Explaining the Lack of a Consumption Gradient

Project Team

Srinivasa Vittal Katikireddi [1, 2], Jim Lewsey [3], Linsay Gray [1], Alastair Leyland [1]

[1] MRC/CSO Social and Public Health Sciences Unit
[2] Public Health and Health Policy, NHS Lothian
[3] Institute of Health and Wellbeing, University of Glasgow

Background

Alcohol is widely considered to be an important cause of both mortality and morbidity in the UK and internationally. The Global Burden of Disease study estimated that it is now responsible for 3.8% of deaths across the world and accounts for 4.6% of lost disability-adjusted life years, making it an important modifiable risk factor. Alcohol is currently of major policy interest and is known to be a major contributor to socio-economic inequalities. The relationship between socio-economic position and alcohol-related harms has also been observed in Scotland.

While alcohol-related harms appear to be socially patterned, in contrast the Scottish Health Surveys suggest overall levels of alcohol consumption are not differentially patterned by socio-economic position. A number of potential explanations exist for this discrepancy. First, health survey data may be prone to differential selection bias whereby those consuming high levels of alcohol and of low socio-economic position are less likely to participate in the surveys but may be captured in alcohol-related harms data. However, McDonald et al. using the Scottish Health Surveys linked to hospital admissions data found that similar levels of consumption were associated with greater harms for more deprived population subgroups (as assessed by SIMD). Second, different drinking patterns (e.g. daily consumption, binge drinking) might exist in socio-economic subgroups, hence resulting in differing rates of harms. Some evidence exists to support this hypothesis but it is worth noting that the McDonald et al. study found that differential harm was not accounted for by adjustment for a dichotomous variable representing binge drinking status. Third, alcohol consumption may result in downward social mobility (reverse causation). For example, Hart et al. found evidence for both downward social mobility and greater levels of harm amongst manual (versus non-manual) men and women when investigating the Midspan cohort in the West of Scotland. Fourth, socio-economic position may effect modify the relationship between alcohol consumption and alcohol-related harms i.e. similar consumption and drinking patterns result in greater harms for different socio-economic subgroups. This could be mediated by differences in other known risk factors, for example, obesity. Finally, self-reported consumption data may be susceptible to different bias by socio-economic subgroup. For example, social norms may differ by socio-economic position which may result in different forms of social desirability bias.
The existence of effect modification by socio-economic position between alcohol consumption and harms has policy relevance as an understanding of this relationship may help comprehend the impacts of population-level interventions on health inequalities. While previous relevant work exists (most notably the study by McDonald et al\textsuperscript{12} which aimed to quantify the burden of alcohol-related harms), no previous study has directly focussed on effect modification in a Scottish context. In particular, there has been limited consideration of reverse causality, the extent that differential harms reflect harms related to other substances (e.g. illicit drug use, smoking) and the potential for different consumption-harms relationships for binge drinkers. This project would allow an exploration of the above explanations with the exception of the possibility of social desirability bias.

**Aims**

This proposal seeks to address this gap in the research evidence by making use of linked health survey, hospital admissions and mortality data in Scotland. The research aims (RA) are

1. To describe the relationship between weekly alcohol consumption, drinking patterns (binge drinking, hazardous drinking) and alcohol-related harms (hospital admissions, mortality) by different measures of socio-economic position (educational level, social class, household income, SIMD deprivation)
2. To quantify how risk of alcohol-related harms differs by social position adjusted for differences in weekly consumption, drinking patterns and both combined (i.e. whether effect modification exists) and to investigate if differences in risk are accounted for by other risk factors (smoking, BMI)
3. To assess the extent that the relationship between socio-economic position and alcohol-related harms is accounted for by downward social mobility of high alcohol consumers and harms related to the use of other substances

**Methods**

Epidemiological analysis of the linked Scottish Health Surveys to administrative health data (mortality, hospital discharges, prescriptions) is planned.

**Population**

Adults aged 16+ who have participated in the Scottish Health Surveys (conducted in 1995, 1998, 2003, 2008, 2009, 2010, 2011) who have given consent to be followed up through linkage to administrative data will form the study sample.

Individuals who have experienced an alcohol-related attendance (defined by alcohol-related hospital admission) prior to their participation in the Scottish Health Survey will be excluded for all analyses.
For RA 2 and 3, individuals who have experienced a drug-related harm at any time (i.e. before or after survey participation) will be excluded to assess the extent that associations differ if individuals experiencing drug-related harms are excluded. This will include exclusion of those who have been treated with naltrexone, methadone, buprenorphine and lofexidine.

**Exposure**

Different measures of socio-economic position are the chief exposure variables of interest. Measures to reflect different stages of the lifecourse will be used (parental social class, highest educational level attained, deprivation quintile in previous residences, current deprivation quintile, household income and individual social class).

Weekly alcohol consumption data will be modelled as a continuous variable for Cox Proportional Hazards modelling. A sensitivity analysis will exclude never drinkers. Initial descriptive analysis will categorise the consumption variable into Never drank and trivial drinker, Ex-drinker, Light drinker (males 1-10 units/week, females 1-7 units/week), Moderate drinker (males 11-21 units/week, females 8-14 units/week), Heavy drinker (males 21-50 units/week, females 14-35 units/week) and Excessive (males 50+ units/week, 35+ units/week) as per Lawder et al. 11

Binge drinking will be defined as over 8 units/week in men and over 6 units/week in women. This information will not be available for the 1995 survey.

**Outcome**

The primary outcome will be experiencing any of the following: alcohol-related event defined as an alcohol-related hospital admission (as defined in ISD Alcohol Statistics Scotland) or an alcohol-related death, considered on a time-to-event basis.

Secondary outcomes will be alcohol-related mortality, alcohol-related hospital admissions and prescription for medication related to alcohol dependence (acamprosate, disulfiram, chlordiazepoxide). Sensitivity analyses will be conducted to allow for the inclusion of diazepam and thiamine as alcohol-related medication.

**Confounders**

Age (as a continuous variable) and sex will be included in the null model as confounders. Smoking (Never, Ex-smoker, Light, Moderate, Heavy) and body mass index (as a continuous variable) will be added to the model to establish the extent that they account for observed social patterning. Polynomial terms will be included for age and BMI to account for potential non-linear associations with outcomes.
Analysis Plan

RA1: Initial descriptive analysis will tabulate levels of alcohol consumption and binge drinking by different measures of socio-economic position (stratified by survey year). Cox Proportional hazards analysis of the alcohol-related harm outcomes will be performed by different measures of socio-economic position.

RA2: Cox Proportional hazards modelling of alcohol-related harms after adjustment for consumption and drinking pattern will be conducted. Consumption will be modelled as a continuous polynomial function with an interaction term for binge drinking.

RA3: Two different approaches will be used to explore the extent that reverse selection explains the differential patterning of harms. First, the consistency of the social patterning observed by different measures of socio-economic position (which reflect different stages of the lifecourse) will be assessed. For example, highest educational attainment would be expected to exhibit lower levels of reverse causality than area deprivation measures (such as SIMD). Second, the hypothesis for reverse causation will be specifically tested by comparing residential movements (identified using the Community Health Index for 2000 onwards) between deprivation quintiles for those consuming high levels of alcohol and/or exhibiting binge drinking with those not displaying high-risk patterns of consumption.

Hierarchical modelling with individuals nested within households will be used to account for the lack of independence between observations. Multiple imputation will be used to reduce bias arising from data that is missing on covariates.

Outputs

Open-access publication(s) in general medical, epidemiology or public health journals would be aimed for from this project. Given the policy importance of this issue, a short briefing document will be written for dissemination to interested relevant audiences. In addition, the project team have good links with NHS Health Scotland, including the Monitoring Evaluation of Scotland’s Alcohol Strategy (MESAS) team, and Scottish Government. They will therefore seek to maintain engagement with policy stakeholders throughout the project and disseminate findings in a timely way.
References


