**Procedure for Selecting Google Correlate Search Terms**

A list of 40 phrases and terms that might be used by high school and college students as a search engine query (i.e., a search term). These terms were generated by the researchers and undergraduate research assistants and were terms that high school and college students might use when doing academic work. Seventy-one participants (*M* age = 36.16, *SD* = 12.23) recruited on Amazon Mturk rated the likelihood that each potential query would be used by a high school or college student when they a) wanted to work hard at learning and b) when they wanted to find a low-effort shortcut on a 5-point Likert scale from 1 (*Very unlikely*) to 5 (*Very likely*). The initial sample included 72 participants, but one participant reported that they answered questions randomly and was removed. (Demographic information was calculated on the final sample, excluding this participant.) Query order was randomized and participants provided these two ratings for each word simultaneously. The task took approximately seven minutes and participants were compensated $0.50. Every participant had graduated from college and many had continued schooling through and beyond college (10% high school degree; 17.14% some college but no degree; 15.71% 2-year college degree; 42.86% 4-year college degree; 10% masters degree; 4.29% doctoral degree). All participants lived in the United States, and participants represented 30 states.

Thirteen search terms were identified as being the most uniquely related to looking for academic shortcuts. First, terms whose average “shortcut” likelihood rating was above the midpoint (i.e., > 3) and whose average “work hard” likelihood rating was below the midpoint (i.e., < 3) were selected. Then, the thirteen search terms with the greatest difference between “shortcut” and “work hard” ratings were selected (see Table 1). These terms are: “how to cheat”;“scantron cheat”; “free term paper”; “fake doctors note”; “cheathouse”; “free research paper”; “answer key”; “worksheet answers”; “corrupt a file”; “equation solver”; “cliff notes”; “test banks”; “sparknotes.”

An equivalent process was used to identify the thirteen search terms most uniquely related to looking for ways to work hard at learning (see Table 2). These terms are: “how to take notes”; “how to cite”; “study tips”; “thesaurus”; “khan academy”; “discussion questions”; “how to memorize”; “research paper ideas”; “coursera”; “quizlet”; “scholarpedia”; “lab report example”; “EdX.”

The raw data (“wide\_ratingsdata.xls”; “long\_ratingsdata.xls”) and SAS code used to select the focal search terms (“mturk\_searchtermanalysis.txt”) are in the Marsh labshare under Hannah > Google Correlate.

Table 1. Shortcut queries

|  |  |  |  |
| --- | --- | --- | --- |
| query | shortcut rating mean | shortcut rating SD | shortcut mean - work hard mean |
| how to cheat | 4.69 | 0.81 | 3.43 |
| scantron cheat | 4.71 | 0.73 | 3.34 |
| free term paper | 4.64 | 0.73 | 3.28 |
| fake doctors note | 4.64 | 0.80 | 3.28 |
| cheathouse | 4.63 | 0.77 | 3.26 |
| free research paper | 4.59 | 0.71 | 2.99 |
| answer key | 4.61 | 0.80 | 2.89 |
| worksheet answers | 4.49 | 0.81 | 2.77 |
| corrupt a file | 3.79 | 1.20 | 2.00 |
| equation solver | 4.13 | 0.98 | 1.77 |
| cliff notes | 3.86 | 1.22 | 1.33 |
| test banks | 3.65 | 1.04 | 1.27 |
| sparknotes | 3.74 | 1.12 | 1.08 |

Table 2. Work hard queries

|  |  |  |  |
| --- | --- | --- | --- |
| query | work hard rating mean | work hard rating SD | work hard mean - shortcut mean |
| how to take notes | 4.49 | 0.77 | 2.55 |
| how to cite | 4.42 | 0.75 | 2.45 |
| study tips | 4.32 | 0.87 | 2.01 |
| thesaurus | 4.04 | 0.94 | 1.63 |
| khan academy | 3.93 | 0.97 | 1.56 |
| discusison questions | 3.96 | 0.84 | 1.48 |
| how to memorize | 3.96 | 1.16 | 1.46 |
| research paper ideas | 3.69 | 0.93 | 0.93 |
| coursera | 3.50 | 0.95 | 0.86 |
| quizlet | 3.53 | 1.17 | 0.85 |
| scholarpedia | 3.64 | 1.24 | 0.81 |
| lab report example | 3.66 | 0.99 | 0.80 |
| EdX | 3.38 | 1.09 | 0.73 |

**Procedure for Obtaining Relative Search Frequencies**

Google Correlate is a free online tool that provides information about search term frequency aggregated at the state level. Each of the 26 focal queries were entered into Google Correlate and the relative search frequency of each term for each state was obtained (in February of 2016). For all shortcut and work hard terms, relative search frequencies were averaged together to create a summary score (shortcut Cronbach’s alpha = 0.85, work hard Cronbach’s alpha = 0.70).

**State level Income and Gini**

Gini coefficient scores (obtained from census.gov) for each state from 2002 – 2012 were averaged together to create our measure of *income inequality*. The scores were very stable across the ten years (Cronbach’s alpha = 0.986). (NOTE: To be determined whether Gini was calculated pre- or post- tax) – Keith thinks the census gini data are pre-tax.

Average income for each state from 2002 – 2012 (obtained from bber.unm.edu/data) were averaged together to create our measure of *income*, which was used as a covariate in the model. These, too, were quite stable (Cronbach’s alpha = 0.994). (NOTE: To be determined whether income is pre- or post- tax)

**Academic Achievement Variables**

***Academic Achievement***

Academic achievement was measured by averaging together average NAEP 8th grade reading and math scores in each state (8th grade is the only age with data available from all states) from 2007 – 2015 (obtained from NCES).

***Academic Achievement Standard Deviations***

Academic achievement standard deviations are the standard deviations of each mean used in the previously described metric, averaged together.

***Graduation Rate Data***

From NCES, CPS data <http://nces.ed.gov/pubs2015/2015015.pdf>.

File: "G:\MarshLab\Hannah\Google Correlate\GraduationRates.pdf"

Citation: Stark, P., and Noel, A.M. (2015). Trends in High School Dropout and Completion Rates in the United States: 1972–2012 (NCES 2015- 015). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

***Event dropout rate, 2000 - 2011*** – the percentage of (public) high school students who left high school between the beginning of one school year and the beginning of the next without earning a high school diploma or an alternative credential. Calculated using CPS and Common Core of Data.

File: "G:\MarshLab\Hannah\Google Correlate\Event drop out rate.xlsx"

***Adjusted cohort graduation rate (ACGR), 2010, 2011*** – the percent of public high school freshmen who graduate with a regular diploma 4 years after starting 9th grade – calculated by State Education Agencies and submitted to the US Department of Ed.

File: "G:\MarshLab\Hannah\Google Correlate\adjusted cohort graduation rate.xlsx"

***Averaged freshman graduation rate (AFGR), 2002 – 2012*** – an estimate of the percentage of an entering freshman class graduating in 4 years

File: "G:\MarshLab\Hannah\Google Correlate\averaged freshman graduation rate.xlsx"

**Analyses**

Independent variables used were: Gini, Income, and their interaction.

Dependent variables used were: Event drop out rate, freshman graduation rate, cohort graduation rate, NAEP Math and Reading scores (averaged), SD of NAEP Math and Reading scores, Workhard Search Frequency, and Shortcut Search Frequency.

***Descriptives***

*Correlations among state-level variables*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | Gini | Income | Event DOR | Freshman  GR | Cohort GR | NAEP | sd NAEP | Workhard |
| 1. Gini | - |  |  |  |  |  |  |  |
| 1. Income | .09 | - |  |  |  |  |  |  |
| 1. Event Drop Out Rate | .07 | -.09 | - |  |  |  |  |  |
| 1. Freshman Grad Rate | -.42\*\* | .29\* | -.59\*\*\* | - |  |  |  |  |
| 1. Cohort Grad Rate | -.21 | .22 | -.62\*\*\* | .80\*\*\* | - |  |  |  |
| 1. NAEP Math & Reading Scores | -.38\*\* | .54\*\*\* | -.44\*\* | .75\*\*\* | .58\*\*\* | - |  |  |
| 1. SD of NAEP Scores | .30\* | .27 | -.33\* | -.28 | -.34\* | -.27 | - |  |
| 1. Workhard Search Terms | -.18 | .07 | -.27 | .32\* | .42\*\* | .20 | -.06 | - |
| 1. Shortcut Search Terms | .55\*\*\* | -.33\* | -.15 | -.35\*\* | -.06 | -.50\*\*\* | .09 | .14 |

Note. *N* = 50, Freshman Grad Rate *N* = 49, Cohort Grad Rate *N* = 47.

*Means, Standard Deviations, Minimum and Maximum of Focal Variables*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Mean | Standard Deviation | Min | Max |
| 1. Gini | .448 | .018 | .408 | .497 |
| 1. Income | 36535.2 | 5130.72 | 28485.0 | 51946.0 |
| 1. Event Drop Out rate | 3.923 | 1.343 | 1.850 | 7.641 |
| 1. Freshman Grad rate | 77.251 | 6.918 | 57.77 | 89.32 |
| 1. Cohort Grad rate | 79.51 | 6.28 | 62.50 | 88.50 |
| 1. NAEP Math & Reading Scores | 273.780 | 6.097 | 260.120 | 286.651 |
| 1. SD of NAEP Scores | 34.171 | 1.567 | 29.582 | 37.736 |
| 1. Workhard Search Terms | 0.020 | 0.462 | -1.098 | 0.817 |
| 1. Shortcut Search Terms | 0.014 | 0.589 | -1.140 | 1.514 |

***Regressions***

Note *b* is the unstandardized partial regression coefficient, *B* is the standardized partial regression coefficient, ssr is the squared semi-partial correlation.

**Shortcut Search Frequency**

Shortcut Search Frequency = *b1*Income + *b2* Gini, *F*(2, 47) = 19.00, *p <*.0001

*b1* = -0.00004, *B1* = -0.38, ssr = 0.15, *p* = .0009

*b2* = 18.194, *B2* = 0.58, ssr = 0.34, *p* = <.0001

Shortcut Search Frequency = *b1*Income + *b2* Gini + *b3* Income x Gini, *F*(3, 46) = 12.73, *p <*.0001

*b1* = -0.000039, *B1* = -0.34, ssr = 0.09, *p* = .0086

*b2* = 18.86, *B2* = 0.60, ssr = 0.34, *p* = <.0001

*b3* = -0.00046, *B3* = -0.09

***Conclusions: A state’s income and gini predict the amount that people in that state search for academic shortcuts, independently and when entered into a model together. The interaction between them is not significant at the .05 level.***

**Work Hard Search Frequency**

Work Hard Search Frequency = *b1*Income + *b2* Gini, *F*(2, 47) = 1.00, *p* = .37

Work Hard Search Frequency = *b1*Income + *b2* Gini + *b3* Income x Gini, *F*(3, 46) = 1.31, *p* = 0.28

***Conclusions: A state’s income and gini do not predict the amount that people in that state search for work hard words, neither independently nor when entered into a model together. Their interaction is also not significant.***

**Event Drop Out Rate**

Regressions non-significant at the omnibus level.

**Cohort Graduation Rate**

Regressions non-significant at the omnibus level. (Note: very limited data for this variable)

**Freshman Graduation Rate as DV**

Freshman Graduation Rate = *b1*Income + *b2* Gini, *F*(2, 46) = 9.37, *p* = .0004

*b1* = 0.0005, *B1* = .34, ssr = .11, *p* = .0091

*b2* = -171.0, *B2* = -.46, ssr = .21, *p* = .0007

Freshman Graduation Rate = *b1*Income + *b2* Gini + *b3* Income x Gini, *F*(3, 45) = 7.74, 0.0003

*b1* = .0003, *B1* = .22, ssr = 0.04, *p* = .11

*b2* = -192.1, *B2* = .52, ssr = 0.25, *p* = .0002

*b3* = 0.02, *B3* = .27, ssr = 0.05, *p* = .0685

***Conclusions: A state’s income and gini predict freshman graduation rates, independently and when entered into a model together. The interaction between them is not significant at the .05 level.***

Short Cut Search Frequency

Freshman Graduation Rate = *b1*Income + *b2* Short Cut, *F*(2, 46) = 4.49, 0.0165

*b1* =.00027, *B1* = 0.199, ssr = 0.036, *p* = 0.1675

*b2* =-3.71, *B2* = -0.297, ssr = 0.080, *p* = 0.0415

***Conclusions: When a state’s income and the amount that people in that state search for shortcuts are entered into a model predicting freshman graduation rates, income is no longer significant.***

Freshman Graduation Rate = *b1*Gini + *b2* Short Cut, *F*(2,46) =5.75, *p* =0.0059

*b1* = -117.16, *B1* =-0.318, ssr = 0.072 , *p* = 0.047

*b2* =-2.34, *B2* = -0.187, ssr = 0.025, *p* = 0.237

***Conclusions: When a state’s gini and the amount that people in that state search for short cuts are entered into a model predicting freshman graduation rates, only gini is significant.***

Freshman Graduation Rate = *b1*Income + *b2* Gini + *b3* Short Cut, *F*(3, 45) = 6.11, *p* = 0.0014

*b1* =.00045, *B1* = .334, ssr = 0.090, *p* = 0.0215

*b2* = -164.70, *B2* = -.447, ssr = 0.126, *p* = 0.0070

*b3* = -0.205, *B3* = -0.016, ssr = 0.0002, *p* = 0.9213

***Conclusions: When a state’s income, gini, and the amount that people in that state search for shortcuts are entered into a model predicting freshman graduation rates, the amount that people search for shortcuts is no longer significant.***

Freshman Graduation Rate = *b1*Income + *b2* Gini + *b3* Income x Gini +*b4* Short Cut, *F*(4, 44) = 5.68, 0.0009

*b1* = .0003, *B1* = 0.225, ssr = .034, *p* = .1392

*b2* = -193.26, *B2* =-0.525, ssr = .162, *p* = .0020

*b3* = 0.015, *B3* = 0.267, ssr = 0.051, *p* = .0720

*b4* = 0.067, *B4* = 0.0054, ssr = .00002, *p* = .9736

***Conclusions: When a state’s income, gini, their interaction and the amount that people in that state search for shortcuts are entered into a model predicting freshman graduation rates, only gini remains significant.***

***Additional conclusions: Formal test of the mediation of income on freshman graduation rate by shortcut search frequency was not significant. Sobel test statistic = 1.59, p* = 0.111.**

Work Hard Search Frequency

Freshman Graduation Rate = *b1*Income + *b2* Work Hard, *F*(2, 46) = 4.73, p  *=* 0.0135

*b1* =.00035, *B1* = 0.26, ssr = 0.07, *p* = 0.0580

*b2* =4.422, *B2* = 0.30, ssr = 0.09, *p* = 0.0329

***Conclusions: When a state’s income and the amount that people in that state search for work hard words are entered into a model predicting freshman graduation rates, both remain significant.***

Freshman Graduation Rate = *b1*Gini + *b2* Work Hard, *F*(2,46) =6.97, *p* =0.0023

*b1* = -135.65, *B1* =-0.37, ssr =0.130 , *p* = 0.008

*b2* =3.66, *B2* = 0.25, ssr = 0.058, *p* = 0.069

***Conclusions: When a state’s gini and the amount that people in that state search for work hard words are entered into a model predicting freshman graduation rates, only gini is significant at the 0.05 level.***

Freshman Graduation Rate = *b1*Income + *b2* Gini + *b3* Work Hard, *F*(3, 45) = 7.40, *p* = 0.0004

*b1* =.0004, *B1* = .317, ssr = 0.098, *p* = 0.0138

*b2* = -151.6, *B2* = -.412, ssr = 0.160, *p* = 0.0020

*b3* = 3.10, *B3* = .208, ssr = 0.041, *p* = 0.1043

***Conclusions: When a state’s income, gini and the amount that people in that state search for work hard words are entered into a model predicting freshman graduation rates, only income and gini remain significant.***

Freshman Graduation Rate = *b1*Income + *b2* Gini + *b3* Income x Gini +*b4* Work Hard, *F*(4, 44) = 6.32, 0.0004

*b1* = .0003, *B1* = 223, ssr = .039, *p* = .1092

*b2* = -175.25, *B2* =-0.476, ssr = .192, *p* = .0007

*b3* = 0.013, *B3* = 0.224, ssr = .0344, *p* = .1298

*b4* = 2.450, *B4* = 0.164, ssr = .0243, *p* = .2017

***Conclusions: When a state’s income, gini, their interaction and the amount that people in that state search for work hard words are entered into a model predicting freshman graduation rates, only gini remains significant.***

***Additional conclusions: Formal test of the mediation of income on freshman graduation rate by work hard search frequency was not conducted because income doesn’t predict work hard search frequency.***

**Achievement as DV**

Achievement = *b1*Income + *b2* Gini, *F*(2,47) = 22.05, *p* <.0001

*b1* = .00069, *B1* = 0.58, ssr = 0.337, *p* <.0001

*b2* =-140.91, *B2* = -0.435, ssr = 0.188, *p* = .0001

Achievement = *b1*Income + *b2* Gini + *b3* Income x Gini, *F*(3,46) =17.00, *p* <.0001

*b1* = .00056, *B1* = 0.472, ssr = 0.171, *p* = 0.0002

*b2* =-158.57, *B2* = -0.490, ssr = 0.222, *p* < .0001

*b3* = 0.0123, *B3* = 0.241, ssr = 0.042, *p* = 0.0500

***Conclusions: A state’s income and gini predict academic achievement, independently and when entered into a model together. The interaction between them is also significant.***

***Specifically…***In low inequality states, the relationship between income and achievement is not significantly different from zero (*std b* = 0.271, *t*(46) = 1.51, *p* = 0.1385). In average inequality states, the relationship between income and achievement is statistically significant and positive; each standard deviation increase in average family income is associated with a 0.47 standard deviation increase in average NAEP reading and math scores (*std b* = 0.472, *t*(46) = 4.07, *p* <.0001). In high inequality states, the relationship between income and achievement is positive and steeper than in average inequality states; each standard deviation increase in average family income is associated with a 0.67 standard deviation increase in average NAEP reading and math scores (*std b* = 0.667, *t*(46) = 6.05, *p* <.0001).

Short Cut Search Frequency

Achievement = *b1*Income + *b2* Short Cut, *F*(2,47) =16.14, *p* <.0001

*b1* = 0.00051, *B1* = 0.426, ssr = 0.162, *p* = 0.0008

*b2* = -3.657, *B2* = -0.353, ssr = 0.111, *p* = 0.0048

***Conclusions: When a state’s income and the amount that people in that state search for shortcuts are entered into a model predicting academic achievement, both are significant.***

Achievement = *b1*Gini + *b2* Short Cut, *F*(2,47) =8.41, *p* = 0.0008

*b1* = -51.99 , *B1* =-0.161, ssr = 0.018, *p* =0.289

*b2* = - 4.22, *B2* = -0.408, ssr = 0.116, *p* = 0.009

***Conclusions: When a state’s gini and the amount that people in that state search for short cuts are entered into a model predicting academic achievement, only short cut search frequency is significant.***

Achievement = *b1*Income + *b2* Gini + *b3* Short Cut, *F*(3,46) = 14.80, *p* <.0001

*b1* = .00064, *B1* = 0.539, ssr = 0.228, *p* <.0001

*b2* = -119.54, *B2* = -0.369, ssr = 0.084, *p* = 0.008

*b3* = -1.17, *B3* = -0.113, ssr = 0.007, *p* = 0.427

***Conclusions: When a state’s income, gini, and the amount that people in that state search for shortcuts are entered into a model predicting academic achievement, the amount that people search for shortcuts is no longer significant (i.e., when gini is added to the model, short cut is no longer significant).***

Achievement = *b1*Income + *b2* Gini + *b3* Income x Gini +*b4* Short Cut, *F*(4,45) =12.67, *p* <.0001

*b1* = .00053, *B1* = 0.442, ssr = 0.129, *p* = 0.001

*b2* =-142.01, *B2* = -0.438, ssr = 0.110, *p* = 0.002

*b3* = 0.012, *B3* = 0.233, ssr = 0.039, *p* = 0.061

*b4* = -0.878, *B4* = -0.085, ssr = 0.004, *p* = 0.543

***Conclusions: When a state’s income, gini, their interaction and the amount that people in that state search for shortcuts are entered into a model predicting academic achievement, only income and gini are significant.***

***Additional conclusions: Formal test of the mediation of income on achievement by short cut search frequency were (just barely) not statistically significant at the .05 level Sobel test = 1.89,*  *p*****= 0.059.**

Work Hard Search Frequency

Achievement = *b1*Income + *b2* Work Hard, *F*(2,47) =11.25, *p* = 0.0001

*b1* = 0.00063, *B1* = 0.532, ssr = 0.281, *p* < .0001

*b2* =2.19, *B2* = 0.166, ssr = 0.027, *p* = 0.1734

***Conclusions: When a state’s income and the amount that people in that state search for work hard words are entered into a model predicting academic achievement, only income is significant.***

Achievement = *b1*Gini + *b2* Work Hard, *F*(2,47) =4.68, *p* =0.0140

*b1* = -116.1, *B1* =-0.358, ssr = 0.124, *p* =0.011

*b2* =1.839, *B2* = 0.139, ssr = 0.019, *p* = 0.309

***Conclusions: When a state’s gini and the amount that people in that state search for work hard words are entered into a model predicting academic achievement, only gini is significant.***

Achievement = *b1*Income + *b2* Gini + *b3* Work Hard, *F*(3,46) =14.81, *p* <.0001

*b1* = 0.00068, *B1* = 0.575, ssr = 0.325, *p* <.0001

*b2* =-135.56, *B2* = -0.419, ssr = 0.168, *p* = 0.0003

*b3* = 1.147, *B3* = 0.0870, ssr = 0.007, *p* = 0.4221

***Conclusions: When a state’s income, gini and the amount that people in that state search for work hard words are entered into a model predicting academic achievement, only gini and income are significant.***

Achievement = *b1*Income + *b2* Gini + *b3* Income x Gini +*b4* Work Hard, *F*(4,45) =12.58, *p* <.0001

*b1* = 0.00056, *B1* = 0.472, ssr = 0.171, *p* =0.0002

*b2* =-154.854, *B2* = -0.478, ssr = 0.200, *p* <.0001

*b3* = 0.012, *B3* = 0.230, ssr = 0.037, *p* = .0683

*b4* = 0.627, *B4* = 0.0475, ssr = 0.002, *p* = 0.658

***Conclusions: When a state’s income, gini, their interaction and the amount that people in that state search for work hard words are entered into a model predicting academic achievement …***

***Additional conclusions: Formal test of the mediation was not conducted because income doesn’t predict work hard search frequency.***

**Achievement SD as DV**

Achievement SD = *b1*Income + *b2* Gini, *F*(2, 47) = 4.08, *p* = .0233

*b1* = 0.00007, *B1* = .25, ssr = 0.06, *p* = .0753

*b2* = 22.876, *B2* = .27, ssr = 0.07, *p* = .0477

\*Can provide all regression results if they are of interest.