**Background**

- The Graduate Record Examination (GRE) is a high-stakes test of developed cognitive abilities. Undergraduate students who aspire to graduate school are often recommended and sometimes required to take the GRE, or a test like it such as the LSAT or MCAT, for admission. Several lines of research have established these tools as valid measures of cognitive ability and strong predictors of subsequent success. For example, performance on the GRE is strongly tied to performance on other measures of cognitive ability (Angoff & Johnson, 1988; Hsu & Schomberg, 2010). Given the GRE's strong ties to other measures of cognitive ability, the GRE is likely to predict high intellectual achievement. In fact, the GRE is a strong predictor of success in both master's and doctoral graduate programs (Kuncel, Wee, Serafin, & Heckert, 2010), as well as overall GPA, graduate GPA, and grade point averages (Kuncel & Heckert, 2007), and even citation counts (Kuncel, Hoekstra, & Onas, 2003).

- Although the GRE is just one of many predictors of exceptional achievement (e.g., emotional stability and conscientiousness forecast a variety of positive life outcomes; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007), there is substantial rationale for its use in higher education admissions decisions. Large-scale databases and meta-analytic evidence suggest that cognitive loaded tests in general do not exhibit predictive bias, are not substantially affected by motivation in high-stakes testing, and demonstrate strong predictive utility even after controlling for socioeconomic status (Sackett, Borman, & Connelly, 2008; see also various reports released by ETS).

- Graduate education itself is typically viewed as the path by which the U.S. will maintain global intellectual leadership for science and technology (Wender, Bridgeham, Olin, Millett, Rock, Bell, & McNalster, 2010). Students who take the GRE represent the pool of intellectual talent aspiring to study at the graduate level. Thus, we compiled the current set of data to determine how scores on the GRE have fared over time. We compare GRE scores and graduate enrollment patterns by sex, ethnicity, and discipline to examine the flow of intellectual talent into graduate education.

**Materials**

We obtained GRE score data from Educational Testing Services (ETS) technical reports released for the periods of 1982 through 1996, and 2003 through 2007. We received enrollment and degree reports from reports released by the National Council of Graduate Schools (CGS) between 1986 and 2009. In November 2010, Nathan Bell, Director of Research and Policy Analysis at CGS, provided us with annual records of graduate enrollments and graduate degrees from 1986 to 2009, by ethnicity, sex, and discipline. Population statistics are reported from 1980, 1990, 2000, and 2010 US Census reports. Below, we list the reports from which our GRE score and graduate enrollment data are taken:

- **ETS/GRE Reports:**

- **CGS Reports:**

- **ET/CGS Reports:**
  - The following websites hold a variety of reports from ETS and CGS:

**Results**

GRE Verbal Scores Have Decreased for Both Sexes, with a Minimal Difference Between Sexes in Recent Years

- Scores on each of the Verbal and Quantitative sections of the GRE have increased since the early 1980s, and a long-enduring gap between the sexes in the Verbal section has essentially disappeared. Scores on the Quantitative section have increased at a similar rate for both sexes. In 1982, men outscored women by 75 points, and in 2004 by 44 points.

GRE Quantitative Scores Have Generally Increased, with a Consistent and Large Gap Between the Sexes

- Over the past 25 years, test takers who self-identify as Asian have consistently earned higher GRE-Quantitative scores than any other ethnic group. While test takers have shown the highest average GRE-verbal score, while black test takers have shown the lowest score, on both verbal and quantitative sections. The gap between Black and White test takers on the GRE-Verbal has diminished in recent years, and capacity between these groups on the quantitative section has not. Although GRE-Quantitative scores have increased slightly over the past 25 years, test takers who self-identify as Asian have consistently earned higher GRE-Quantitative scores than any other ethnic group.

**Discussion**

- Overall, the data compiled here suggest slowly decreasing GRE-V scores and increasing (although recently stagnant) GRE-Q scores. The fact that all groups have shown increases in GRE-Q scores since the 1980s, and that some historically disadvantaged groups have shown increases in GRE-V scores as well, suggests that an increased number of test-takers has not resulted in lower scores overall.

- Women's GRE-Q scores lag behind men's, and the gap is persistent from year to year. At the same time, however, women's representation in math-heavy disciplines has grown at a stronger rate than men's. Some people might argue that women still do not comprise 50% of students (or faculty or CEOs) in STEM (Science, Technology, Engineering, and Math) careers. However, sex differences in cognitive abilities relevant for STEM disciplines are only part of a complex picture: Women with strong quantitative abilities tend to have competing intellectual interests, are less likely than men to be committed to a work-centered life, are more interested than men in working with people as a more likely way to stay home at least part-time with their children (see Ceci, Williams, & Barnett, 2009, and Lubinski & Benbow, 2006, for lengthy reviews). Moreover, success in STEM disciplines does not appear to be a product of discrimination against women in interviewing, reviewing, or hiring (Ceci & Williams, 2010).

- The data show flow of strong intellectual talent into some disciplines over others. GRE scores among students in Education are particularly low. An additional concerning factor is that higher-scoring Education majors advancing beyond undergraduate training are more likely than lower-scoring majors to move out of Education for graduate schools (Grandy, 1995). In the current national climate, people questioning whether the U.S. really trains enough STEM-producers and our nation's teachers. By attracting individuals of high intellectual caliber to Education as a profession, we will not only be promoting the value of our nation's teachers but also improving the efficacy of our nation's education system.

**Conclusion**

- A recent report of the National Science Education, prepared jointly by the Educational Testing Service and the National Council of Graduate Schools, offered these introductory words (p. 4): “Our competitiveness in the global economy hinges on our ability to produce sufficient numbers of graduate-degree holders — people with the advanced knowledge and critical-thinking abilities to devise solutions to grand challenges such as energy independence, affordable health care, climate change and others. One of our greatest resources is our human capital. To date, we as a nation have been successful in educating more of our population at the graduate level to ensure our capacity to innovate and to secure our intellectual leadership into the future.”

- Research suggests that the GRE does just what it was designed to do—it forecasts success in grade and graduate school, as well as completion of training and subsequent impact (via citation counts). In essence, then, GRE scores provide a measure of intellectual leadership potential; we suggest that any interventions put forward must not ignore but rather acknowledge and include prescriptions for the persistence and discipline differences, sex differences, and ethnic differences in GRE scores, so that those who enroll in graduate training have the potential to secure from that training all of which it have the potential to secure from that training all of which it