

Lexicocalorimeter: Real-time health measurement

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Principles of Complex Systems,
Vols. 1, 2, 3D, 4 Fourever, V for Vendetta

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University of Vermont | Santa Fe Institute

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Other lexical meters
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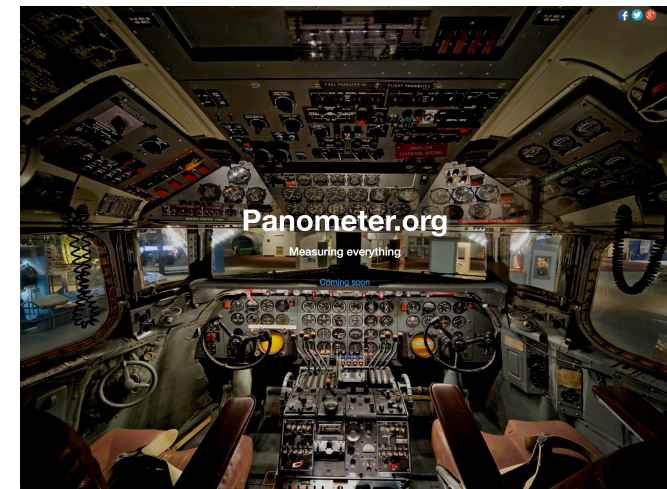
Outline

The LCM

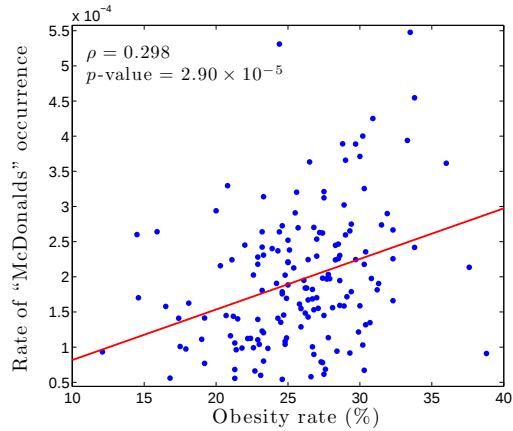
Other lexical meters

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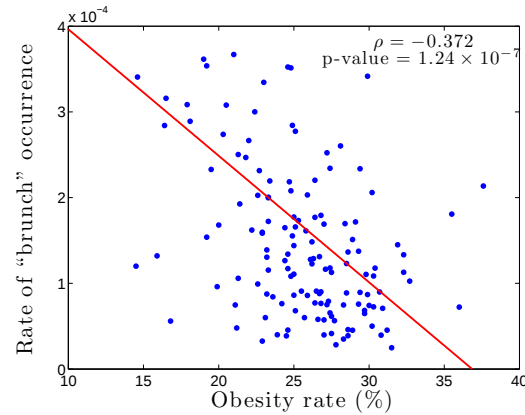


Obesity and tweets—"McDonalds":



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Obesity and tweets—"Brunch":



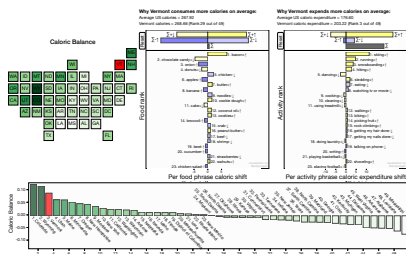
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Word	ρ	$p\text{-value}$
cafe	-0.509	6.07×10^{-14}
sushi	-0.487	9.93×10^{-13}
brewery	-0.469	8.67×10^{-12}
restaurant	-0.448	8.93×10^{-11}
bar	-0.435	3.59×10^{-10}
banana	-0.434	3.77×10^{-10}
apple	-0.408	5.22×10^{-9}
fondue	-0.403	8.34×10^{-9}
wine	-0.400	1.08×10^{-8}
delicious	-0.392	2.17×10^{-8}
dinner	-0.386	3.85×10^{-8}
coffee	-0.384	4.51×10^{-8}
bakery	-0.383	5.12×10^{-8}
bean	-0.378	7.88×10^{-8}
espresso	-0.377	8.47×10^{-8}
cuisine	-0.376	8.82×10^{-8}
foods	-0.374	1.07×10^{-7}
tofu	-0.372	1.27×10^{-7}
brunch	-0.368	1.79×10^{-7}
veggie	-0.364	2.46×10^{-7}
organic	-0.361	3.13×10^{-7}
booze	-0.360	3.34×10^{-7}
grill	-0.354	5.4×10^{-7}
chocolate	-0.351	6.77×10^{-7}
#vegan	-0.350	7.47×10^{-7}

mcDonalds	0.246	6.18×10^{-4}
eat	0.241	8.22×10^{-4}
wings	0.222	2.13×10^{-3}
hungry	0.210	3.65×10^{-3}
heartburn	0.194	7.37×10^{-3}
ham	0.177	1.45×10^{-2}

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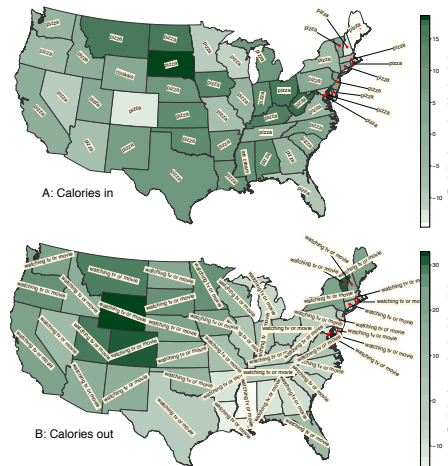
 "The Lexicocalorimeter: Gauging public health through caloric input and output on social media" 
Alajajian, Williams, Reagan, Alajajian, Frank, Mitchell, Lahne, Danforth, and Dodds.
PLOS ONE, 12, e0168893, 2017. ^[1]



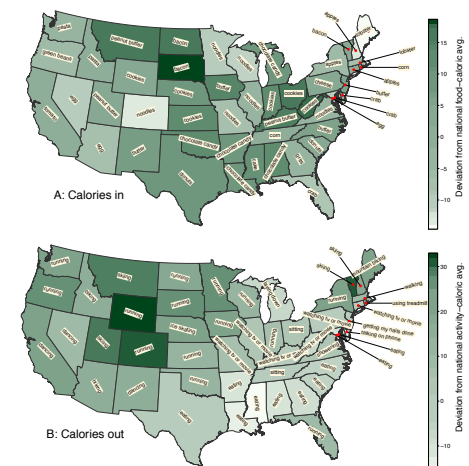
<http://panometer.org/instruments/lexicocalorimeter/> 

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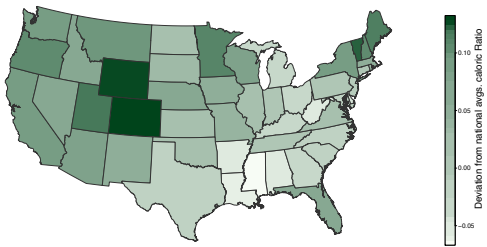
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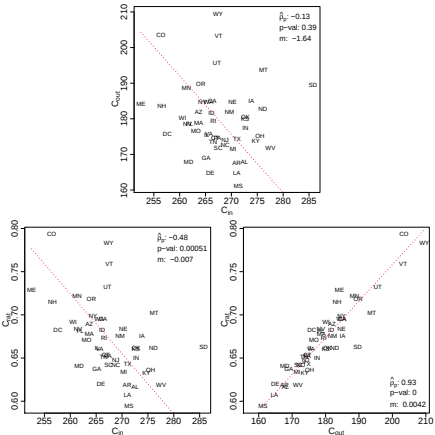


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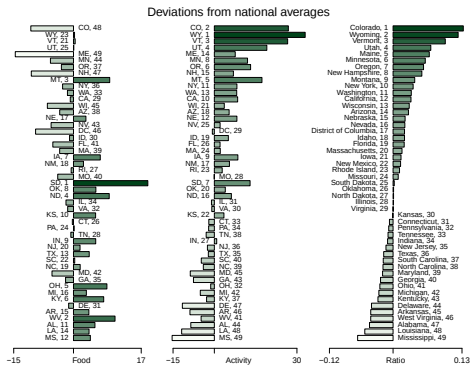
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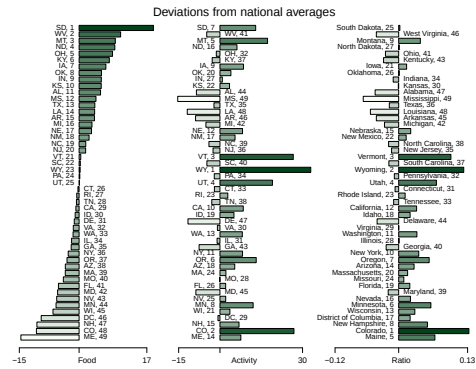
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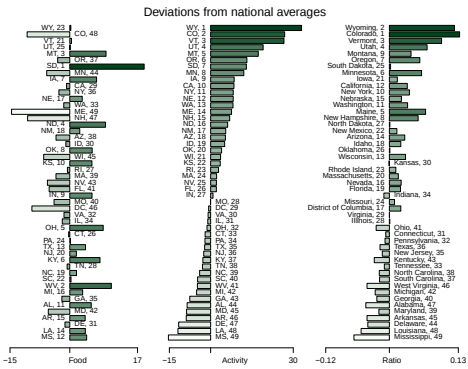
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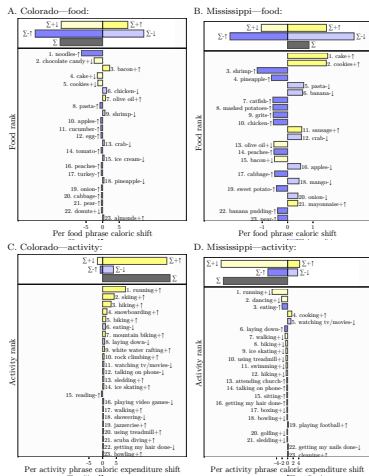
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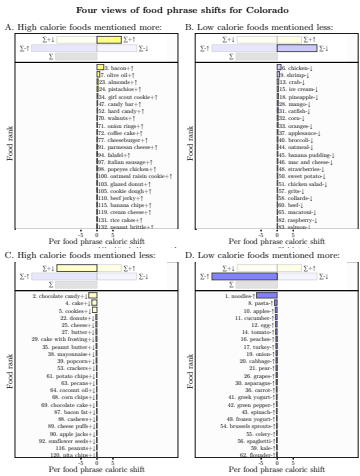
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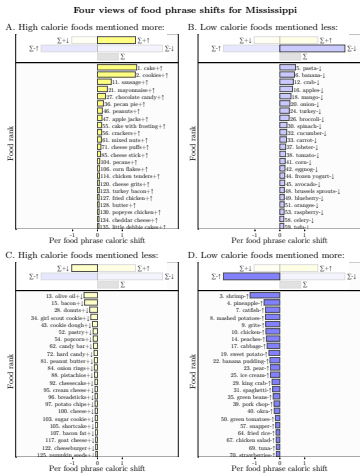
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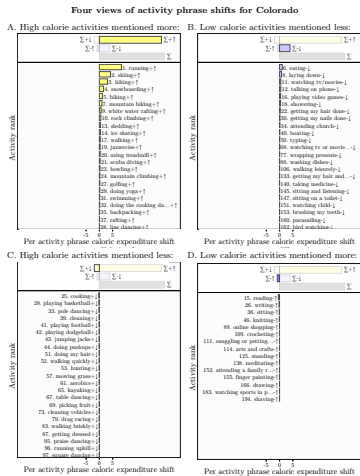
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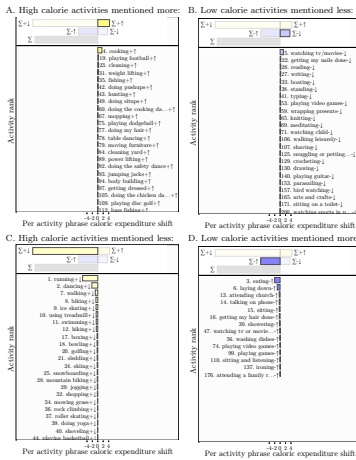
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The Lexicocalorimeter:

Four views of activity phrase shifts for Mississippi

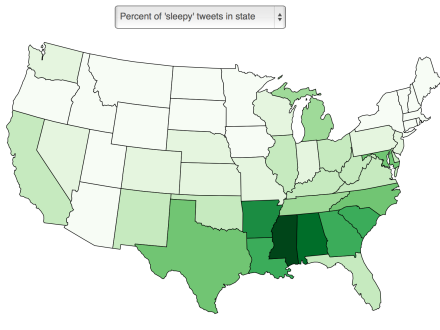


The Lexicocalorimeter:

Health and/or well-being quantity	β , for C_{Cal}	ρ -val	β , for C_{Cal}	ρ -val	β , for C_{Cal}	ρ -val
1. % no physical activity in past 30 days [24]	-0.76	1.07×10^{-9}	0.56	4.43×10^{-9}	-0.69	1.59×10^{-8}
2. % have been physically active in past 30 days [24]	-0.78	1.07×10^{-9}	-0.58	5.59×10^{-9}	-0.67	1.31×10^{-8}
3. % high blood pressure [24]	-0.77	1.07×10^{-9}	0.88	1.16×10^{-9}	-0.76	1.07×10^{-9}
4. Heart disease death rate [27]	-0.73	1.02×10^{-9}	0.38	1.24×10^{-9}	-0.72	1.02×10^{-9}
5. Adult diabetes rate [25]	-0.74	1.17×10^{-9}	0.34	2.77×10^{-9}	-0.77	1.02×10^{-9}
6. CNIHQ quality of life ranking [26]	-0.74	1.87×10^{-9}	0.83	3.22×10^{-9}	-0.77	1.80×10^{-9}
7. % child overweight/obesity [27]	-0.71	1.31×10^{-9}	0.53	5.12×10^{-9}	-0.69	1.56×10^{-9}
8. Gallup Wellbeing score [4]	-0.7	1.17×10^{-9}	-0.31	3.38×10^{-9}	0.71	1.43×10^{-9}
9. America's Health Rankings, overall [24]	-0.69	1.10×10^{-9}	0.52	4.11×10^{-9}	-0.69	1.56×10^{-9}
10. Life expectancy at birth [27]	-0.67	7.92×10^{-9}	-0.36	1.50×10^{-9}	0.65	2.58×10^{-9}
11. Life expectancy at birth [27]	-0.65	2.58×10^{-9}	0.34	2.82×10^{-9}	-0.64	2.68×10^{-9}
12. % child overweight/obesity [27]	-0.63	2.58×10^{-9}	0.52	7.45×10^{-9}	-0.51	3.90×10^{-9}
13. % who eat fruit less than once a day [26]	-0.61	1.92×10^{-9}	0.53	5.14×10^{-9}	-0.46	1.72×10^{-9}
14. % who eat vegetable less than once a day [26]	-0.61	1.92×10^{-9}	0.53	5.14×10^{-9}	-0.46	1.72×10^{-9}
15. Median daily intake of fruits [26]	-0.59	3.56×10^{-9}	-0.50	3.56×10^{-9}	0.41	3.72×10^{-9}
16. Snapping rate [27]	-0.59	1.81×10^{-9}	0.47	1.49×10^{-9}	-0.46	2.18×10^{-9}
17. Median daily intake of vegetables [26]	-0.5	7.25×10^{-9}	-0.56	1.49×10^{-9}	0.31	4.09×10^{-9}
18. Median household income [27]	-0.48	1.37×10^{-9}	-0.3	8.38×10^{-9}	0.4	1.07×10^{-9}
19. % high cholesterol [24]	-0.48	1.28×10^{-9}	0.24	1.19×10^{-9}	-0.49	1.10×10^{-9}
20. Colorectal cancer rate [25]	-0.47	1.72×10^{-9}	0.56	1.37×10^{-9}	-0.47	9.35×10^{-9}
21. Brain health ranking [29] (lower is better)	-0.46	1.95×10^{-9}	0.31	1.74×10^{-9}	-0.49	5.43×10^{-9}
22. US Census GI index score [30] (lower is better)	-0.44	1.60×10^{-9}	0.11	12.74×10^{-9}	-0.3	6.22×10^{-9}
23. % with bachelor's degree or higher [31]	-0.42	1.48×10^{-9}	-0.11	4.21×10^{-9}	0.31	2.82×10^{-9}
24. Avg # of poor mental health days, past 30 days [24]	-0.39	9.97×10^{-9}	0.1	8.1×10^{-9}	-0.42	1.20×10^{-9}
25. Sometimes Big Five personality trait [31]	-0.37	1.31×10^{-9}	0.21	1.95×10^{-9}	-0.37	1.42×10^{-9}
26. Snage drinking rate [24]	-0.34	2.91×10^{-9}	-0.12	4.88×10^{-9}	0.41	6.23×10^{-9}
27. Fatness markers per 100,000 in pop. [28]	-0.33	2.58×10^{-9}	-0.01	8.59×10^{-9}	0.32	3.41×10^{-9}
28. Extraneous Big Five personality trait [31]	-0.33	2.83×10^{-9}	0.11	4.13×10^{-9}	-0.39	3.50×10^{-9}
29. Avg # of poor physical health days, past 30 days [24]	-0.32	1.81×10^{-9}	0.16	3.32×10^{-9}	-0.38	1.18×10^{-9}
30. Shuffling of the Hedonic Income score (lower is better)	-0.31	1.58×10^{-9}	0.1	8.22×10^{-9}	-0.31	1.16×10^{-9}
31. % schools offering fruit/veg at cafeterias [26]	-0.25	1.10×10^{-9}	-0.38	1.30×10^{-9}	0.05	7.75×10^{-9}
32. Openness Big Five personality trait [31]	-0.23	1.31×10^{-9}	-0.42	5.43×10^{-9}	0.04	7.95×10^{-9}
33. % engaged harvested for fruits/veg [26]	-0.18	2.53×10^{-9}	-0.52	2.49×10^{-9}	-0.06	7.78×10^{-9}
34. Conscientiousness Big Five personality trait [31]	-0.1	5.31×10^{-9}	-0.14	1.97×10^{-9}	-0.05	7.78×10^{-9}
35. % census tracts, healthy food outlet within 1/2 mile [28]	-0.06	7.47×10^{-9}	-0.09	1.69×10^{-9}	-0.24	1.28×10^{-9}
36. Group Mean overall freedom ranking [33] (lower is better)	-0.02	8.46×10^{-9}	-0.05	7.73×10^{-9}	-0.1	5.58×10^{-9}
37. Agreeableness Big Five personality trait [31]	0	9.95×10^{-9}	0.24	1.28×10^{-9}	0.08	6.41×10^{-9}

TABLE S1. Identical to Tab. 1 but with liquids included. Spearman correlation coefficients, β , and Benjamin-Hochberg ρ -values for caloric input C_{Cal} , caloric output C_{Cal} , and caloric rate $C_{\text{Cal}} = C_{\text{Cal}}/C_{\text{Cal}}$ and demographic data related to food and physical activity. Big Five personality traits [31], health and well-being quantities by state, and socioeconomic status, correlated, ordered from strongest to weakest Spearman correlations with caloric ratio.

The Insomniometer:



Correlation with CDC's Sleep Insufficiency measure $\mathcal{C}$: $r_s = .48$, $p = 5.3 \times 10^{-4}$.

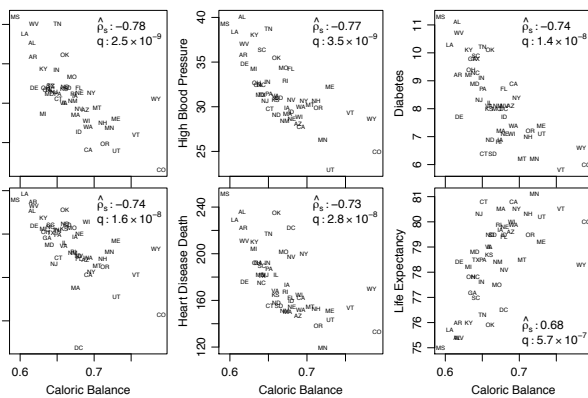
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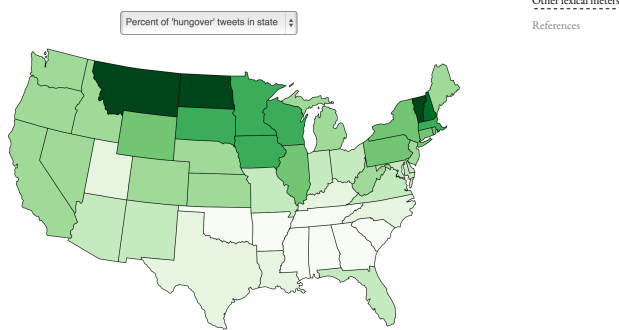
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TABLE S1. Identical to Tab. 1 but with liquids included. Spearman correlation coefficients, β , and Benjamin-Hochberg ρ -values for caloric input C_{Cal} , caloric output C_{Cal} , and caloric rate $C_{\text{Cal}} = C_{\text{Cal}}/C_{\text{Cal}}$ and demographic data related to food and physical activity. Big Five personality traits [31], health and well-being quantities by state, and socioeconomic status, correlated, ordered from strongest to weakest Spearman correlations with caloric ratio.

The Hangoverometer:



Correlation with Binge drinking estimates $\mathcal{C}$: $r_s = .72$, $p = 5.8 \times 10^{-9}$.

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8. America's Health Rankings, overall [24]	-0.69	1.10×10^{-9}	0.52	4.11×10^{-9}	-0.69	1.56×10^{-9}
9. Life expectancy at birth [27]	-0.67	7.92×10^{-9}	-0.36	1.50×10^{-9}	0.65	2.58×10^{-9}
10. Life expectancy at birth [27]	-0.65	2.58×10^{-9}	0.34	2.82×10^{-9}	-0.64	2.68×10^{-9}
11. Life expectancy at birth [27]	-0.63	2.58×10^{-9}	0.52	7.45×10^{-9}	-0.51	3.90×10^{-9}
12. % who eat fruit less than once a day [26]	-0.61	1.92×10^{-9}	0.53	5.14×10^{-9}	-0.46	1.72×10^{-9}
13. % who eat vegetable less than once a day [26]	-0.61	1.92×10^{-9}	0.53	5.14×10^{-9}	-0.46	1.72×10^{-9}
14. % who eat vegetable less than once a day [26]	-0.61	1.92×10^{-9}	0.53	5.14×10^{-9}	-0.46	1.72×10^{-9}
15. Median daily intake of fruits [26]	-0.59	3.56×10^{-9}	-0.50	3.56×10^{-9}	0.41	3.72×10^{-9}
16. Snapping rate [27]	-0.59	1.81×10^{-9}	0.47	1.49×10^{-9}	-0.46	2.18×10^{-9}
17. Median daily intake of vegetables [26]	-0.5	7.25×10^{-9}	-0.56	1.49×10^{-9}	0.31	4.09×10^{-9}
18. Median household income [27]	-0.48	1.37×10^{-9}	-0.3	8.38×10^{-9}	0.4	1.07×10^{-9}
19. % high cholesterol [24]	-0.48	1.28×10^{-9}	0.24	1.19×10^{-9}	-0.49	1.10×10^{-9}
20. Colorectal cancer rate [25]	-0.47	1.72×10^{-9}	0.56	1.37×10^{-9}	-0.47	9.35×10^{-9}
21. Brain health ranking [29] (lower is better)	-0.46	1.95×10^{-9}	0.31	1.74×10^{-9}	-0.49	5.43×10^{-9}
22. US Census GI index score [30] (lower is better)	-0.44	1.60×10^{-9}	0.11	12.74×10^{-9}	-0.3	6.22×10^{-9}

