Using health utility to set drinking targets for alcohol brief interventions

Jeremy W. Bray, PhD
Abraham Gebreselassie
Collin Labutte
UNCG

Eve Wittenberg, PhD
Harvard TH Chan School of Public Health

Benjamin Thornburg
Johns Hopkins University

Carolina Barbosa, PhD
RTI International

Funding for this research was provided by NIAAA grant #1R15AA027655-01

UNC GREENSBORO
Department *of* Economics

Low-risk drinking guidelines

- Low-risk drinking guidelines provide recommended drinking limits based on epidemiological evidence of harm from alcohol consumption
- Guidelines inform ABI drinking targets
- Most developed countries and the WHO have guidelines
- Guidelines often specify daily and weekly limits

How are guidelines set?

- In the US, guidelines are set by the relevant advisory boards
  - Based on epidemiological evidence of harm, but basis for exact thresholds remains unclear
- Other countries have attempted to bring more transparency and scientific rigor to determining thresholds
  - Relative risk (Canada)
  - Absolute risk (Australia)

Criticisms

- From the scientific community (Holmes et al., 2019; Rehm et al., 2008)
  - Process lacks transparency and objectivity
  - Process is limited to health risks
- From the public (Stautz et al., 2017)
  - General lack of support for guidelines
  - Resistance based on disagreement with scientific support and a failure to account for the enjoyment people get from drinking

Adding health utility

- Health utility reflects individuals' preferences for living in states of health and is conceptually bounded between 0 (for dead) and 1 (for perfect health)
- Health utility is the foundation of quality adjusted life years and, therefore, cost-effectiveness analysis
- Using health utility to inform low-risk drinking guidelines allows us to incorporate consumer preferences for health in a way that is scientifically rigorous and methodologically transparent

Our basic approach

- We estimate regression models that relate health utility to alcohol consumption behaviors and find the patterns of use that maximize individual health utility
- I will present these findings as if they are casual for ease of presentation, but they are not; at least not yet

Data

- National Epidemiologic Survey of Alcohol and Related Conditions Wave 3 (NESARC-III)
  - Face-to-face interview survey of noninstitutionalized US residents aged 18 years and older
  - Collected from April 2012 to June 2013 through a multistage probability sample with oversampling of ethnic subgroups
  - Adjusted for non-response and weighted such that aggregate counts match the demographic proportions of 2010 US Census blocks.
  - Total NESARC-III sample size was 36,309; the response rate was 60.1%
- We limited our preliminary analysis sample to individuals who consumed alcohol in the past year and have no history of alcohol use disorder
- Sampling weights were used in all analyses

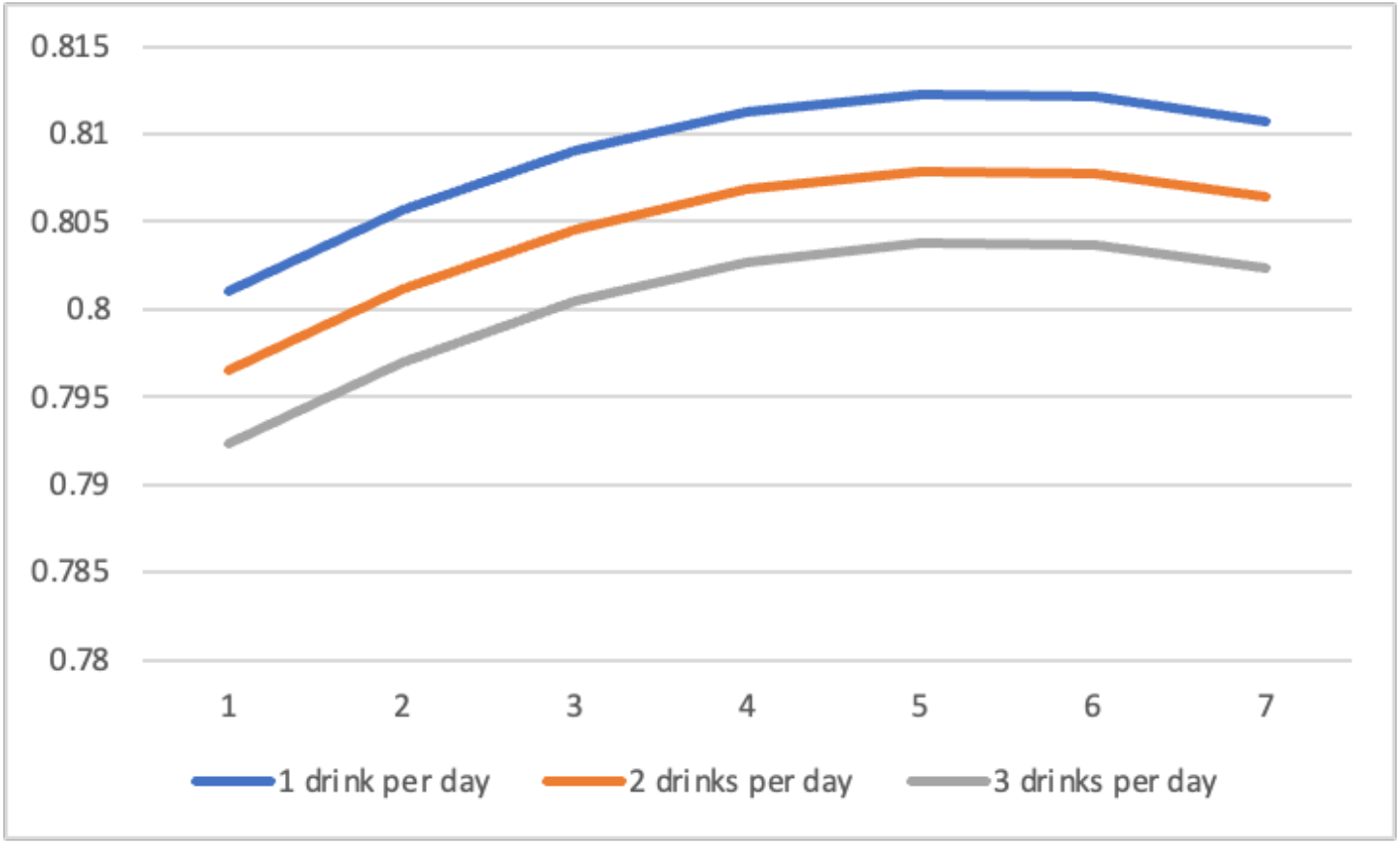
Data

- Final analysis sample after listwise deletion is 16,014
- Health utility measured with the SF-6D (mean = 0.804; SD = 0.14)
- Alcohol use measured using
  - Typical frequency of alcohol use in past year (mean = 63.7 dpy, 1.2 dpw; range 2-365)
  - Typical quantity consumed (mean = 2.2; range 1-54)
  - Largest quantity consumed in past year (mean = 3.6; range 1-60)
  - Frequency of consuming that amount in the past year (mean = 23.3 dpy, 0.4 dpw; range 1-365)
  - Frequency variables divided by 52 to scale them to weekly values
- Other control variables are
  - Marital status
  - Gender
  - Race/ethnicity
  - Age
  - 54 comorbid physical and behavioral health conditions

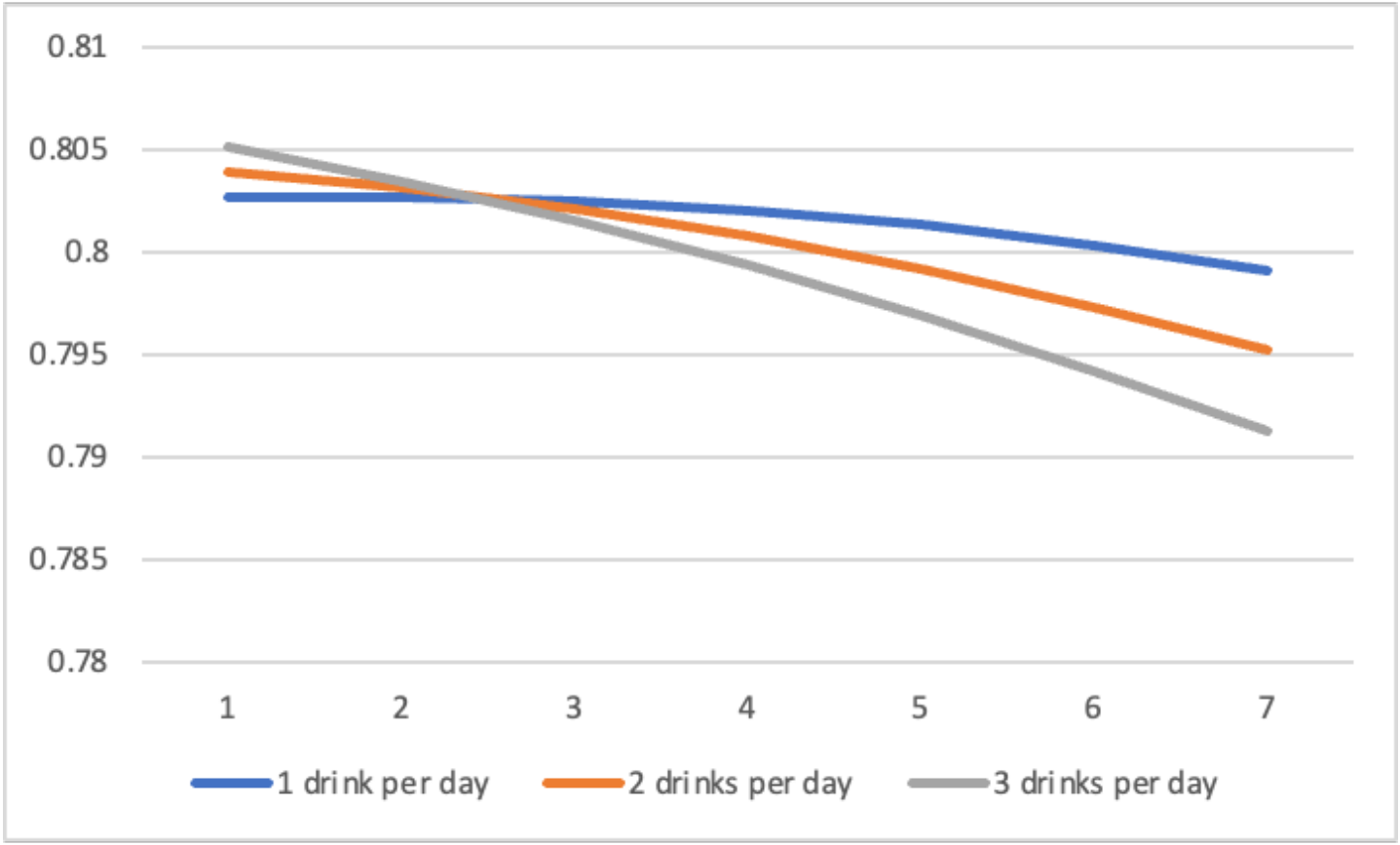
Results: Regression coefficients

	Coefficient	SE	p
typical frequency	0.0064	0.0028	0.0230
typical frequency squared	-0.0006	0.0004	0.1160
Wald test			0.0334
typical quantity	-0.0049	0.0017	0.0040
typical quantity squared	0.0001	0.0001	0.0110
Wald test			0.0132
typical frequency X typical quantity	0.0000	0.0005	0.9560
Wald test			0.0000
largest frequency	0.0013	0.0040	0.7390
largest frequency squared	-0.0001	0.0006	0.8200
Wald test			0.9310
largest quantity	0.0024	0.0010	0.0230
largest quantity squared	-0.0001	0.0000	0.0660
Wald test			0.0777
largest frequency X largest quantity	-0.0009	0.0005	0.0780
Wald test			0.0180

Results: Typical consumption



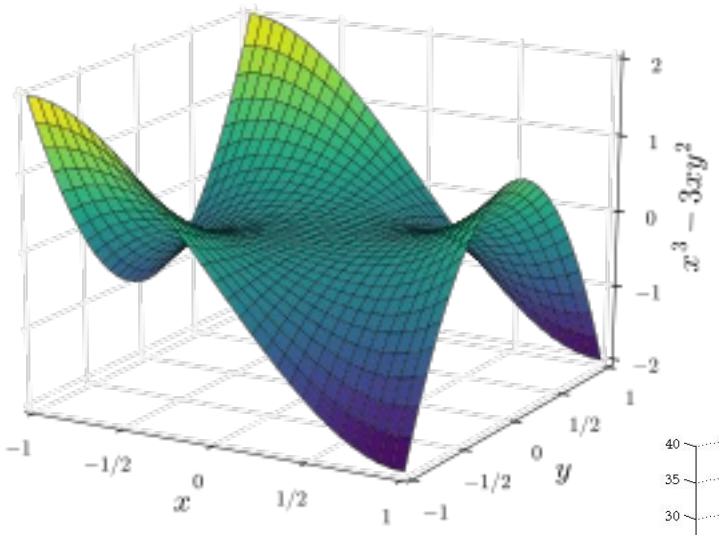
Results: Largest consumption

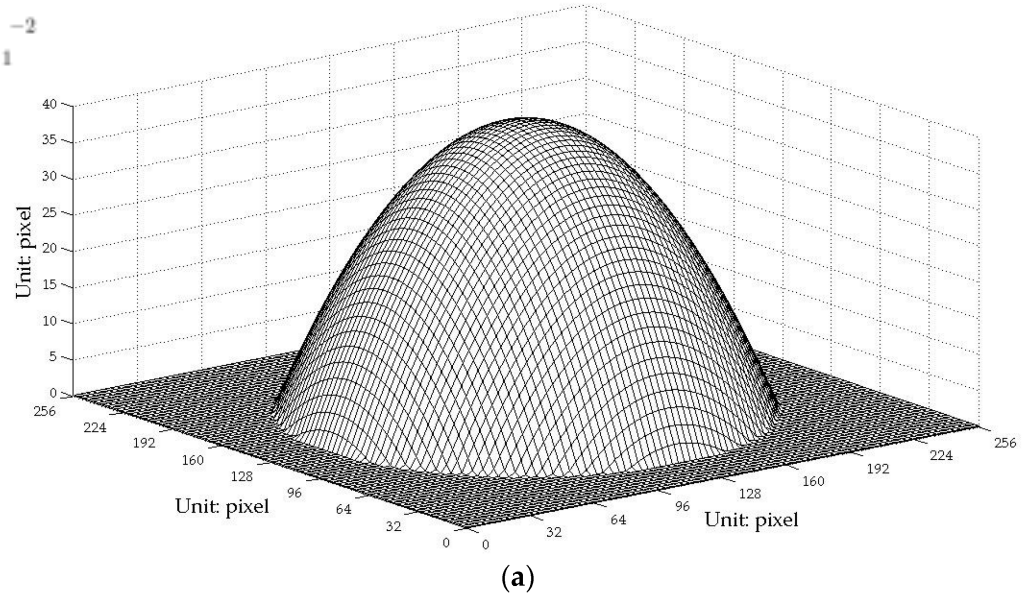


Results: Optima

- Typical drinking
  - Saddle point, not a global maximum or minimum
  - Frequency
    - 5.7 days per week; 5.3 without interaction
    - Maximum in frequency
  - Quantity
    - 17.4 drinks per day; 17.9 without interaction
    - Minimum in quantity
- Largest quantity
  - Saddle point, not a global maximum or minimum
  - Frequency
    - 2.6 days per week; 5.0 without interaction
    - Maximum in frequency
  - Quantity
    - 0.7 drinks per day; 18.4 without interaction
    - Maximum in quantity

Twisted sheet of paper, not a bowl





(a)

Next steps

- Refine the functional form assumptions
- Stratify by gender
- Bootstrapping to compute confidence intervals for optima
- Use Mendelian randomization (AKA genetic instrumental variable analysis) to estimate causal relationships using genetic data collected by NESARC-III (N = 23,860)

References

- Holmes J, Angus C, Meier PS, Buykx P, Brennan A. How should we set consumption thresholds for low risk drinking guidelines? Achieving objectivity and transparency using evidence, expert judgement and pragmatism. *Addiction*. 2019;114(4):590-600. doi:10.1111/add.14381
- Rehm J, Room R, Taylor B. Method for moderation: measuring lifetime risk of alcohol-attributable mortality as a basis for drinking guidelines. *Int J Methods Psychiatr Res*. 2008;17(3):141-151.
- Stautz K, Bignardi G, Hollands GJ, Marteau TM. Reactions on Twitter to updated alcohol guidelines in the UK: a content analysis. *BMJ Open*. 2017;7(2):e015493. doi:10.1136/bmjopen-2016-015493

Questions?