arrangement
(based on ACT/SAT and UNR placement scores, N = 7,775)

<table>
<thead>
<tr>
<th>1st Semester Load</th>
<th>Living On Campus</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 or more credits</td>
<td>Yes</td>
</tr>
<tr>
<td>&lt; 15 credits</td>
<td>9.5%</td>
</tr>
<tr>
<td>Yes</td>
<td>17.1%</td>
</tr>
<tr>
<td>No</td>
<td>12.8%</td>
</tr>
<tr>
<td>Total</td>
<td>40.8%</td>
</tr>
</tbody>
</table>

New Full-Time Freshmen in Need of Remediation
Fall Semester 2000-2003 by Financial Aid Package
(based on ACT/SAT and UNR placement scores, N = 7,775)

<table>
<thead>
<tr>
<th>Financial Aid Package</th>
<th>Scholarships/Grants (incl. Millennium)</th>
<th>Pack w/ loans or WS</th>
<th>Millennium only</th>
<th>No aid</th>
</tr>
</thead>
<tbody>
<tr>
<td>% in need of remediation</td>
<td>9.3%</td>
<td>15.4%</td>
<td>13.7%</td>
<td>19.9%</td>
</tr>
<tr>
<td>English only</td>
<td>11.8%</td>
<td>13.5%</td>
<td>13.7%</td>
<td>18.2%</td>
</tr>
<tr>
<td>Math only</td>
<td>8.9%</td>
<td>15.8%</td>
<td>17.9%</td>
<td>16.5%</td>
</tr>
<tr>
<td>Both</td>
<td>15.4%</td>
<td>15.8%</td>
<td>17.9%</td>
<td>18.2%</td>
</tr>
</tbody>
</table>

English only | Math only | Both
New Full-Time Freshmen in Need of Remediation
Fall Semester 2000-2003 by Institutional Aid Received*
(based on ACT/SAT and UNR placement scores, N = 7,775)

N = 118, 162, 257, 346, 2331
% 3.7, 5.0, 8.0, 10.8, 72.5

* Fall semester

New Full-Time Freshmen in Need of Remediation
Fall Semester 2000-2003 by 2nd Year Departure
(based on ACT/SAT and UNR placement scores, N = 7,775)

Re-enrolled % 81.2, 74.5, 66.8, 64.1, 67.2, 73.7, 61.9
Total N* = 4,561, 805, 280, 446, 180, 912, 591
% not remediated: 18.3, 76.5, 57.0

*Including re-enrolled
^Not remediated in either
New Full-Time Freshmen in Need of Remediation
Fall Semester 2000-2003 by 2nd Year Departure
(based on ACT/SAT and UNR placement scores, N = 6,940)

End of 2nd semester

<table>
<thead>
<tr>
<th>Remediated</th>
<th>Not remediated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-enrolled %</td>
<td>87.0</td>
</tr>
<tr>
<td>Total N* =</td>
<td></td>
</tr>
<tr>
<td>% not remediated:</td>
<td></td>
</tr>
<tr>
<td>*Including re-enrolled</td>
<td></td>
</tr>
</tbody>
</table>

New Full-Time Freshmen in Need of Remediation
Fall semester 2000-2003 by 2nd Year Departure
(based on ACT/SAT and UNR placement scores)

Taken in 1st semester

<table>
<thead>
<tr>
<th>Remedial Need</th>
<th>Math only</th>
<th>Math&amp;Engl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-enrolled %</td>
<td>70.5</td>
<td>78.3</td>
</tr>
<tr>
<td>Total N* =</td>
<td>112</td>
<td>143</td>
</tr>
<tr>
<td>% w/ &lt;B grade:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Including re-enrolled</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Summary**

- **ACT/SAT test scores strongly predict academic success in college**
  - ACT/SAT scores are typically the strongest predictor of college success among a wide-range of factors examined by the research; socio-economic status, institutional commitment, social support, and social involvement are weakly connected to academic success based on cumulative research.

- There is a crisis in academic preparation of high school graduates: Nationally, **only one out of three is sufficiently prepared to go on to a 4-year college**.

- At UNR, the proportion of new freshmen that are insufficiently prepared ranges from **44 percent to 65 percent**, depending on the preparedness level considered appropriate (e.g., UNR vs. California State U. System).

- Sixty-five percent of UNR’s new freshmen needing math remediation **never complete a remedial math course**—either at UNR or somewhere else—during the first year.

- Of those who do complete remedial math, 64 percent receive less than a grade of ‘B’. These students are 50 percent more likely to leave UNR after the first year compared to those receiving at least a grade of ‘B’ in remedial math.

- Registration data from 1997 to 2002 suggest that **26 percent of students trying to enroll in remedial math at UNR fail to do so**, compared to 18 percent for remedial English.
Summary

- The level of remediation need at UNR remained constant over the past ten years.
- Millennium Scholarship students are as likely in need of remediation as other students; Millennium students account for over 70 percent of all students in need of remediation.
- Women are 50 percent more likely than men to be in need of math remediation; men are 25 percent more likely than women to be in need of English remediation.
- The proportion of Hispanic and African American students in need of remediation is at least 15 percent higher compared to Asian American or Caucasian students.
- The physical and natural sciences attract the best prepared students; education, including pre-majors, and some of the social sciences attract the least prepared students.
- The best prepared students are found in the engineering and biochemistry majors.
- Freshmen who take summer courses prior to initial matriculation are almost three times less likely in need of remediation.

Summary

- Freshmen who take advanced placement or international baccalaureate courses in high school are four times less likely in need of remediation.
- Students from McQueen and Green Valley (Clark County) high schools are least likely in need of remediation; students from Sparks and Elko high schools are most likely in need of remediation.
  - However, these differences are not due to high school institutional attributes (e.g., size, spending per student), but rather student academic and background factors.
- Early ACT/SAT test takers (e.g., juniors in high school) are less likely in need of remediation compared to the 60% of test takers who take it within 8 months of matriculation at UNR.
- Freshmen with high school grades in the bottom quartile are four times more likely in need of remediation compared to those in the top quartile.
- Freshmen who do not take and pass a first-year math course are twice as likely in need of remediation.
- Freshmen who do not take a science course are three times more likely in need of remediation.
Operational Impact

- At university level
  - **Mandatory advising** of new freshmen and **placement** into, completion of, remedial courses prior to college-level course enrollment in math or English.
  - **Expansion of remedial course sections offered** in fall and spring to accommodate enrollment demand; improved coordination with Extended Studies College and local community colleges to offer remedial courses during summer and off-campus.
  - **Restructuring of introductory-level math** curriculum and course section scheduling to improve in-sequence enrollment and **enhance math preparation** for both quantitative and non-quantitative program majors.

- At high school level in local district
  - Establishment of **‘gateway’ curriculum in high schools**
    - 4 years of math, 3 years of science courses (parental opt-out choice)
  - Seniors must enroll in 6 class periods each term
  - AP students must take AP exam
  - Sophomores must take PSAT exam

*Presentation available at [http://www.unr.edu/ia/research/](http://www.unr.edu/ia/research/)*
### Combining Multiple Psychosocial and Study Skill Factors (PSFs) and Traditional Predictors to Predict Grade Point Average

<table>
<thead>
<tr>
<th>Predictor beta weight</th>
<th>Model 4: Traditional predictors only</th>
<th>Model 5: PSFs only</th>
<th>Model 6: Traditional predictors and PSFs combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>SES</td>
<td>0.691 (.086)</td>
<td>0.035 (-.023)</td>
<td></td>
</tr>
<tr>
<td>HS GPA</td>
<td>0.298 (.332)</td>
<td>0.162 (-.040)</td>
<td></td>
</tr>
<tr>
<td>ACT/SAT</td>
<td>0.222 (.227)</td>
<td>0.231 (.274)</td>
<td></td>
</tr>
<tr>
<td>Achievement motivation</td>
<td>.161 (.198)</td>
<td>0.110 (.190)</td>
<td></td>
</tr>
<tr>
<td>Academic goals</td>
<td>-0.07 (-.193)</td>
<td>0.014 (-.202)</td>
<td></td>
</tr>
<tr>
<td>Academic self-efficacy</td>
<td>0.334 (.499)</td>
<td>0.286 (.466)</td>
<td></td>
</tr>
<tr>
<td>Multiple R</td>
<td>0.468 (.500)</td>
<td>0.405 (.533)</td>
<td>0.512 (.581)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.219 (.250)</td>
<td>0.164 (.273)</td>
<td>0.262 (.338)</td>
</tr>
<tr>
<td>$\Delta R^2$</td>
<td></td>
<td>Model 6 - Model 4: .043 (.088)</td>
<td>Model 6 - Model 5: .098 (.065)</td>
</tr>
</tbody>
</table>

**Note:** The values in parentheses are based on correlations fully corrected for measurement error in both predictor and criterion variables, so they are hypothetical values representing the optimal situation where there is no measurement error (i.e., they are estimates of the construct-level relationships among the variables). The psychosocial predictors were selected to be included in the models on the basis of the magnitudes of their zero-order correlations with the college outcome criteria (except for skills, which is not included in the retention model because there is no data enabling estimation of the intercorrelations between skills and several other variables). SES = socioeconomic status; HS GPA = high school grade point average; ACT/SAT = achievement.