

# Drinking over the life-course and health effects

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CLOSER 22<sup>nd</sup> March 2018



The UK Medical Research Council
Alcohol Research UK
European Research Council

Alcohol Lifecourse Project





# Public Health impact

About **3.3 million deaths** each year are estimated to have been caused by alcohol consumption.

About 6% of all deaths, or one in every twenty deaths in the world (7.6% for men, 4.0% for women).





# Older people.... Invisible addicts?

In 2015-16 more than half a million people aged between 55 and 74 were admitted to hospital with an alcohol-related issue



Guardian graphic | Source: Local Alcohol Profiles for England

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#### Long Term Effects of Alcohol







Alcohol has been identified as a causal factor in more than

# 60 Medical conditions

#### including:

- mouth, throat, stomach, liver and breast cancers
- depression
- stroke
- cirrhosis of the liver
- heart disease
- liver disease



Room et al. Alcohol and Public Health. Lancet 2005



# But what about health benefits..



- Tony Edwards is a science journalist and writer
- He has brought together leading research on the effects of alcohol
- Found that, far from being harmful, drinking could prevent illness
- Red wine is best, but must still be drunk in moderation



# How do we know this?

- Observational studies
- Experimental studies





# **Observational studies**





## Alcohol consumption and mortality



#### Relative risks for dose response association between alcohol intake and mortality

Source: Di Castelnuovo et al. Arch Intern Med 2006. DOI: 10.1001/archinte.166.22.2437



# Alcohol consumption and heart disease

Meta-analyses consistently indicate that those who consume alcohol in moderation have a lower risk of developing CHD than heavy drinkers and those who abstain from alcohol



#### Relative risks for dose response association between alcohol intake and IHD mortality in men

Source: Roerecke & Rehm Addiction 2012. DOI: 10.1111/j.1360-0443.2012.03780.x



# Reasons to be skeptical of observation studies

- Comparison groups? Drinkers vs non-drinkers?
  - Who are the non-drinkers? Life-time abstainers, former drinkers?
  - Who are the moderate drinkers? Confounding factors
  - Selection biases e.g. healthy survivor effects
- What about changes in drinking over time?
  - Life course perspective
  - Accumulation of harmful effects



### Is a life course perspective important?





Why might previous drinking matter?

# Evidence on health consequences of alcohol consumption comes from observational cohort studies

Alcohol (baseline) Health outcome (decades later)

- Ignores changes in consumption over the life-course
- Ignores cumulated effects over life-course
- Ignores "critical" age-specific effects



#### Alcohol trajectories across the life-course







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#### What do alcohol trajectories over life course look like?



# Cohorts included so far...

- MRC NHSD 1946 British Birth Cohort Study (N= 3,552)
- NCDS 1958 British Birth Cohort Study (N= 14,651)
- 1970 British Birth Cohort Study (N=12,594)
- UK Whitehall II Cohort study (N= 10,284)
- English Longitudinal Study of Ageing (N= 10,924)
- West of Scotland Twenty-07 1930s (N= 1,485)
- West of Scotland Twenty-07 1950s (N=1,432)
- West of Scotland Twenty-07 1970s (N=1,551)
- Caerphilly Prospective Study (N=2,906)
- European Prospective Investigation into Cancer-Norfolk (N= 24,255)

#### **COMBINED SAMPLE 83,600 individuals with 200,000+ alcohol observations**



# Harmonisation

- Alcohol volume: Mean weekly consumption derived from each cohort
- Frequency: "none in past year", "monthly/special occasions", "weekly infrequent", "weekly frequent"
- Covariates: Smoking, social class, physical activity, diet, ethnicity...
- Outcomes: Death, CHD, biomarkers...



## Life time drinking



Predicted mean alcohol consumption trajectories (in units of alcohol per week) and 95% CI across the life course in 9 UK cohort studies



# Results: Combined predicted mean alcohol



Britton et al. Life-course trajectories of alcohol consumption in the UK using longitudinal data from nine cohort studies. *BMC Medicine 2015* 



# Does previous drinking matter when estimating (chronic) harm?



# Atherosclerosis





Britton et al. BMC 2016



# Atherosclerosis

#### Thickening of the vessel wall with plaque - asymptomatic

Leads to heart attack and stroke



Carotid intima media thickness



### Data



### Whitehall II Cohort Study

### 1946 British Birth Cohort



# **Combined** sample



#### 5,404 men and women

20 year drinking trajectories Atherosclerosis aged approx. 60 yrs



































































#### **Current drinking**





#### Long term drinking





#### **Current drinking**



Difference from moderate drinker median cIMT (mm)









Difference from moderate drinker median cIMT (mm)





Difference from moderate drinker median cIMT (mm)





Difference from moderate drinker median cIMT (mm)



#### Long term drinking drinking Current drinking Multivariable adjusted β (95% CI) Multivariable adjusted β (95% CI) Non-drinker Stable heavy drinker Whitehall II-0.007 (-0.008, 0.022) 0.025 (0.004, 0.045) Whitehall II NSHD $\rightarrow$ 0.022 (0.001, 0.043) NSHD 0.001 (-0.044, 0.047) Subtotal 0.021(0.002, 0.039)0.012 (-0.001, 0.026) Subtotal Mostly moderate drinker 0.007 (-0.005, 0.020) Whitehall II NSHD Heavy drinker 0.009 (-0.011, 0.028) Subtotal 0.008 (-0.003, 0.018) 0.007 (-0.006, 0.020) Whitehall II Mostly heavy drinker NSHD 0.003 (-0.021, 0.027) Whitehall II 0.025 (0.009, 0.040) -0.002 (-0.028, 0.024) 0.006 (-0.005, 0.017) NSHD Subtotal Subtotal 0.013 (-0.012, 0.039) Former drinker Whitehall II 0.015 (-0.003, 0.032) 0.032 (0.006, 0.058) NSHD Subtotal 0.021 (0.005, 0.037) -.01 .01 .02 .03 .04 0 Difference from moderate drinker median cIMT (mm) 05 04 03 04 00 00 05 05 05

Difference from moderate drinker median cIMT (mm)



#### Current drinking

#### Long term drinking drinking



Difference from moderate drinker median cIMT (mm)



β (95% CI)

#### Difference in cIMT (mm) reference group moderate drinkers

Multivariable adjusted

#### Current drinking

#### Stable non-drinker Multivariable adjusted β (95% CI) Whitehall II 0.011 (-0.012, 0.035) -0.002 (-0.043, 0.038) NSHD Subtotal 0.008 (-0.012, 0.028) Non-drinker Stable heavy drinker 0.007 (-0.008, 0.022) Whitehall II-0.025 (0.004, 0.045) Whitehall II NSHD $\rightarrow$ 0.022 (0.001, 0.043) NSHD 0.001 (-0.044, 0.047) Subtotal 0.021(0.002, 0.039)0.012 (-0.001, 0.026) Subtotal Mostly moderate drinker 0.007 (-0.005, 0.020) Whitehall II Heavy drinker NSHD 0.009 (-0.011, 0.028) Subtotal 0.008 (-0.003, 0.018) 0.007 (-0.006, 0.020) Whitehall II Mostly heavy drinker NSHD 0.003 (-0.021, 0.027) Whitehall II 0.025 (0.009, 0.040) -0.002 (-0.028, 0.024) NSHD Subtotal 0.006 (-0.005, 0.017) Subtotal 0.013 (-0.012, 0.039) Former drinker 0.015 (-0.003, 0.032) Whitehall II 0.032 (0.006, 0.058) NSHD Subtotal 0.021 (0.005, 0.037) -.01 .02 .03 .04 0 .01 Difference from moderate drinker median cIMT (mm) 05 04 03 03 04 00 05 05 05 05 05

Long term drinking drinking

Difference from moderate drinker median cIMT (mm)



#### Atherosclerosis

#### Arterial stiffness



Coronary heart disease





#### Inflammation



#### Fatty liver disease





# How to capture lifetime drinking – our approaches so far:

- **Retrospective analyses** –*e.g.* Bell & Britton Addiction 2015, NgFat (Biomarkers & CHD)
- Mean consumption. e.g. Britton et al. BMC Med 2015
- Variation from mean. e.g. Britton et al Addiction 2010
- **Bivariate dual-change score modelling** *e.g. Bell & Britton, J Clin Endo Metab 2015; Bell & Britton, BMC Med 2014*
- Latent class analyses E.g. Bell et al. 2014 and Bell & Britton 2015
- Constructing typologies e.g. Britton et al. (Atherosclerosis), O'Neill et al. (Pulse wave velocity), Bell & Britton (Inflammatory markers), O'Neill et al. (CHD)



#### Conclusion

- Drinking is not a stable behaviour
- Past drinking has an effect on chronic conditions
- Where possible, take a life-course approach
- Improve the evidence base



# Acknowledgements

Steven Bell Dara O'Neill Craig Knott Linda NgFat

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Funding:



European Research Council

C Medical Research Council

