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&

The ELAStiC Team

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Public Health Wales Showcase Event

Electronic Longitudinal Alcohol Study in Communities

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DECIPHer
ESRC, MRC, Alcohol Research UK - ES/L015471/1

ELASTIC

Electronic **L**ongitudinal **A**lcohol **St**udy **i**n **C**ommunities

To determine the life-course effects of alcohol misuse and hazardous use on health and well-being - including injury, mental health, emotional and cognitive development and on educational attainment and health service utilisation.

January 2015 to June 2018

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Mark Bellis Public Health Wales	**David Fone** Cardiff University
John MacLeod Bristol University	**Shantini Paranjothy** Cardiff University
Matt Hickman Bristol University	**John Gallacher** Cardiff University
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Frank Dunstan Cardiff University	**Daniel Farewell** Cardiff University

Funded by the
Economic and Social Research Council, Medical Research Council,
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Cohorts

Avon Longitudinal Study of Parents and Children (ALSPAC)

British Household Panel Survey (BHPS) and Understanding Society (USoc)

UK BioBank (UKB)

Millennium Cohort Study (MCS)

Caerphilly Health and Social Needs Electronic Cohort Study (E_CATALyST)

Change in Alcohol Outlet Density and Alcohol-Related Harm to Population Health (CHALICE)

Routine Data

Welsh Electronic Cohort for Children (WECC)

Patient Episode Database for Wales (PEDW)

GP Data

Office for National Statistics (ONS) Mortality Data

ONS Births table

Emergency Department Data Set

Work Packages

WP1 – Methodological Innovations

WP2 - Pathways into Harm

WP3 - Secondary Harms

WP4 - Mental Health & Well-Being

Outputs to date

Akbari A, Lyons R, Berridge D, Gallacher J, MacLeod J, Heron J, ... Moore S. (2017). The ELAStiC (Electronic Longitudinal Alcohol Study in Communities) project. *International Journal of Population Data Science,* (1)

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Kendler Kenneth S., Gardner Charles O., Edwards Alexis C., Dick Danielle M., Hickman Matt, MacLeod John, ... Heron Jon. (2018). Childhood Risk Factors for Heavy Episodic Alcohol Use and Alcohol Problems in Late Adolescence: A Marginal Structural Model Analysis. *JOURNAL OF STUDIES ON ALCOHOL AND DRUGS, 79*(3), pp. 370-379.

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Lloyd K, Rosin P, Marshall D, Moore S. (2017). Detecting violent and abnormal crowd activity using temporal analysis of grey level co-occurrence matrix (GLCM)-based texture measures. *Machine Vision and Applications,* (3-4)

Mahedy L, Hammerton G, Teyhan A, Edwards AC, Kendler KS, Moore SC, ... Heron J. (2017). Parental alcohol use and risk of behavioral and emotional problems in offspring. *PloS one, 12*(6), pp. e0178862

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Moore SC. (2016). Human cognition tips the balance away from thresholds. *Addiction (Abingdon, England), 111*(10), pp. 1732-3

Paranjothy S, Evans A, Bandyopadhyay A, Fone D, Schofield B, John A, ... Long SJ. (2018). Risk of emergency hospital admission in children associated with mental disorders and alcohol misuse in the household: an electronic birth cohort study. *The Lancet. Public health, 3*(6), pp. e279-e288

Piumatti G, Moore SC, Berridge DM, Sarkar C, Gallacher J. (2018). The relationship between alcohol use and long-term cognitive decline in middle and late life: a longitudinal analysis using UK Biobank. *Journal of public health (Oxford, England), 40*(2), pp. 304-311

Webb BT, Edwards AC, Wolen AR, Salvatore JE, Aliev F, Riley BP, ... Kendler KS. (2017). Molecular Genetic Influences on Normative and Problematic Alcohol Use in a Population-Based Sample of College Students. *Frontiers in genetics, 8*, pp. 30

Highlights

Effects of Excessive Alcohol Use on Antisocial Behavior Across Adolescence and Early Adulthood

- Young people who drink alcohol excessively are also more anti-social

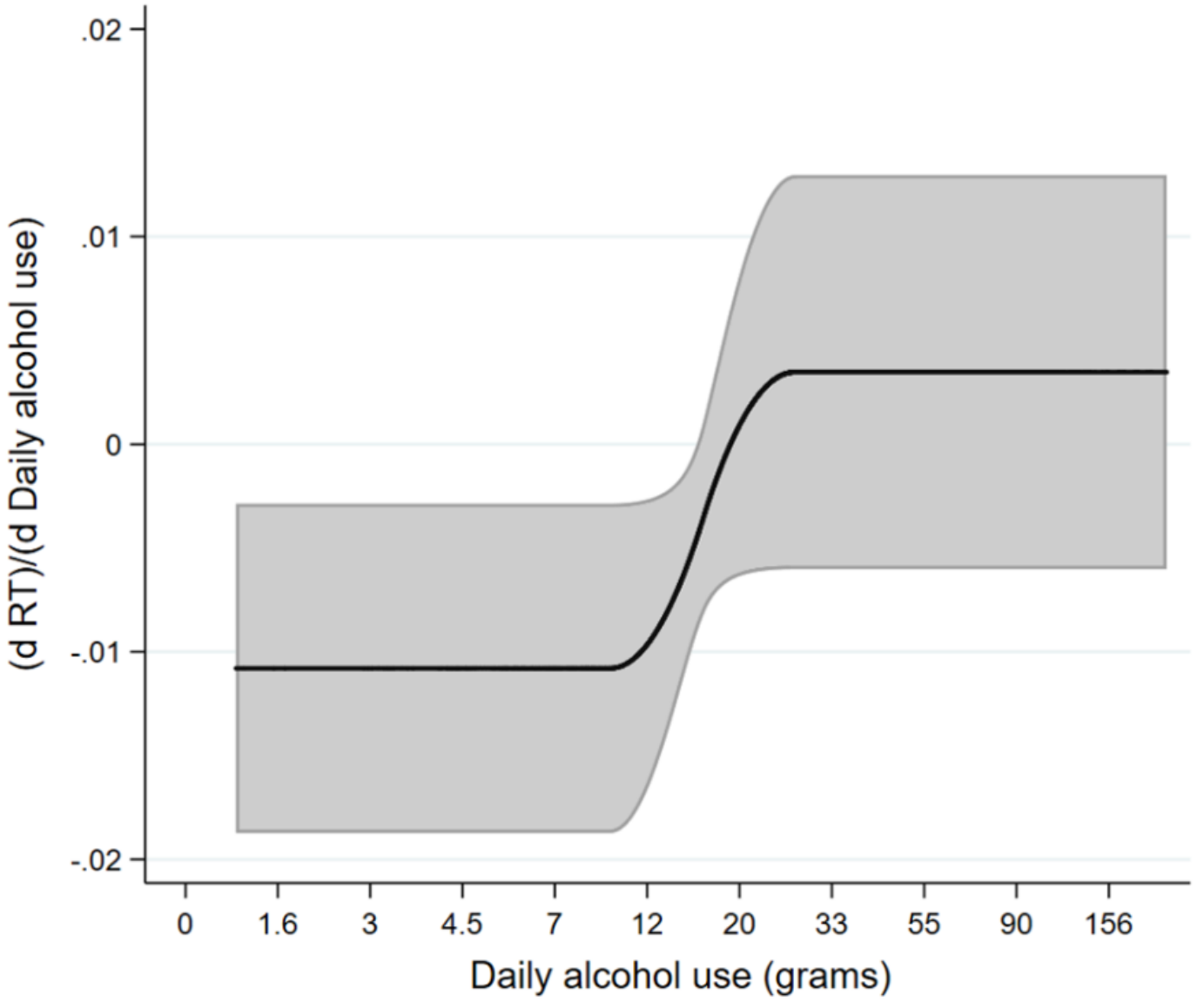
Parental Alcohol Use and Risk of Behavioral And Emotional Problems In Offspring

- Little evidence to support a dose response association between parental alcohol use and offspring outcomes: maternal alcohol use at age four years and childhood conduct problems, adolescent depressive symptoms.

Risk of Emergency Hospital Admission in Children Associated with Mental Disorders and Alcohol Misuse in the Household: An Electronic Birth Cohort Study

- Data for 253,717 children with 1,015,614 child-years of follow-up. Living with an adult with a mental disorder increases risk of emergency admission. Children living with a household member who had an alcohol-related hospital admission had a significantly higher risk of emergency admissions for injuries and external causes.

Alcohol and Cognitive Function



$$U = f(\ln Y, AC)$$

$$\Delta U = \frac{\partial U}{\partial \ln Y}\Delta lnY + \frac{\partial U}{\partial AC}\Delta AC$$

$$\Delta lnY = -\frac{\partial U/\partial AC}{\partial U/\partial lnY}\Delta AC$$

$$\Delta Y = Y * (\exp\left(-\frac{\partial U/\partial AC}{\partial U/\partial lnY}\right) * \Delta AC - 1)$$

$$\Theta_{i,t} = \alpha + \sum_{k=1}^{K}\beta_k^w(x_{i,k,t} - \bar{x}_{i,k}) + \sum_{k=1}^{K}\beta_k^b\bar{x}_{i,k} + \sum_{j=1}^{J}\beta_j c_{i,j} + v_i + \epsilon_{i,t}$$

$$n_{i,k}^{-1}\sum_{t=1}^{n_{i,k}} x_{i,k,t}$$

$$\Theta_{i,t} = \alpha + \sum_{k=1}^{K}\beta_k^w x_{i,k,t} + \sum_{j=1}^{J}\beta_j^R c_{i,j} + \left(\sum_{k=1}^{K}(\beta_k^b - \beta_k^w)\bar{x}_{i,k} + v_i\right) + \epsilon_{i,t}$$

$$CIV = Y * \left(\exp\left(-\frac{\beta_{AC}}{\beta_{lnY}}\right) - 1\right)$$

$$\mathrm{Cov}(\hat{\tau}) = \left(\frac{\partial g(\hat{\boldsymbol{\lambda}})}{\partial \boldsymbol{\lambda}}\right)\mathrm{Cov}(\hat{\boldsymbol{\lambda}})\left(\frac{\partial g(\hat{\boldsymbol{\lambda}})}{\partial \boldsymbol{\lambda}}\right)^T$$

$$\frac{\partial g(\hat{\boldsymbol{\lambda}})}{\partial \boldsymbol{\lambda}} = \left[-\exp\left(-\frac{\hat{\beta}_{AC}}{\hat{\beta}_{lnY}}\right) * \frac{1}{\hat{\beta}_{lnY}} \quad \exp\left(-\frac{\hat{\beta}_{AC}}{\hat{\beta}_{lnY}}\right) * \frac{\hat{\beta}_{AC}}{\hat{\beta}_{lnY}^2}\right]$$

$$CIV^{£} = CIV * \sum_{i=1}^{8} p_i * (income_i - tax_i)$$

The True Cost of Alcohol

- There is a causal relationship between alcohol and depression
  - Boden, J. M., & Fergusson, D. M. (2011). Alcohol and depression. Addiction, 106(5), 906-914.
  - Fergusson DM, Boden JM, Horwood LJ. Tests of causal links between alcohol abuse or dependence and major depression. Archives of General Psychiatry. 2009;66(3):260-6.
- A consistent relationship between depression and alcohol consumption; and neuroticism and alcohol consumption.
- Significant associations were found between household income and depression and household income and neuroticism.
- The value of reducing alcohol consumption by one gram/day was pooled and estimated to be £209.06 (95% CI £171.84 to £246.27).
- The affective benefit of reducing alcohol consumption by one bottle of wine each week is equivalent to an increase in annual household income of £2,389.
- Reducing consumption by one pint of beer each week is equivalent to an increase in annual household income of £610.69

Forthcoming: Parental Consumption

	n Studies	n ES	Effect Size		Test Statistic
			r	95% CI	
Random-effects model					
Overall effect size	56	220	.15	[.12, .17]	t(219) = 12.94, p < .001
Mixed-effects models Substantive Moderators					
Parental substance abuse					F(3, 205) = 50.15, p = .002
Alcohol	21	83	.13	[.09, .16]	
Tobacco	25	70	.13	[.10, .16]	
Drug use (cannabis = 0.23)	8	14	.25	[.19, .31]	
Alcohol use disorder	11	42	.14	[.09, .19]	
Child wellbeing dimension					F(2, 214) = 20.65, p = .073
Physical	38	162	.15	[.12, .17]	
Psychological	16	42	.15	[.11, .19]	
Cognitive	4	13	.06	[-.02, .14]	

Barriers

- MCS data not linked to NHS data due to consent issues
- MoJ data not linked to ALSPAC
- NHS data linkage to ALSPAC under Section 251 delayed
- BHPS data not linked to NHS data due to delays at ISER

Opportunities

- The problem is not that people drink too much. The problem is that their causes harm, to themselves and others.
- Small changes in consumption may have little bearing on the individual at moderate doses. But across the 40M drinkers in the UK a small change aggregates up to a significant effect on the £3.5B cost of alcohol the NHS, and additional costs in respect of productivity and childhood outcomes.
- Many of these costs are hidden, as ELAStiC evolves we can better inform drinkers of the true costs and understand the broader damage on society.