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Big data and the well-being nexus: Tracking Google search activity by state IQ

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ABSTRACT

In the era of "big data," internet search activity can provide interesting insight into human behavior. Here we used the Google Correlate algorithm (a database tracking billions of user searches) to identify search terms that co-varied most strongly with U.S. state-level IQ and well-being (see Pesta, McDaniel, & Bertsch, 2010). First, we identified the 100 strongest positive (e.g., crock pot applesauce, custom woodworking) and negative (e.g., ASVAB for Dummies, Hello Kitty) search term covariates for state IQ. We then rationally clustered search terms into composites (e.g., "food," "job seeking activity") based on similarity of concept. Thereafter, we correlated the composite scores with other well-being variables (e.g., crime, health). Search-term composite scores correlated strongly with all well-being variables. We offer post-hoc explanations for the various composite-score correlations, showing how state differences in internet search activity fit within the "well-being nexus" for the U.S. Moreover, we explore how the use of Google Correlate can inform additional research inquires in this domain.

1. Introduction

Differential psychologists have recently focused research attention on geographical subdivisions—versus individuals—as their units of analysis. The subdivisions comprise either countries or specific areas within countries. For example, estimates of IQ now exist for each of the 50 U.S. states (McDaniel, 2006), northern and southern Italy (Piffer & Lynn, 2014), regions in Germany (Rindermann, 2006) and China (Lynn & Cheng, 2013), and for over 190 countries (Lynn & Meisenberg, 2010; Lynn & Vanhanen, 2002, 2012). Aggregate IQ measures correlate strongly with many other meaningful variables. Examples include aggregate IQ predicting levels of institutional quality (Jones & Potrafke, 2014), absolute latitude/temperature (León & León, 2014; Pesta & Poznanski, 2014), election outcomes (Pesta & McDaniel, 2014), economic freedom (Belasen & Hafer, 2012), religiosity (Reeve, 2009), crime (Templer & Rushton, 2011), education (Pesta et al., 2010), health (Eppig, Fincher, & Thornhill, 2011; Reeve & Basalik, 2010), and income (Lynn & Vanhanen, 2002, 2012). In fact, levels of religiosity, crime, education, health, and income are themselves largely inter-correlated within the 50 U.S. states.

Strong inter-correlations between aggregate-level variables led Pesta et al. (2010) to hypothesize the existence of a "well-being nexus" for the 50 U.S. states. The well-being nexus is similar to but subsumes Jensen's (1998) *g* nexus. Specifically, important aggregate-level variables (e.g., income, intelligence) rarely exist independently of other aggregate-level variables (e.g., education, crime). Instead, they appear as nodes in an inter-correlated nexus containing almost all variables. Pesta et al. (2010) analyzed these inter-correlations to derive a general factor of state-level well-being. The well-being factor

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explained most of the variance in the component variables, and predicted other important social and political state-level outcomes (Pesta, Bertsch, McDaniel, Mahoney, & Poznanski, 2012; Pesta & McDaniel, 2014; Pesta et al., 2010). Like the *g* nexus (see, Jensen, 1998), the well-being nexus hypothetically contains both vertical and horizontal components. Postulated causes of group differences in well-being comprise the vertical dimension, while the consequences that follow from these differences comprise the horizontal dimension. IQ, itself, is a central node in the well-being nexus.

Table 1
Search term composites.

Composite name	Number of search terms	Alpha reliability	Search terms included	Comments
Food	22	.99	How much turkey, tortellini, dry pasta, how to hard boil an egg, calories in pumpkin, Clif Bars, overnight french toast, turkey per person, cooking corn on the cob, panini recipes, fat banana, crock pot applesauce, summer salad, banana chocolate chip, low fat banana bread, baked french toast, make ahead, summer pasta, meatballs, summer drinks, free snacks, best apples	Food, drinks, and cooking
Reading	7	.97	Books of 2010, year in review, kids book, Sandra Boynton, American Girl magazine, club books, club book	Reading including reading for adults, children and a children's book author (Sandra Boynton)
House preservation	21	.99	Decking reviews, foundation wall, foundation walls, custom woodworking, furnace cost, furnace price, Timbertech decking, basement insulation, entryway storage, window prices, direct vent gas fireplace, bench with storage, basement window, furnace prices, wood cleaner, coat tree, coat hook, coat hooks, cordless blinds, radon level, radon test	House preservation, house accessories (e.g., coat tree), and house safety (e.g., radon level)
Snow	14	.99	Snow shovels, snow shovel, amount of snow, aggressive alpine skiing, car snow, Sears snow blowers, snow blowers, electric snow blower, used snow plows, how much snow, blowers, H727, Optimo H727, Hankook Optimo H727	Quantities of snow, snow removal (e.g., snow shovels), driving in snow, automobile tires for snow (e.g., H727)
Healthy	3	.93	Going off the pill, hip flexor, calories burned running	Contraception, anatomy related to exercise (e.g., hip flexor), calorie burning
Lawn and garden	6	.97	Mow lawn, lamium, barberry, spring lawn, asters, liatris	Lawn, garden plants
Babies	6	.96	Sleep sacks, sleep sack, most popular names, crib safety, safety gate, halo sleep	Baby-related products and popular names
Games	3	.90	Cricket rules, Stratego, ladder ball	Games
Asanti rims	3	.97	Asanti wheels, Asanti, Asanti.rims	Asanti brand automobile wheels
Beauty	6	.96	Eyeshadow tutorial, eyeshadow, cut hair, MAC makeup, Retin-A cream, braces before and after	Make-up, hair, braces
Fighting	4	.96	School fights, high school fights, real fight, fights videos	Fighting, school fights
Job seeking	15	.98	Clerk job description, clerk job, become a pharmacist, to become a pharmacist, become a registered nurse, resume for a job, jobs application, ASVAB for dummies, clerk duties, objective for resume, join the airforce, learn how to type, free fax cover, cover sheet, how to write an essay	Job information, job skills (e.g., typing, essay writing)
Hello Kitty	16	.99	Hello Kitty shoes, Hello Kitty stuff, Hello Kitty cake, Hello Kitty case, Hello Kitty games, Hello Kitty clothes, hellokitty.com, Hello Kitty phone, Hello Kitty backpack, Hello Kitty birthday, Hello Kitty cases, Hello Kitty purse, Hello Kitty purses, Hello Kitty shirts, Hello Kitty nails, Hello Kitty iPod	Products related to Hello Kitty™ (see http://www.sanrio.com/). Searches referencing "kitty" but lacking the word "hello" are not included.
Social media	14	.98	www.my.space.com, free.layouts.com, hot.free.layouts.com, hotfreelayouts, cherrybam.com, myspace.com, myspace. com, symbols for myspace, facebook search, layouts.com, photo a day, photo a day challenge, www.photobucket.com, muzy.com	Websites associated with social media including photograph-related sharing sites
Thuggish Ruggish Bone	3	1.00[a]	Thuggish, thuggish ruggish, ruggish	Terms related to a rap song by the artists "Bone Thugs-n-Harmony"

[a] The actual alpha reliability is 0.9979694.

Generating further empirical support for the construct validity of the nexus can be achieved by identifying new variables that correlate (or fail to correlate) with IQ/well-being in ways that make theoretical sense. An example of convergent validity comes from correlations between well-being and measures of liberalism and conservatism (Pesta & McDaniel, 2014; Pesta et al., 2010). An example of divergent validity comes by the relative lack of relationship between state personality and either IQ or well-being (Pesta et al., 2010). In sum, the robustness of the well-being nexus is measured by the scope of state-level variables it subsumes.

The present study is therefore descriptive. We show that IQ and well-being covary with an activity ubiquitous in many people's lives—conducting Google searches on the internet. Billions of Google searches are performed per day (Internet Live Stats, 2014). These searches provide snapshots of interesting human behavior. Moreover, many state well-being variables are derived from self-report data (e.g., religious belief data, census survey data) that may be influenced by impression management and self-deception (Paulhus, 1991), in addition to potentially being affected by accuracy of memory and inattentive responding. In contrast, the current study employs novel measurement methods (massive archival records of internet searches) that are not affected by typical problems inherent in self-report data. Our data are therefore both unobstrusive and non-reactive (Webb, Campbell, Schwartz, & Sechrest, 2000). Here, for example, we report that some specific search terms (e.g., Hello Kitty™; crock pot applesauce) covary in frequency with each state's relative level of IQ and well-being. We make sense of these correlations by using rational clustering, and by referencing extant literature to explain why the derived clusters might fall within the well-being nexus.

We note that there is some precedent for using search term queries as variables in social science research. Recently, Neville (2012) showed that academically dishonest searches (e.g., students seeking to buy term papers) were more frequent in states with higher levels of income inequality. As such, the present study sought to deepen our understanding of the factors that may (or may not) relate to the IQ/well-being of the 50 U.S. states.

2. Method

Similar to past work (e.g., McDaniel, 2006; Pesta et al., 2010), the unit of analysis was states within the USA ($n = 50$). We used state well-being data from Pesta et al. (2010), who created six sub-domains of global well-being: IQ, religiosity, crime, education, health, and income. IQ was estimated from public school achievement test scores (see McDaniel, 2006). Religiosity was derived from state-level survey data assessing fundamentalist religious beliefs (e.g., "My holy book is literally true;" "Mine is the one true faith"). Crime was created from various violence statistics, including burglary, murder, rape, violent crimes, and the number of inmates per capita. Education included the percentage of residents with (a) college degrees and (b) jobs in science, technology, engineering, or mathematics. Health included infant mortality and the incidence of obesity, smoking, and heart disease. Finally, income included income per capita, disposable income per capita, percent of families in poverty, and percent of individuals in poverty. An estimate was made for each variable within each state. Religiosity and crime were reverse coded such that higher scores represented lower levels of each.

We used the Google Correlate algorithm (Google Correlate, 2014; program available at http://www.google.com/trends/correlate) to explore how well-being relates to differences in search-term frequencies by U.S. state. Google Correlate can be used in two ways. One way seeks to identify terms that correspond to a trend across time (weekly or monthly); the other way seeks to identify terms that correspond to the 50 U.S. states. Given our paper's focus, we used the latter approach. The algorithm compiles lists of search terms that "best mimic the data" provided by the user (Mohebbi et al., 2011; p. 1). Specifically, the algorithm generates 100 terms that maximize the magnitude of a correlation with a vector of user provided data for each state. The vector we provided was state IQ; thus, we sought search terms that covary strongly with state IQ. The

Table 2
Inter-correlations of Google search-term composites related to state IQ.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Food														
2. Reading	.94													
3. House preservation	.95	.92												
4. Snow	.94	.88	.96											
5. Healthy	.94	.91	.90	.88										
6. Lawn & garden	.92	.91	.94	.89	.89									
7. Babies	.94	.92	.95	.92	.93	.91								
8. Games	.96	.93	.95	.93	.94	.92	.94							
9. Asanti rims	−.84	−.83	−.86	−.81	−.77	−.82	−.82	−.81						
10. Beauty	−.86	−.84	−.88	−.80	−.81	−.86	−.85	−.87	.86					
11. Fighting	−.86	−.84	−.84	−.80	−.82	−.78	−.86	−.86	.82	.91				
12. Job seeking	−.88	−.86	−.88	−.82	−.86	−.84	−.88	−.89	.86	.93	.95			
13. Hello Kitty	−.87	−.84	−.88	−.84	−.79	−.82	−.87	−.86	.86	.91	.91	.90		
14. Social media	−.90	−.87	−.88	−.84	−.87	−.85	−.89	−.90	.87	.93	.94	.93	.92	
15. Thuggish Ruggish Bone	−.79	−.77	−.80	−.78	−.72	−.73	−.77	−.77	.81	.80	.83	.79	.85	.81

Note. All correlations are significant at $p < .001$.

Table 3
Correlations between Google search composites, state IQ, and other well-being variables.

	State IQ	Religiosity	Crime	Education	Health	Income	Well-being
1. Food	.88	.63	.77	.35	.74	.52	.80
2. Reading	.86	.53	.73	.40	.73	.51	.77
3. House preservation	.88	.58	.77	.28	.66	.49	.75
4. Snow	.85	.63	.76	.31	.66	.55	.77
5. Healthy	.83	.58	.73	.38	.71	.52	.77
6. Lawn & garden	.86	.40	.72	.20	.62	.37	.65
7. Babies	.86	.58	.76	.40	.72	.53	.79
8. Games	.90	.62	.72	.37	.70	.54	.79
9. Asanti rims	−.83	−.54	−.77	−.35	−.72	−.38	−.74
10. Beauty	−.90	−.56	−.71	−.32	−.66	−.47	−.75
11. Fighting	−.88	−.72	−.75	−.52	−.83	−.61	−.88
12. Job seeking	−.92	−.67	−.78	−.48	−.79	−.52	−.85
13. Hello Kitty	−.89	−.58	−.70	−.39	−.66	−.50	−.76
14. Social media	−.90	−.62	−.75	−.44	−.77	−.58	−.84
15. Thuggish Ruggish Bone	−.81	−.53	−.73	−.34	−.67	−.48	−.73

Note. All correlations are significant at $p < .001$.

algorithm returned the top 100 search terms that correlated most strongly and positively with IQ. Next, we provided the algorithm with state IQ multiplied by -1 in order to yield the top 100 terms that correlated most strongly and negatively with state IQ. Numeric values for each state represent the search term's relative frequency as a number with a mean of zero and a standard deviation of one (Mohebbi et al., 2011). Higher magnitude positive (negative) numbers indicate that the search term is more (less) frequent for that state given its IQ. Values were derived from all Google searches conducted in the USA between January 2003 and the day we ran the algorithm (August 19, 2014 for positive covariates; August 20, 2014 for negative covariates).

Given that the Google algorithm selected only those search terms highly correlated with state IQ, the resulting search terms were extremely correlated with each other, despite the fact that the content of the searches varied widely. As such, and considering our two lists of search terms (i.e., those positively or negatively correlated with state IQ), the terms themselves were positively correlated within lists, and negatively correlated across lists. Because of these high intercorrelations, we were precluded from empirically clustering the search terms. Instead, we clustered search terms rationally. We required a minimum of three search terms per cluster, and that the terms comprising each cluster must come from either the positive or the negative list of IQ covariates, but not from both lists. Next, we derived tentative search term clusters based on similarity of concept. The search terms that were included in a cluster were finalized via discussion and consensus among the authors. Specifically, each author went through all derived search terms and placed each into an appropriate category; any discrepancies (e.g., not including an item in a particular category, including an item that another author did not include) were discussed until a unanimous conclusion was reached.

As an illustrative example of our categorization process, two of the authors did not see the connection between the following set of search terms: “thuggish”, “thuggish ruggish”, and “ruggish.” However, another author recognized that the terms were part of a song entitled *Thuggish Ruggish Bone*. After identifying this commonality, the terms were assigned to their own category. As a second illustrative example, we did not initially know the meaning of the terms *lamium* and *liatris*. Through research, we discovered that these search terms were plant names, and the plants are sold in nurseries for use in gardens. Therefore, we added these two terms to the lawn and garden category. It is important to note that not all search terms were placed in a cluster; only search terms in Appendix Tables A-1 and A-2 that are marked with an asterisk were assigned to a cluster. For example, the search term “Irish phrases” had little in common, to the best of our judgment, with any other search term, and so it was not included in a cluster.

As a final step, we derived composite scores for each cluster by state. These comprised the mean of all search term frequencies within clusters. Our analytic strategy was to correlate the cluster composite scores (derived from state IQ) with all other well-being variables, including the global measure.

3. Results and discussion

Table 1 shows the search term composites. The first column lists the composite name, the second column lists the number of search terms in the composite, and the third column provides the alpha reliability of the composite.[1] The search terms forming each composite are listed in the fourth column. Comments on the composites appear in the last

[1] Whereas the search terms were selected to mimic state IQ, the alpha reliabilities of our rationally constructed scales will always be high. The magnitude of the reliability is not evidence for the merit of the scale. Any randomly selected set of terms from the positive list will show a high alpha reliability. Likewise, any randomly selected set of terms from the negative list will show a high alpha reliability.

column. In total, eight composites were built from 82 search terms that positively correlated with state IQ, and seven composites were built from 61 search terms that negatively correlated with state IQ. All search terms and their correlations with IQ are presented in Appendix Tables A-1 and A-2. Appendix Table A-3 shows the relative frequencies of the cluster composites by state.

Table 2 shows the inter-correlations of the search-term composites. The first eight composites correlate positively with themselves because their search terms came from the positive list of IQ covariates. Likewise, the last seven composites correlate positively with themselves because their search terms came from the negative list of IQ covariates. Note then that the first eight composites must therefore correlate negatively with the last seven.

Table 3 shows the inter-correlations of state IQ and other well-being variables with the 15 search composites. Noticeable trends emerged between the state IQ/well-being variables and the search terms. Higher IQ states are associated with Google searches related to food, reading, house preservation, snow, health, lawn and garden, babies, and games. Higher IQ states tend to be colder and many are located in the Northeastern United States (see Pesta & Poznanski, 2014); as such, Google searches related to snow make sense, as do searches regarding house preservation (e.g., furnace prices, basement insulation). Additionally, the remaining Google search-term composites are suggestive of the relative importance high-IQ states place on maintaining healthy lifestyles (e.g., calories burned running, low fat banana bread, playing outdoor games), starting a family (e.g., sleep sack, kids' books), and pursuing intellectual hobbies (e.g., books of 2010).

We do note that there are some anomalies within the clusters for high-IQ states. For instance, within the food category, although many of the search terms reflect healthy food choices (e.g., calories in pumpkin, summer salad), some reflect choices that would be higher in caloric intake (e.g., baked french toast, tortellini). Nonetheless, we view the emphasis on food (and cooking as implied by many of the searches) to reflect an overall concern of health.

The Google search terms for states with lower IQ and well-being were quite different in content. Here search terms related to Assanti™ automobile rims, beauty, fighting, job seeking, Hello Kitty products, social media, and a rap song titled *Thuggish Ruggish Bone*. These results suggest that lower IQ states place relatively greater emphasis on hobbies related to maintaining an online presence (e.g., Facebook search, photo a day challenge), music, and cars (e.g., Assanti rims). Moreover, the results highlight the efforts that residents of lower IQ states made toward obtaining a job via searches related to general job seeking advice (e.g., objective for resume) and actual career paths (e.g., become a registered nurse; become a pharmacist).

The current study sought to build upon past work expanding the nomological network around state-level IQ and well-being (e.g., Pesta & McDaniel, 2014; Pesta et al., 2010). We did this by exploring whether salient trends emerged via Google search terms, relative to each state's level of IQ and well-being. Our results suggest fairly clear patterns: individuals residing in states with higher IQ and well-being tended to search for things related to home ownership, growing a family, and outdoor activities (including gardening, games, and physical fitness [running]). Conversely, individuals living in states with lower IQ and well-being focused their searches more on popular culture (e.g., rap music, Hello Kitty), shopping in general (e.g., beauty products, car accessories), and obtaining employment.

Our clusters of Google search terms seem to fit rationally with the sub-domains comprising state well-being (i.e., IQ, education, income, religiosity, health, and crime; Pesta et al., 2010). For instance, past research has shown that states in the southern United States, which tend to have lower levels of IQ and well-being (i.e., higher crime rates; Pesta et al., 2010), experience higher levels of violence (Nisbett, 1993). These states also have lower levels of overall health (Pesta et al., 2012). Mapping these findings on to relative Google search-term frequencies, states with higher IQ and well-being tend to pursue (as inferred by their Google search behaviors) healthier and more intellectual lifestyles (e.g., our Health and Reading clusters), as opposed to placing emphasis on things like violence (e.g., our Fighting cluster) or social media (e.g., our Social Media cluster). Engaging in the latter activity may also potentially minimize opportunities for physical activity (e.g., Iannotti, Kogan, Janssen, & Boyce, 2009). Moreover, given that states with lower IQ and well-being tend to experience greater economic problems, the relative frequency with which low-IQ state residents conduct searches related to pursuing various job opportunities seems rational.

Of particular note is the anomaly that residents of lower IQ states more frequently searched for terms related to Hello Kitty. It is difficult to determine why Hello Kitty searches would be more prevalent in these states. Hello Kitty is enormously popular in Asian cultures (Mcveigh, 2000), but to our knowledge, no state-specific trends have been noted in the United States. Thus, although we find this cluster inherently interesting due to its unexpected emergence, we also do not perceive it to fit within the well-being nexus.

3.1. Limitations and directions for future research

Given that users conduct billions of Google searches per day (Internet Live Stats, 2014), the search terms generated by the algorithm were likely relatively stable, and not meaningfully affected by random sampling error. A limitation of these data, however, is that the search terms derived for each state come only from state residents who actually use Google. Our results are somewhat non-representative within states, as not all residents use computers, and not all internet searches are conducted with Google (Mohebbi et al., 2011). Thus, the search terms may not reflect the interests of those too poor to have a computer or internet access, or older adults who may lack computer skills. An additional limitation of these data is that the Google search algorithm outputs only 200 search terms (100 each for the negative and positive covariate lists). We would likely have been able to identify more search clusters that co-vary with IQ if the Google Correlate service would provide more than 100 terms per search inquiry.

The correlations in Table 3 between search term composites and the Pesta et al. (2010) well-being factors are always higher for IQ rather than the other well-being variables. This occurs because the search terms were selected by the Google Correlate algorithm to maximize the correlation with IQ by state. Thus, the higher correlations with state IQ are a function of the manner in which the search terms were selected. The goal of Table 3 was to show that the IQ-relevant composites are related to other well-being variables as well. Table 3 should not be used to draw inferences about the importance of IQ relative to other well-being variables.

When discussing possible explanations for our results, we inferred activity (e.g., exercising) based on how often residents within states searched for terms related to that activity. There is likely some difference between searching for exercise routines versus actually engaging in them. Relatedly, although our search terms provide unique, and perhaps more honest, insight into correlates of state IQ and well-being, they lack context. It is impossible to know the motives behind these various Google searches, which could lead to an incorrect interpretation of how they may fit within the well-being nexus. However, given that clear patterns of searches emerged, and that many of the search terms were rather easily grouped into clusters, we do not view this as a critical problem. A natural extension of this descriptive work would be to identify and test specific, theory-driven hypotheses regarding the existence of state differences in Google search term relative frequencies.

Finally, our results are correlational and causality cannot be inferred. Therefore, we cannot determine whether state-level factors related to IQ and the well-being nexus were driving the Google search terms (e.g., knowing one's state has poor health may drive one to pursue an advanced degree, such as pharmacy or nursing), or if the Google search terms reflect a lower-level, emergent process that drives the state-level well-being nexus (e.g., a focus on raising a family leads to higher aggregate levels of state well-being). Our results should be interpreted without causality in mind.

3.2. Summary and conclusion

This research has shown that the field can expand its knowledge concerning geographical (i.e., state-level) conceptions of IQ and other well-being variables. Big data—aggregated Google searches by state in the current study—can help expand our knowledge of the construct space of state well-being variables. Furthermore, such data are not subject to the limitations of self-reports and represent a new form of unobtrusive and non-reactive measurement.

Appendix A

Table A-1
Google search terms that positively covary with state IQ.

Google search term	r	Google search term	r	Google search term	r	Google search term	r
*mow.lawn	.84	owning.a.dog	.79	*window.prices	.78	warm.vacation	.77
*cricket.rules	.83	*going.off.the.pill	.79	*spring.lawn	.78	address.a.cover.letter	.77
*stratego	.83	*wood.cleaner	.79	spanish.vocab	.78	olympic.schedule.2010	.77
*decking.reviews	.82	*turkey.per.person	.79	*halo.sleep	.78	*meatballs	.77
*how.much.turkey	.82	*most.popular.names	.79	*low.fat.banana.bread	.78	*radon.test	.77
*tortellini	.82	*timbertech.decking	.79	*baked.french.toast	.78	*hankook.optimo.h727	.77
*books.of.2010	.82	*cooking.corn.on.the.cob	.79	*make.ahead	.78	red.rubber.ball	.77
*foundation.wall	.82	*basement.insulation	.79	rwanda.genocide	.78	*summer.drinks	.77
*lamium	.81	*amount.of.snow	.79	*safety.gate	.78	*basement.window	.77
*year.in.review	.81	*aggressive.alpine.skiing	.79	*direct.vent.gas.fireplace	.78	garfield.minus	.77
*dry.pasta	.81	*barberry	.79	*radon.level	.78	*furnace.prices	.77
per.person	.81	*sleep.sacks	.79	*sears.snow.blowers	.78	*asters	.77
*how.to.hard.boil.an.egg	.80	*foundation.walls	.79	*hip.flexor	.78	*used.snow.plows	.77
used.car.reviews	.80	*car.snow	.79	*bench.with.storage	.78	*club.book	.77
*snow.shovels	.80	*panini.recipes	.79	*h727	.78	weather.	.77
*calories.in.pumpkin	.80	*entryway.storage	.79	*american.girl.magazine	.78	*coat.hooks	.77
*clif.bars	.80	*fat.banana	.79	*summer.pasta	.78	*best.apples	.77
*snow.shovel	.80	*ladder.ball	.78	*snow.blowers	.78	*liatris	.77
*coat.tree	.80	chumbawamba	.78	*cordless.blinds	.78	*how.much.snow	.77
*crib.safety	.80	*blowers	.78	*optimo.h727	.78		
*coat.hook	.80	*crock.pot.applesauce	.78	squeeze.box	.78		
*overnight.french.toast	.80	*summer.salad	.78	*sleep.sack	.77		
*free.snacks	.80	*kids.book	.78	berlin.germany	.77		
*custom.woodworking	.80	*furnace.price	.78	*club.books	.77		
*furnace.cost	.80	*banana.chocolate.chip	.78	shut.the.box	.77		
fun.holiday	.80	*sandra.boynton	.78	*calories.burned.running	.77		
africa.toto	.80	irish.phrases	.78	*electric.snow.blower	.77		

Note. The Google algorithm reports results in lower case with periods substituted for spaces. Correlations are significant at $p < .001$. An asterisk indicates that the search term was assigned to a cluster.

Table A-2
Google search terms that negatively covary with state IQ.

Google search term	r	Google search term	r	Google search term	r	Google search term	r
*eyeshadow.tutorial	−.88	*hot.free.layouts.com	−.83	*asvab.for.dummies	−.82	*objective.for.resume	−.81
kitty.shoes	−.87	*braces.before.and.after	−.83	*layouts.com	−.82	*cover.sheet	−.81
*hello.kitty.shoes	−.86	beautiful.girl.in.the.world	−.83	party.decoration.ideas	−.81	space.com	−.81
*hello.kitty.stuff	−.86	*hellokitty.com	−.83	*photo.a.day	−.81	*myspace.com.	−.81
*learn.how.to.type	−.86	the.most.beautiful.girl.in.the.world	−.83	*hello.kitty.shirts	−.81	*asanti.rims	−.81
how.to.detox	−.85	wholesale.t.shirts	−.83	minnie	−.81	*how.to.write.an.essay	−.81
sign.in.sheet	−.85	*muzy.com	−.83	*cut.hair	−.81	*asanti	−.81
killer.instinct	−.85	most.beautiful.girl.in.the.world	−.83	ear.cropping	−.81	*symbols.for.myspace	−.80
*school.fights	−.85	dragon.ball.z.movies	−.83	*www.photobucket.com	−.81	fawn.pitbull	−.80
*clerk.job.description	−.85	*hello.kitty.phone	−.83	*clerk.duties	−.81	*retin.a.cream	−.80
*eyeshadow	−.84	happy.4th	−.83	hulk.vs	−.81	paint.shops	−.80
*high.school.fights	−.84	happy.4th.of.July	−.82	how.to.file.a.claim	−.81	kitty.nails	−.80
mend.a.broken.heart	−.84	*hotfreelayouts	−.82	kitty.birthday	−.81	that.moment.when	−.80
*hello.kitty.cake	−.84	*hello.kitty.ipod	−.82	apple.head.chihuahua	−.81	liu.kang	−.80
*www.my.space.com	−.84	*resume.for.a.job	−.82	*thuggish	−.81	sign.in.sheets	−.80
*clerk.job	−.84	*hello.kitty.backpack	−.82	*asanti.wheels	−.81	*myspace.com	−.80
*become.a.pharmacist	−.84	*hello.kitty.birthday	−.82	*fights.videos	−.81	goodnight.quotes	−.80
*to.become.a.pharmacist	−.84	*hello.kitty.cases	−.82	*photo.a.day.challenge	−.81	*join.the.airforce	−.80
kitty.cake	−.84	how.to.produce	−.82	*free.fax.cover	−.81	to.spot	−.80
unconditional	−.83	toyota.tacoma.prerunner	−.82	*facebook.search	−.81		
*free.layouts.com	−.83	sign.in.sheet.template	−.82	*thuggish.ruggish	−.81		
dolliecrave	−.83	vevo	−.82	*cherrybam.com	−.81		
heal.a.broken.heart	−.83	*hello.kitty.purse	−.82	grow.bigger	−.81		
*hello.kitty.case	−.83	*jobs.application	−.82	*hello.kitty.nails	−.81		
*hello.kitty.games	−.83	*real.fight	−.82	*ruggish	−.81		
*hello.kitty.clothes	−.83	kitty.backpack	−.82	*mac.makeup	−.81		
*become.a.registered.nurse	−.83	*hello.kitty.purses	−.82	t.shirts.wholesale	−.81		

Note. The Google algorithm reports results in lower case with periods substituted for spaces. Correlations are significant at $p < .001$. An asterisk indicates that the search term was assigned to a cluster.

Table A−3
Listing of Google search composites by state.

	Food	Reading	House preservation	Snow	Healthy	Lawn & garden	Babies	Games
Alabama	−1.28	−0.84	−1.02	−1.15	−0.91	−0.98	−0.91	−1.00
Alaska	−0.51	−0.32	−0.06	0.13	−0.62	−0.75	−0.05	−0.22
Arizona	−0.60	−0.96	−1.23	−1.07	−0.90	−1.65	−1.15	−0.69
Arkansas	−0.88	−0.90	−0.86	−0.87	−1.06	−0.50	−0.68	−0.94
California	−1.21	−1.36	−1.20	−1.21	−1.03	−1.46	−0.71	−1.19
Colorado	0.36	0.64	0.54	0.33	0.49	0.21	0.64	0.28
Connecticut	0.87	1.20	0.86	1.40	0.59	0.99	0.91	0.92
Delaware	0.45	−0.10	0.39	0.48	0.50	0.34	−0.13	0.49
Florida	−1.05	−1.43	−1.41	−1.20	−1.52	−1.54	−1.70	−1.23
Georgia	−1.09	−1.09	−0.99	−1.08	−1.05	−0.90	−1.10	−0.93
Hawaii	−1.46	−1.43	−1.73	−1.59	−0.74	−1.92	−1.56	−1.77
Idaho	0.54	0.66	0.09	0.07	−0.12	0.85	−0.08	0.12
Illinois	0.18	0.20	0.15	0.19	0.53	0.21	0.22	0.06
Indiana	0.13	0.32	0.33	0.27	0.26	0.60	0.14	0.27
Iowa	0.79	1.00	1.27	0.87	1.32	1.27	1.38	1.16
Kansas	0.07	0.48	0.14	0.37	−0.05	0.48	0.08	0.50
Kentucky	−0.48	−0.29	−0.17	−0.54	−0.57	−0.20	−0.58	−0.71
Louisiana	−1.49	−1.43	−1.35	−1.28	−1.17	−1.36	−1.24	−1.31
Maine	1.38	1.35	1.36	1.44	0.80	1.18	1.14	1.15
Maryland	0.02	0.48	0.12	0.12	0.39	0.04	0.33	−0.17
Massachusetts	1.02	0.93	0.70	0.95	1.76	0.51	1.34	1.27
Michigan	0.36	0.20	0.48	0.67	0.09	0.29	0.03	0.76
Minnesota	1.40	1.36	1.13	1.10	1.51	1.80	1.34	1.15
Mississippi	−1.53	−1.67	−1.47	−1.34	−1.72	−1.08	−1.53	−1.67
Missouri	0.03	0.04	0.20	0.00	0.03	0.15	0.02	0.06
Montana	0.90	0.73	1.19	0.92	0.76	0.68	0.99	0.44
Nebraska	0.65	0.87	0.97	0.59	1.00	1.33	0.75	1.42
Nevada	−0.86	−1.40	−1.25	−1.03	−1.55	−1.54	−1.48	−1.31
New Hampshire	1.81	1.47	1.58	1.83	1.51	1.14	1.53	1.70
New Jersey	0.11	0.12	0.36	0.75	−0.24	−0.02	0.23	0.18
New Mexico	−0.95	−0.93	−0.82	−0.80	−1.07	−0.92	−0.96	−1.08

(continued on next page)

Table A−3 *(continued)*

	Food	Reading	House preservation	Snow	Healthy	Lawn & garden	Babies	Games
New York	−0.18	−0.14	−0.18	0.11	−0.20	−0.49	−0.18	−0.28
North Carolina	−0.35	−0.16	−0.54	−0.76	−0.09	−0.16	−0.28	−0.26
North Dakota	1.37	0.50	1.34	1.71	1.40	1.21	1.79	1.21
Ohio	0.29	0.51	0.47	0.28	0.23	0.35	−0.22	0.34
Oklahoma	−0.73	−0.60	−0.89	−0.73	−0.67	−0.37	−0.74	−0.73
Oregon	−0.13	−0.37	−0.19	−0.83	−0.49	−0.16	−0.16	−0.26
Pennsylvania	0.70	0.38	0.65	0.81	0.78	0.28	0.17	0.79
Rhode Island	0.82	0.47	0.61	0.83	0.64	0.44	0.72	0.54
South Carolina	−0.58	−0.24	−0.81	−1.04	−0.64	−0.54	−0.48	−0.63
South Dakota	1.04	0.50	1.14	1.10	1.14	1.52	1.24	0.75
Tennessee	−0.71	−0.51	−0.61	−0.89	−0.64	−0.48	−0.48	−0.67
Texas	−1.27	−1.38	−1.28	−1.21	−1.13	−0.89	−1.18	−1.03
Utah	0.35	1.19	0.01	0.03	0.13	0.14	0.34	−0.04
Vermont	1.51	1.61	1.01	0.91	1.93	1.14	1.28	1.72
Virginia	−0.82	−0.87	−0.60	−0.57	−0.82	−0.53	−0.72	−0.66
Washington	0.28	0.16	0.00	−0.57	0.12	0.03	0.47	0.40
West Virginia	−0.55	−0.78	0.07	0.10	−0.69	−0.15	−0.61	−0.60
Wisconsin	1.41	1.15	1.03	1.23	1.39	1.57	0.93	0.94
Wyoming	0.37	0.38	0.92	0.58	−0.25	0.17	0.82	0.47

	Asanti rims	Beauty	Fighting	Job seeking	Hello Kitty	Social media	Thuggish Ruggish Bone
Alabama	1.60	0.93	1.67	1.50	1.25	1.48	3.82
Alaska	−0.04	−0.03	−0.52	0.39	−0.28	0.05	−1.86
Arizona	0.63	0.83	0.71	0.88	0.66	0.85	4.62
Arkansas	0.54	0.59	1.08	1.12	0.52	0.82	1.95
California	1.06	1.10	0.14	0.46	1.15	0.66	4.22
Colorado	−0.40	−0.28	−0.35	−0.58	−0.29	−0.26	−0.38
Connecticut	−0.62	−0.46	−0.66	−0.55	−0.52	−0.24	−3.52
Delaware	−0.20	0.08	0.41	0.31	−0.36	−0.58	−2.44
Florida	1.90	0.97	0.60	1.11	0.67	0.81	1.02
Georgia	1.75	0.49	0.79	0.95	0.91	0.63	2.94
Hawaii	1.34	2.12	1.67	1.53	2.59	1.56	3.93
Idaho	−1.14	−0.25	−0.68	−0.24	−0.53	−0.23	−3.12
Illinois	0.05	−0.23	−0.23	−0.39	0.13	−0.39	1.56
Indiana	−0.39	−0.55	−0.10	−0.27	−0.16	−0.03	0.57
Iowa	−0.88	−1.11	−1.08	−0.91	−0.52	−1.01	−2.87
Kansas	−0.27	−0.14	−0.05	−0.35	0.08	−0.40	2.02
Kentucky	−0.22	0.18	0.63	0.19	0.44	0.86	0.44
Louisiana	3.05	2.14	1.34	1.30	1.50	2.20	4.37
Maine	−1.36	−1.19	−1.07	−1.18	−1.11	−1.01	−3.71
Maryland	−0.09	0.20	−0.02	0.50	−0.33	−0.41	1.89
Massachusetts	−0.63	−0.68	−1.04	−1.13	−0.70	−0.97	−3.43
Michigan	−0.02	−0.38	−0.12	−0.27	−0.05	−0.44	−0.05
Minnesota	−0.53	−0.93	−1.10	−1.05	−0.67	−1.25	−2.07
Mississippi	1.89	2.00	2.87	2.54	2.25	2.04	7.40
Missouri	−0.30	−0.43	0.01	−0.24	−0.07	−0.32	0.13
Montana	−1.23	−0.96	−0.82	−0.74	−1.35	−0.75	−4.55
Nebraska	−0.55	−0.79	−0.57	−0.68	−0.53	−0.55	−0.69
Nevada	1.78	1.53	1.12	1.51	1.61	1.35	6.27
New Hampshire	−1.10	−1.27	−1.09	−1.17	−1.02	−1.07	−4.57
New Jersey	−0.01	0.27	−0.22	0.09	−0.37	0.01	−2.75
New Mexico	0.15	1.61	1.69	0.85	1.06	1.38	5.13
New York	−0.28	−0.16	−0.49	−0.29	−0.40	−0.41	−2.96
North Carolina	0.36	0.08	0.46	0.44	0.30	0.35	−0.67
North Dakota	−1.04	−0.74	−1.04	−1.04	−1.37	−1.44	−2.33
Ohio	−0.50	−0.73	−0.38	−0.45	−0.25	−0.03	2.52
Oklahoma	0.36	0.72	0.84	0.44	0.01	0.66	2.10
Oregon	−0.80	−0.87	−0.98	−1.05	−0.67	−0.63	−2.29
Pennsylvania	−0.59	−0.19	−0.39	−0.41	−0.55	−0.32	−2.43
Rhode Island	−0.40	−0.24	−0.61	−0.49	−0.47	−0.20	−2.01
South Carolina	0.72	0.56	0.94	1.05	0.76	0.87	0.03
South Dakota	−0.93	−1.02	−0.86	−0.80	−1.17	−1.04	−0.73
Tennessee	0.65	0.39	0.69	0.67	0.95	0.46	0.84
Texas	1.26	1.12	1.37	0.67	1.37	1.20	4.47
Utah	−0.72	0.15	−0.56	−0.24	−0.44	−0.71	−1.87
Vermont	−1.21	−1.41	−1.58	−1.73	−1.52	−1.74	−3.47
Virginia	−0.40	−1.10	−0.55	−0.53	−0.54	−0.48	−1.26
Washington	−0.37	−0.10	−0.62	−0.49	−0.23	−0.36	0.13
West Virginia	−0.77	0.69	0.68	0.64	0.66	0.51	−2.50
Wisconsin	−0.81	−1.13	−0.81	−0.92	−0.51	−0.85	−2.25

Table A—3 *(continued)*

	Asanti rims	Beauty	Fighting	Job seeking	Hello Kitty	Social media	Thuggish Ruggish Bone
Wyoming	−0.28	−0.56	−0.29	−0.61	−1.30	−0.35	−2.32

Note. Values represent the mean relative frequency of the search terms comprising each composite expressed as a number with a mean of zero and a standard deviation of one.

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