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Investigating America's elite: Cognitive ability, education, and sex differences

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ABSTRACT

Are the American elite drawn from the cognitive elite? To address this, five groups of America's elite (total N = 2254) were examined: Fortune 500 CEOs, federal judges, billionaires, Senators, and members of the House of Representatives. Within each of these groups, nearly all had attended college with the majority having attended either a highly selective undergraduate institution or graduate school of some kind. High average test scores required for admission to these institutions indicated those who rise to or are selected for these positions are highly filtered for ability. Ability and education level differences were found across various sectors in which the billionaires earned their wealth (e.g., technology vs. fashion and retail); even within billionaires and CEOs wealth was found to be connected to ability and education. Within the Senate and House, Democrats had a higher level of ability and education than Republicans. Females were underrepresented among all groups, but to a lesser degree among federal judges and Democrats and to a larger degree among Republicans and CEOs. America's elite are largely drawn from the intellectually gifted, with many in the top 1% of ability.

1. Introduction

Are the American elite drawn from the cognitive elite? Murray (2008, p. 107) stated in *Real Education* that "Whether we like or not, America's future *does* depend on an elite that runs the country. The members of that elite are drawn overwhelmingly from the academically gifted." However, whether the elite are primarily composed of individuals in the top percentiles of the ability distribution who have attended the most prestigious colleges and universities has not yet been empirically examined.

The link between cognitive ability and later educational and occupational success has been well demonstrated (Kuncel, Hezlett, & Ones, 2004; Nyborg & Jensen, 2001; Schmidt & Hunter, 2004). This relationship holds even for individuals in the top 1% of the ability distribution (Park, Lubinski, & Benbow, 2007; Wai, Lubinski, & Benbow, 2005). However, another way to examine the link between ability and success is to find groups of individuals who have made it to the pinnacle of their respective professions and then retrospectively assess whether they exhibited indications of high ability at an earlier age (Cox, 1959; Simonton, 2009).

When describing America's elite, Murray (2008) makes a distinction between the *elected elite* (i.e. Senators, House members) and the *unelected elite*, who are also individuals in the top positions that shape American society. This unelected elite includes:

> "[T]he senior executives in the nation's largest corporations and financial institutions; the lawyers and judges who engage in litigation that shapes our constitutional jurisprudence; the journalists whose bylines are found in the *New York Times*, *Washington Post*, *Wall Street Journal*, and the rest of the leading print media; the producers and writers who decide what will be covered on national television news programs and how it will be covered; the producers, directors, and writers who create the nation's films and television shows; and the most influential faculty in the nation's elite universities" (pp. 107–108).

Therefore, to empirically examine whether America's elite are composed of people in the top percentiles of the ability distribution, we need groups of people who have risen to these

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positions of influence in American society as well as data that would allow a retrospective examination of their ability level.

2. Samples

The samples used in this study (total N = 2254) were public data sources that 1. matched Murray's (2008) description as part of America's elite and 2. had college, graduate school, and other basic demographic information systematically available. Billionaires were also included because they clearly have the power to and do shape American society by using their wealth (e.g., in education, politics, and philanthropy).

2.1. Fortune 500 Chief Executive Officers (CEOs)

Data on the 500 (M = 481, F = 17; age range = 39 to 94, average ≈ 57) Fortune 500 CEOs (2012) were taken from *CNN Money's* annual database of rankings (http://money.cnn.com/magazines/fortune/fortune500/2012/ceos/). Name, college, graduate school, total calculated compensation, age and sex were collected.

2.2. Federal judges

Data on the 789 active federal judges (M = 553, F = 236; age range = 40 to 89, average ≈ 60) were taken from the Biographical Directory of Federal Judges (2013) on January 16, 2013 (http://www.fjc.gov/history/home.nsf/page/judges.html). Name, college, graduate school, age and sex were collected.

2.3. Billionaires

Data on the 424 American billionaires (M = 376, F = 48; age range = 28 to 97, average ≈ 66) were taken from *Forbes* magazine's database (The World's Billionaires, 2012) (http://www.forbes.com/billionaires). Name, college, graduate school, sector in which their wealth was obtained, net worth, age and sex were collected.

2.4. Senators

Data on the 100 U.S. Senators (M = 80, F = 20; age range = 39 to 88, average ≈ 61) were taken from the Biographical Directory of the United States Congress (2012) (http://bioguide.congress.gov/biosearch/biosearch.asp). Name, college, graduate school, party affiliation, age and sex were collected.

2.5. House of Representatives

Data on the 441 U.S. House members (M = 360, F = 81; age range = 29 to 89, average ≈ 56) were also taken from the Biographical Directory of the United States Congress (2012). Name, college, graduate school, party affiliation, age and sex were collected.

3. Method

Gaining admission to a highly selective American college or university typically requires scoring at or above a certain level on the Scholastic Assessment Test (SAT) or the American College Test (ACT), which are standardized tests that have been shown to measure general intelligence or IQ to a large degree (Frey & Detterman, 2004; Koenig, Frey, & Detterman, 2008). Murray (2012, p. 366) concluded that "the average graduate of an elite college is at the 99th [per]centile of IQ of the entire population of seventeen-year-olds," basing this conclusion on SAT test data from the College Board website. He calculated that a median combined Critical Reading and Mathematics score of 1400 or greater puts a student in the top 3% of the select population of SAT test takers and well within the top 1% of seventeen-year-olds in the general population.[1] Murray defined an elite college to be roughly one of the top dozen schools in the *U.S. News & World Report* rankings. Therefore, in addition to a marker of high education level, elite college attendance also indicates a high general ability level.

Attendance at a national university or liberal arts college that had median combined SAT Critical Reading and Math scores of 1400 or greater according to the 2013 *U.S. News* rankings (America's Best Colleges, 2013) was used as one reasonable indicator that the individual was in the top 1% in ability in the American population (Murray, 2012). The *U.S. News* rankings report the 25th and 75th combined SAT Critical Reading and Math or ACT composite percentiles so an average of these two values was computed to approximate the median score. Before doing this, ACT composites were translated to SAT composites using a concordance table (ACT, 2011). There were 21 national universities and 8 liberal arts colleges that met these criteria for a total of 29 schools. Table 1a gives a list of these schools ranked by SAT scores.[2] Elite graduate school attendance was also used as a reasonable indicator that the individual was in the top 1% in ability. *U.S. News* ranks law and business schools and reports average Law School Admission Test (LSAT) and Graduate Management Admission Test (GMAT) scores which are relevant to at least two of the samples examined in this study: federal judges and Fortune 500 CEOs. The top law and business schools were rank ordered according to test scores and the top 12 from each group were selected which approximate the top 10% of test takers within each pool (GMAT, 2013; LSAC, 2007). Given that the fraction of the college graduate population who go on to take the GMAT and LSAT are extremely select, individuals who attended one of these schools are likely well within the top 1% in ability. Table 1b and c gives a list of the top 12 schools in each group ranked by LSAT and GMAT scores. Finally, because *U.S. News* only ranks other

[1] According to Murray (2012, p. 366): "In 2010, a combined score of 1400 put a student at about the 97th percentile of all students who took the SAT (based on the distribution produced by the known means and standard deviations for the two tests and a correlation of +0.7 between them). But the number of test-takers in 2010 represented only 36% of the seventeen-year-olds in the country. Any plausible assumptions about the proportion of the 62% of seventeen-year-olds who didn't take the SAT who could have gotten a combined score of 1400 or more puts a student who actually does score 1400 well into the 99th [per]centile of the seventeen-year-old population."

[2] Table 1a also allows a comparison of the elite schools included in this study strictly based on average ability level. The *U.S. News* rankings included criteria not just limited to ability so the fact the rank order has shifted when only examining ability is notable. Overall, top national universities had higher average test scores than top liberal arts colleges. The California Institute of Technology (originally ranked 10th among national universities) rose to number one with the highest ability level and Harvey Mudd College (originally ranked 12th among liberal arts colleges) rose to a tie with Princeton University at number two. Stanford University (6th to 12th), Duke University (8th to 16th), and the University of Pennsylvania (8th to 17th) all dropped in rank when accounting for ability alone. Otherwise, the rank order remained similar.

Table 1
Schools attended that indicate top 1% in ability status (ranked by ability).

a. National universities and liberal arts colleges	Combined SAT math and critical reading scores
1. California Institute of Technology	1525
2. Harvey Mudd College	1500
2. Princeton University	1500
4. Yale University	1495
5. Harvard University	1490
5. Massachusetts Institute of Technology	1490
7. University of Chicago	1485
8. Columbia University	1475
9. Washington University in St. Louis	1465
9. University of Notre Dame	1465
11. Pomona College	1460
12. Stanford University	1455
12. Dartmouth College	1455
14. Northwestern University	1445
14. Vanderbilt University	1445
16. Duke University	1440
16. University of Pennsylvania	1440
16. Swarthmore College	1440
19. Brown University	1430
19. Rice University	1430
19. Tufts University	1430
22. Amherst College	1425
23. Williams College	1420
24. Carleton College	1415
25. Johns Hopkins University	1410
25. Carnegie Mellon University	1410
25. Bowdoin College	1410
28. Cornell University	1400
28. Haverford College	1400

b. Law schools	Average LSAT scores
1. Yale University	173.5
1. Harvard University	173.5
3. Columbia University	172.5
4. New York University	172
5. University of Chicago	170
6. Stanford University	169.5
7. Duke University	169
7. Georgetown University	169
9. University of Pennsylvania	168.5
9. University of Michigan — Ann Arbor	168.5
11. University of Virginia	168
11. Northwestern University	168

c. Business Schools	Average GMAT scores
1. Stanford University	730
2. Harvard University	724
3. University of Chicago	719
3. Yale University	719
3. New York University (Stern)	719
6. University of Pennsylvania (Wharton)	718
6. Dartmouth College (Tuck)	718
8. Columbia University	716
9. University of California Berkeley	715
10. Northwestern University	712
11. Massachusetts Institute of Technology	710
12. University of Michigan — Ann Arbor (Ross)	703

Note. These data were taken from the 2013 *U.S. News* rankings (America's Best Colleges, 2013). A combined SAT Critical Reading and Mathematics score of 1400 or greater places an individual in the top 3% of all test takers and well within the top 1% in ability of all seventeen-year-olds in the population. An LSAT score of 168 or higher and a GMAT score of 700 or higher places an individual in roughly the top 10% of test takers in the respective pools. Given that the fraction of the college graduate population who go on to take the GMAT and LSAT are extremely select, individuals who attended one of these schools are likely well within the top 1% in ability.

graduate schools according to narrow discipline, the list of the 21 national undergraduate universities was also used as a reasonable indicator that if an individual had attended one of these schools for graduate school other than law or business that this individual was likely in the top 1% in ability.[3] Just because an individual did not attend one of these schools does not mean they were not in the top 1% of ability. For example, they might have chosen to attend a less selective school for financial reasons. And just because an individual did attend one of these schools does not mean they were in the top 1% of ability. For example, they might have been legacy or athletic admits who do not usually meet the typical test score criteria (Espenshade & Radford, 2009). Overall, this method appears to be reasonable as factors in both directions likely counterbalance one another.

The present study addressed two primary questions: 1. How cognitively able and educated are these groups of America's elite? and 2. Are there sex differences among these groups of America's elite? In addition, comparisons between Republicans and Democrats, differences in ability and education level across billionaire sectors, and the connection between ability, education, and wealth were explored. To assess significance between groups when appropriate, independent sample *t* tests and confidence intervals around the differences between proportions were computed (Agresti, 2007). In addition, *h* for the effect size for proportions (Cohen, 1988), along with *d*, the standard effect size measure, were computed when appropriate.

4. Results

4.1. Cognitive ability and education level of America's elite

Table 2 presents data on the education and ability level for each group in four primary independent categories. *Elite School* indicates the percentage of people who attended one of the top schools in Table 1 for either undergraduate or graduate school according to the *U.S. News* rankings (America's Best Colleges, 2013) and roughly represents a group in the top 1% of ability. *Graduate School* indicates the percentage having attended some graduate school independent of the Elite School category and roughly represents a group likely in the top percentiles of ability. *College* indicates the percentage having attended college but not Graduate School or an Elite School. *NR/NC* indicates the

[3] Because some participants attended college in a different country, there were three other schools that were classified as being part of the Elite School group due to their known selectivity and international reputations: The Indian Institutes of Technology, Cambridge University, and Oxford University. The 2013 best college and university rankings are for present day and did not hold precise rank order across the past decades when many of the individuals in this study attended college or graduate school. However, according to Cole (2009, pp. 33–34): "Whatever the basis for the rankings, the same small group of elite public and private universities would be designated as 'distinguished.' The top 10 or 15 in 1903 are still rated among the top 20 or so in most studies of university quality." Thus there has been relatively little shift in rank order over time among the very top schools. Due to the wide age range of individuals within each group, analyses were conducted examining the effect of age on Elite School attendance by comparing participants at or above the median age to those below the median age. For all groups a slightly higher proportion of younger participants attended an Elite School but none of these comparisons were significant. Therefore, even though participants attended Elite Schools across a wide span of time, average SAT and ACT scores are likely similar across time due to the consistent pattern of university rankings. For all these reasons, using the 2013 rankings appears reasonable.

Table 2
Ability and education level among Fortune 500 CEOs, federal judges, billionaires, Senate members, and House members.

	Sample size (N)	Elite school (Top 1%)	Graduate school	College	NR/NC	Harvard	M to F ratio
Fortune 500 CEOs	500	38.6%	28.4%	27.2%	5.8%	13.2%	28.3
Federal judges	789	40.9%	59.1%	—	—	11.9%	2.3
Billionaires	424	45.0%	11.6%	31.4%	12.0%	11.3%	7.8
Senators	100	41.0%	42.0%	16.0%	1.0%	12.0%	4.0
House of Representatives	441	20.6%	47.5%	30.8%	0.9%	6.6%	4.4

Note. Elite School = person attended one of the top schools in Table 1 for either undergraduate or graduate school according to the *U.S. News* rankings which reasonably indicates top 1% in ability status. Graduate School = percentage that attended graduate school. College = percentage that attended college. NR/NC = percentage that did not report any education or had no college. The Elite School, Graduate School, College, and NR/NC categories are independent of one another and sum to 100%. No information was available in the College and NR/NC categories for federal judges because all had obtained a JD. Harvard = percentage that attended Harvard University. M to F ratio = The ratio of males to females within each category.

percentage that either did not report their education or had no college. These four categories sum to 100%.

Roughly one third to one half of the billionaires (45.0%), Fortune 500 CEOs (38.6%), Senators (41.0%), and federal judges (40.9%) attended a school requiring standardized test scores that likely places them in the top 1% of ability. This finding replicated across four of the five categories. The exception was the House of Representatives (20.6%). Therefore, the Senate had a higher education and ability level than the House. All of the judges attended college, as did the majority of the House (99.1%), Senate (99.0%), CEOs (94.2%), and billionaires (88%). An independent analysis examined the percentage of each group that attended Harvard (one of the Elite Schools). Similar to the Elite School analysis, this percentage replicated for CEOs (13.2%), Senators (12.0%), judges (11.9%), and billionaires (11.3%), but was again lower for the House (6.6%).

4.2. Sex differences in ability and education level by group and political party

Table 2 also examines the ratio of males to females within each group. Males were more highly represented as CEOs (28.3 males for every 1 female), billionaires (7.8 to 1), House members (4.4 to 1), Senators (4.0 to 1), and judges (2.3 to 1). Fig. 1 panel A examines sex differences across groups with the Senate and House as a function of political party. House Republicans (11.2 to 1) and Senate Republicans (10.3 to 1) showed greater female underrepresentation than House Democrats (2.4 to 1) and Senate Democrats (2.3 to 1).

Fig. 1 panel B examines sex differences further by looking at the percentage of males and females within each group who attended an Elite School. Significance tests were not computed due to limited sample sizes for females (see Appendix A), but effect sizes were computed. Males were more likely to attend an Elite School if they were a Senate Democrat (M: 67.6%, F: 25.0%; $h = 0.89$), billionaire (M: 47.3%, F: 27.1%; $h = 0.42$), House Democrat (M: 37.4%, F: 16.1%; $h = 0.49$), or Senate Republican (M: 24.4%, F: 0%; $h = 1.02$). Males were about as likely as females to attend an Elite School if they were a judge (M: 40.7%, F: 41.5%; $h = -0.02$) or House Republican (M: 11.7%, F: 5.3%; $h = 0.26$). However, among CEOs, females were more likely than males to attend an Elite School (M: 38.0%, F: 58.8%; $h = -0.42$), thus the females who ended up as CEOs – although quite low in number (N = 17) – were smarter and attended a more prestigious school than their male counterparts.

4.3. Ability and education level of republicans and democrats

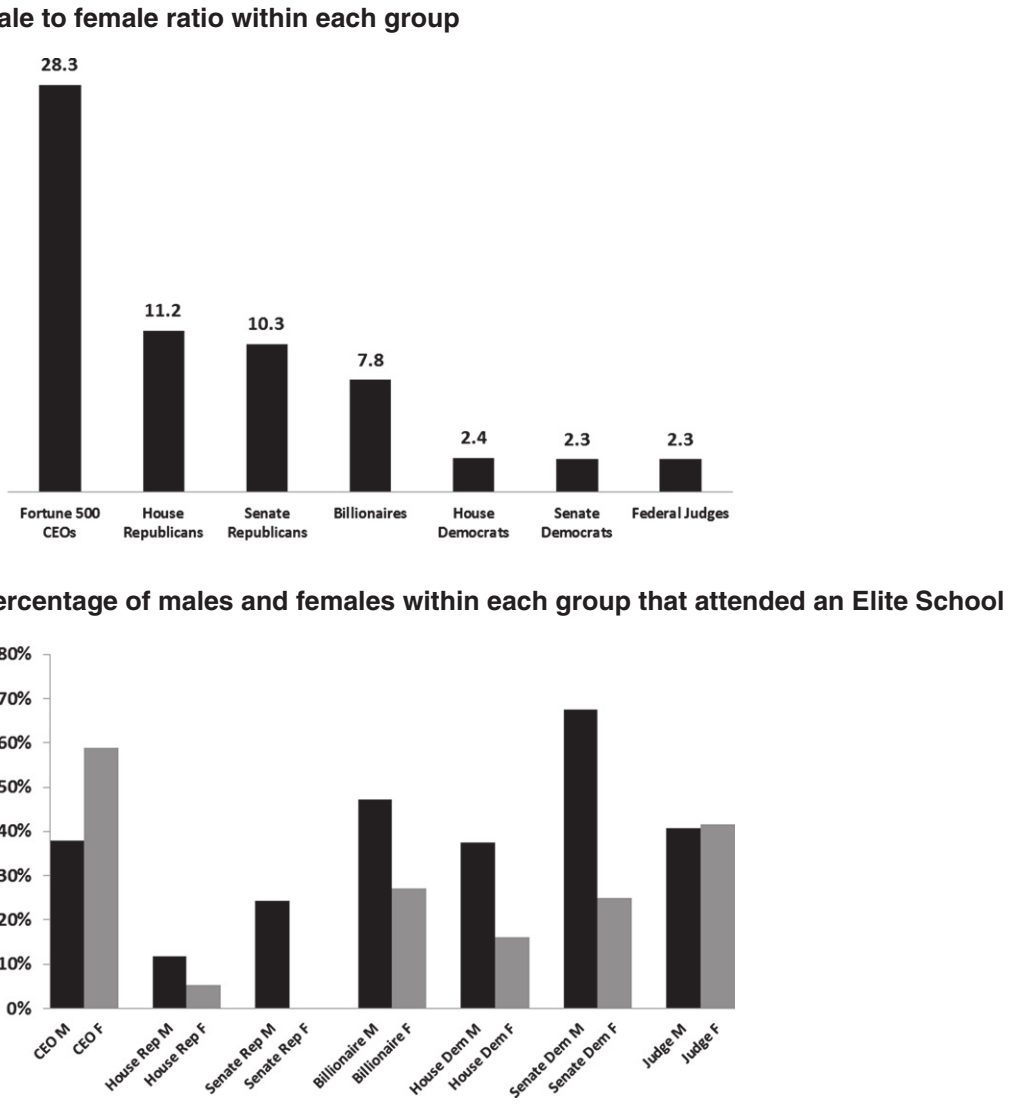
Fig. 1 panel A shows that the ratio of males to females was greater for Republicans than for Democrats. However, Fig. 1 panel B and Appendix A illustrate that Democrats were significantly more likely to have attended an Elite School than Republicans in both the Senate (D: 54.7%, R: 22.2%; 95% CI Proportion Differences: 0.14, 0.51, *significant*; $h = 0.70$) and the House (D: 31.1%, R: 11.2%; 95% CI PD: 0.12, 0.27, *significant*; $h = 0.51$). Democrats were also more likely to have attended Harvard than Republicans in both the Senate (D: 15.1%, R: 8.9%, 95% CI PD: N/A; $h = 0.19$) and the House (D: 12.4%, R: 1.3%, 95% CI PD: N/A; $h = 0.51$). This pattern held for males and females. Therefore, at least in 2012, Democrats were more likely than Republicans to have attended an Elite School and be in the top percentile of ability.

4.4. Ability and education level across billionaire sectors

Billionaires, overall, had the highest percentage that attended an Elite School (45.0%). However, whether there were differences across the various sectors in which the billionaires made their money remains unclear. Fig. 2 compares the education and ability level of the billionaires by looking at sectors with samples greater than 25. The groups were rank ordered as a function of whether they attended college (Elite School + Graduate School + College) or not (NR/NC). The Investments (69.4%) and Technology (63.3%) sectors had the highest percentages attending an Elite School and the Fashion and Retail (25.0%) and Food and Beverage (22.6%) sectors had the lowest. The Investments (26.5%) and Technology (16.3%) sectors had the highest Harvard attendance and the Fashion and Retail and Food and Beverage sectors had zero attendance. This shows the majority of people in Investments and Technology were in the top 1% of ability and that higher brainpower is concentrated in some sectors compared to others.

4.5. Ability, education, and wealth within billionaires and CEOs

The next set of analyses examined whether smarter people accumulated greater wealth, even within extremely select groups. For billionaires and CEOs data was available on net worth and total calculated compensation, respectively. Table 3a examines whether billionaires and CEOs with wealth and compensation greater than or equal to the median of their group had a higher ability level than those with wealth and compensation below the median. Those with greater wealth



Note. In Figure 1 Panel B"Rep" = Republicans, "Dem" = Democrats, "M" = males, and "F" = females.

Fig. 1. Sex differences in ability and education level as a function of political party. Panel A. Male to female ratio within each group. Panel B. Percentage of males and females within each group that attended an Elite School.

tended to be more likely to have attended an Elite School for both billionaires (≥Median: 47.7%, <Median: 42.4%; 95% CI PD: −0.04, 0.15, *not significant*; $h = 0.12$) and CEOs (≥Median: 46.4%, <Median: 30.6%; 95% CI PD: 0.07, 0.25, *significant*; $h = 0.31$), although the comparison for billionaires was not significant. Table 3b shows the average net worth of those that attended an Elite School was higher than those who did not for billionaires (Elite: $5.01 billion, Not Elite: $3.31 billion, $t = 2.87$, $p = 0.004$, $d = 0.27$) and CEOs (Elite: $12,583,176, Not Elite: $11,725,952, $t = 0.45$, $p = 0.65$, $d = 0.05$), although the comparison for CEOs was not significant. Table 3c examines whether even within the top 1% of ability those billionaires and CEOs who had SAT or GMAT scores equal to or greater than the median had greater wealth than those below the median. Those with higher ability had higher wealth for billionaires on the SAT (≥Median: $6.04 billion, <Median: $3.36 billion, $t = 1.93$, $p = 0.056$, $d = 0.35$), CEOs on the SAT (≥Median: $14,419,391, <Median: $12,078,294, $t = 0.83$, $p = 0.830$, $d = 0.21$), and CEOs on the GMAT (≥Median: $12,992,761, <Median: $11,139,462, $t = 1.23$, $p = 0.223$, $d = 0.26$). However, none of these three comparisons within the top 1% reached statistical significance. When taken together, however, these analyses show that even within these extremely select and high achieving groups, higher wealth is positively associated with higher ability and education level.[4]

[4] It is important to note that there is likely a restriction of range on ability for these comparisons because the SAT or ACT may be too easy for intellectually talented students who attend these elite colleges and who take the tests in the 11th grade (Wai, 2012a). If the measures had sufficient headroom, the association between ability and wealth within these highly select samples would have been more accurately examined.

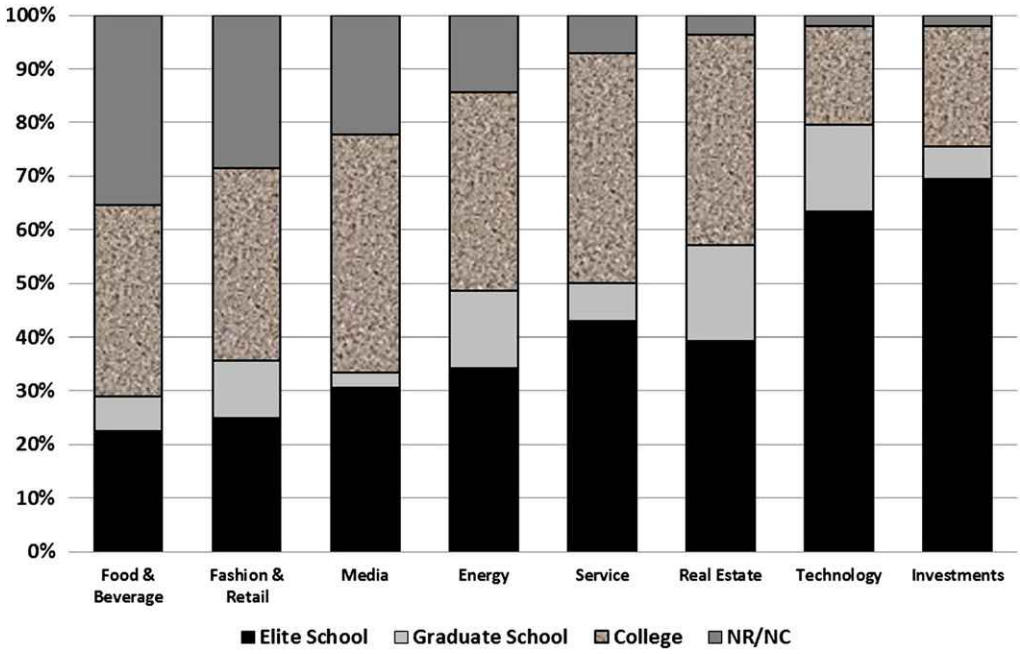


Fig. 2. Billionaire ability and education level by sector.

5. Discussion

5.1. America's elite are highly able and highly educated

Murray (2008) was correct that a large portion of America's elite are drawn from the intellectually gifted. This held for every group except the House of Representatives, which had a lower percentage having attended an Elite School. If the definition of elite is broadened to include either attendance at an Elite School or Graduate School then the majority met these criteria and are likely in the top percentiles of ability. This would include 56.6% of the billionaires, 67.0% of the CEOs, 68.1% of the House, 83.0% of the Senate, and all of the judges. All the federal judges and Senators and nearly all the other groups attended college.

The connection between attending Harvard University and being a part of America's elite was also investigated. Roughly 11% to 13% of CEOs, judges, billionaires, and Senators had attended Harvard in some capacity, but only 6.6% of the House did so. Harvard only enrolls a small fraction of the students who end up in the schools at the top of the *U.S. News* rankings, so this illustrates its disproportionate reach into the positions of power among America's elite.

5.2. Females are underrepresented among the elite

Although there is much discussion today about female underrepresentation in science, technology, engineering, and mathematics (STEM; Ceci & Williams, 2010; Wai, Cacchio, Putallaz, & Makel, 2010), females are also underrepresented to a small degree in federal judgeships, the House, the Senate, and to a larger degree among billionaires and especially among Fortune 500 CEOs (see Fig. 1 panel A). Females are also more highly underrepresented in the Republican compared to the Democratic party within the House and Senate. Females had lower average ability than males in the House, Senate, and among billionaires. Females had similar ability to males among federal judges and had higher ability among CEOs (see Appendix A). However, it is unclear whether (and if so to what degree) these abilities contributed to their underrepresentation because these were females who had already made it to the top of their respective fields. In fact, the higher average ability of female CEOs suggests that these females needed to be smarter than their male counterparts in order to make it to the top of a Fortune 500 corporation.

5.3. Democrats have a higher ability and education level than Republicans

Research has indicated that individuals who are politically liberal are more likely to have higher ability than those who are politically conservative in America (Kanazawa, 2010) and Britain (Deary, Batty, & Gale, 2008). However, this finding pertained to voters rather than political leaders those people had elected. This study demonstrates that in America, Democrats were more likely than Republicans to have a higher percentage of Senate and House members who attended an Elite School which places these individuals in the top 1% in ability (see Fig. 1 panel B and Appendix A). Therefore, among the elected elite, Democrats had a higher ability and education level, on average, than Republicans.

There is a stereotype that America's political leaders are primarily lawyers (Friedman, 2005). JDs were earned by 57.0% of the Senate and 13.8% of the House. Therefore, a slight majority of Senators were lawyers, but the majority of House members were not.

5.4. Ability and education level varies across billionaire sectors

Average general ability level has been demonstrated to vary across occupations (Wai, Lubinski, & Benbow, 2009, p. 834),

Table 3
Ability, education level, and wealth among billionaires and CEOs.

	Sample size (N)	Elite School (Top 1%)	Graduate school	College	NR/NC	Harvard
a.						
Billionaire worth ≥ median	218	47.7%	8.7%	29.4%	14.2%	11.9%
Billionaire worth < median	205	42.4%	14.6%	33.7%	9.3%	10.7%
CEO compensation ≥ median	222	46.4%	23.9%	27.9%	1.8%	16.2%
CEO compensation < median	222	30.6%	33.8%	27.0%	8.6%	9.5%
	N	Elite school	SD	N	Not Elite School	SD
b.						
Billionaires[a]	191	$5.01 billion	8.01	232	$3.31 billion	3.78
CEOs	171	$12,583,176	9,759,981	273	$11,725,952	23,637,855
	N	≥Median	SD	N	<Median	SD
c. Top 1%						
Billionaires SAT[a]	77	$6.04 billion	10.08	58	$3.36 billion	3.72
CEOs SAT	55	$14,419,391	14,602,472	30	$12,078,294	6,731,511
CEOs GMAT	49	$12,992,761	8,446,230	44	$11,139,462	5,701,431

Note. The median billionaire net worth was $2.3 billion. The median Fortune 500 CEO total calculated compensation was $9,693,960. The median SAT score was 1455. The median GMAT score was 724.

[a] Net worth was reported in billions of dollars.

with people having occupations in STEM – which require high math ability – possessing the highest general ability level compared to all other groups. Fig. 2 illustrates that average ability level also varies across billionaire sectors, with those requiring high math ability (i.e., Investments, Technology) having the largest percentage of individuals who attended an Elite School. This replicates the pattern of occupations and ability levels in a stratified random sample (Wai et al., 2009) within a group highly selected for wealth (in the top 0.0000001%). Table 1a also replicates this pattern showing that by ranking schools strictly based on ability level, schools that are known for STEM rose to the top (i.e., California Institute of Technology and Harvey Mudd College).

This also shows that Bill Gates and Mark Zuckerberg (included in the Technology sector), who are often used as prominent examples in the media as to why going to college is not necessary for success (e.g., Lin, 2010: "Top 10 college dropouts"; Williams, 2012: "Saying no to college"), are actually exceptions to the rule. Within the billionaire sample, 37 (8.7%) were clearly marked as a college drop out by the *Forbes* staff who compiled the data. The majority of the billionaires (88%) went to college and graduated.

5.5. Even within billionaires and CEOs, wealth is connected to education and ability

Even within a group in the top 0.0000001% of wealth and a group of CEOs who were compensated quite highly (well within the top 1% of wealth), there were differences in the education and ability level between those who earned more money compared to those who earned less. The analyses in Table 3a and b demonstrate that even within billionaires and CEOs, higher education and ability level is related to higher net worth and compensation. Prior research demonstrated that even within a group in the top 1% in ability, higher ability is associated with higher income (Wai et al., 2005). The analyses in Table 3c demonstrated that even within the top 1% of ability, higher ability is associated with higher net worth and compensation. Therefore, this study adds to, expands, and strengthens the literature linking education, ability, and wealth (Murray, 1998; Nyborg & Jensen, 2001; Zax & Rees, 2002), and provides further evidence that does not support an ability threshold hypothesis (Kuncel & Hezlett, 2010; Park et al., 2007; Wai et al., 2005) — or the idea that more ability does not matter beyond a certain point in predicting real world outcomes.

5.6. Limitations of this study

This study used average SAT or ACT scores of a college or university (America's Best Colleges, 2013) as an approximation for ability level (Frey & Detterman, 2004; Koenig et al., 2008), which may not hold for each individual case. It would have been optimal to have access to individual test scores, but unfortunately this data was not publicly available. However, using average SAT and ACT scores as an approximation for ability level may give an underestimate because extremely smart people may not have chosen to attend a top school for multiple reasons (e.g., financial, scholarship, staying close to home). Alternatively, using this method may also give an overestimate because there are many legacies and athletic admits to elite institutions who do not usually meet the typical test score criteria (Espenshade & Radford, 2009). The groups of people examined in this study are not fully representative of the many other individuals in the top 1% of ability in America, and are likely defined by attributes (such as high motivation and willingness to work) that are not limited to ability. Additionally, this study examines five sectors of America's elite. However, these sectors do not include all the individuals who shape American society and therefore these findings may not generalize to other sectors. The groups not included due to unavailable or unsystematic data were top journalists, producers and writers of major news programs, the producers, directors and writers that create America's film and television shows, and the most

influential university faculty. If possible, future research including these other groups would be informative.

6. Conclusion

Both those who are elected by Americans and those who are selected through other means to enter positions that greatly influence American society are not ordinary when it comes to cognitive ability and education. These elite individuals are drawn largely from the intellectually talented, with many of them in the top 1% of education and ability (Wai, 2012b).

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Appendix A

Ability and education level among Fortune 500 CEOs, federal judges, billionaires, Senate members, and House members as a function of political party and sex

	Sample size	Elite school (Top 1%)	Graduate school	College	NR/NC	Harvard
a. Fortune 500 CEOs						
Males and females	500	38.6%	28.4%	27.2%	5.8%	13.2%
Males	481	38.0%	29.1%	27.4%	5.4%	13.7%
Females	17	58.8%	11.8%	23.5%	5.9%	0%
b. Federal judges						
Males and females	789	40.9%	59.1%	—	—	11.9%
Males	553	40.7%	59.3%	—	—	12.7%
Females	236	41.5%	58.5%	—	—	10.2%
c. Billionaires						
Males and females	424	45.0%	11.6%	31.4%	12.0%	11.3%
Males	376	47.3%	12.0%	30.3%	10.4%	12.0%
Females	48	27.1%	8.3%	39.6%	25.0%	6.3%
d. Republican Senate						
Males and females	45	22.2%	57.8%	20.0%	0%	8.9%
Males	41	24.4%	58.5%	17.1%	0%	9.8%
Females	4	0%	50.0%	50.0%	0%	0%
e. Democrat Senate						
Males and females	53	54.7%	30.2%	13.2%	1.9%	15.1%
Males	37	67.6%	21.6%	8.1%	2.7%	21.6%
Females	16	25.0%	50.0%	25.0%	0%	0%
d. Republican House						
Males and females	232	11.2%	48.7%	39.2%	0.9%	1.3%
Males	213	11.7%	49.3%	38.0%	0.9%	1.4%
Females	19	5.3%	42.1%	52.6%	0%	0%
e. Democrat House						
Males and females	209	31.1%	46.4%	21.5%	1.0%	12.4%
Males	147	37.4%	44.2%	17.0%	1.4%	16.3%
Females	62	16.1%	51.6%	32.3%	0%	3.2%

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