

Trends and Inequalities in Alcohol Related Harm – A Birth Cohort Comparison of Finnish Adolescents Born Between 1979 and 2004

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ABSTRACT

Background: Recent evidence indicates a decline in adolescent alcohol consumption, raising expectations of a corresponding reduction in alcohol-related harms. However, research on trends in these outcomes is limited, and some findings challenge this assumption. Potential explanations for this inconsistency include variations in alcohol use across sex and socioeconomic groups, which may contribute to both increased incidence rates of alcohol-related harm and widening social inequalities.

Objective: This study examined trends and socioeconomic disparities in alcohol-related inpatient admissions and deaths among Finnish girls and boys, analysing changes across successive birth cohorts.

Method: We used Finnish register-based data to estimate secular trends in the incidence rates of alcohol-related intoxication among adolescents, modelling birth cohorts using restricted cubic splines. To evaluate temporal variability in the relative risk among different socioeconomic groups, we compared incidence rate ratios across birth cohorts based on information about parental education, household income, and unemployment.

Results: Incidence rates of alcohol-related harm increased across successive birth cohorts, peaking among those born in the early 1990s and early 2000s. These increases were more pronounced among girls and adolescents with a lower SEP, which narrowed the gender gap and widened socioeconomic inequalities. The steepest rise was observed among girls whose parents did not attain secondary education. Across all SEP indicators, a lower SEP was associated with an increased rate of harm. Incidence rate ratios increased significantly among girls whose parents had no secondary education compared to those whose parents had tertiary education, and among those in the lowest versus highest income quartile.

EXTENDED ABSTRACT

Background

Alcohol consumption poses a significant risk to adolescents' short and long-term health. The acute harms encompass both direct effects, such as alcohol poisoning, and indirect consequences, such as injuries resulting from an increased tendency to take risks and impaired motor skills associated with intoxication (1,2). Moreover, alcohol use can have detrimental effects that extend beyond the acute period of intoxication. Young people who regularly consume alcohol or drink excessively may face a cumulative risk to their long-term mental health and neurocognitive development (3–5).

In view of the extensive list of negative consequences, it is thus encouraging to observe a growing body of research indicating a decline in alcohol use among young people in several Western countries over the last few decades (6). This finding suggests that the prevalence of associated consequences may also have declined. Indeed, a recent systematic review on trends in alcohol-related healthcare contact points towards a simultaneous decrease in alcohol-related harm (ARH). However, as the review only compared relative changes between two time points, conclusions about long-term trends are limited. Furthermore, some of the included findings were based on grey literature involving raw counts of harmful events, and studies employing divergent measures with regard to case definition or service type (7).

These methodological limitations may explain the discrepancies observed in trends, with some studies reporting an increase in harmful events alongside a decline in alcohol use (7). However, observations of divergence in the temporal changes of heavy compared to average consumption, as well as heterogeneity in alcohol use trends among socio-demographic subgroups, provide similarly plausible explanations for the inconsistencies, representing true underlying changes in prevalence rates. Heavy alcohol use remains high, with 30–50% of adolescents in many European countries reporting heavy episodic drinking at least once in the last 30 days. This consumption pattern has also been found to decline later than average use (8,9). Additionally, variability in temporal trends is evident among socioeconomic subgroups. Groups exhibiting higher vulnerability, such as females and individuals from lower socioeconomic backgrounds, demonstrate slower declines or even increasing levels of alcohol consumption (2,8–10). These changes may have led not only to an increase in alcohol-related harm in some countries, but also to an increase in social inequality in harm.

Objectives

In view of the paucity of evidence on alcohol-related harm among the youth population, particularly in the European context, the present study aims to enhance our understanding of temporal trends and disparities within the adolescent population in Finland. Rather than modelling trends over time, we employ a birth cohort analysis, tracking individuals from successive birth cohorts each year throughout their adolescence. Specifically, the study examined trends and socio-economic disparities in alcohol-related inpatient admissions and deaths among Finnish girls and boys, analysing changes across successive birth cohorts.

Methodology

Population

The analysis is based on individual-level register data covering the years 1991–2023. In line with previous register studies on ARH among adolescents, we included adolescents born in Finland and residing in the country at age 12 (birth cohorts 1979–2004), and followed them until their first ARH event, emigration, death, or the end of the follow-up period at age 19 (1,2). The final population consists of 1,564,051 adolescents and 12,439,734 person-years.

Measures

Alcohol related harm is measured using data on hospital admissions to inpatient wards from the Finnish Hospital Discharge Register (1989–1993) and the Care Register for Health Care (1994–2023). These registers provide information on care in public hospitals, health centres, and specialized hospitals. We combined this data with

information on alcohol-related deaths from Statistics Finland's Cause-of-Death Register. Harm is defined as a hospital admission or death, determined by primary and all secondary diagnoses as well as external causes of morbidity and mortality. As temporal trends in chronic, mental health-related inpatient events are more likely to reflect changes in health-seeking behaviour or shifts to outpatient treatment, our analysis focuses on acute events, i.e. acute alcohol intoxication and alcohol poisoning (ICD-9: 305.0, 291.4, 980, E851; ICD-10: F10.0, Y91, T51, Y15, X45, X65; table S1).

Family identifiers were used to link parents and their offspring to obtain information on the family's socio-economic living conditions. Parents were defined as sociological parents living with their child in the same household at age 12. We operationalized parent's SEP using three categorical variables, measured at ages 8-12: Parental education is based on Statistics Finland's classification according to the International Standard Classification of Education 2011. It is divided into three groups: basic, upper secondary, and tertiary. The final measure reflects the highest level attained by either parent. Mean household income is measured as standardized, equivalized annual gross household income, including both earned and capital income. The data were divided into quartiles based on the income distribution within each birth cohort. The unemployment variable indicates if at least one parent received unemployment benefits for at least three years.

Analysis

For the regression analysis, we aggregated each SEP variable and counted events and person-years within strata of sex, birth year, and SEP level. To investigate successive changes in harm, we estimated Poisson regression models including birth cohort and SEP variables as predictors and accounted for individual risk over time by including an exposure variable. To test non-linear trends, cohort effects are modelled continuously using restricted cubic splines (11). We tested model specifications with up to 6 knots, with the final decision being based on model fit according to the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC), likelihood ratio tests (LR-test), and visual inspection of crude IRs. We assessed variability in relative differences in IRs across subgroups by testing interactions between spline terms and SEP variables. Significance was evaluated using LR-test comparing models with and without interaction terms. Models were run separately for sexes and each SEP variable. Results are presented graphically as predicted IRs and Incidence rate ratios (IRRs) with 95% confidence intervals. We used STATA 18 and the command `f_able` to obtain these estimates (12).

To assess the robustness of the results regarding the possibility that factors associated with changes in the healthcare system were driving the observed birth cohort trends, several sensitivity analyses were conducted.

Results

Crude IRs per 10,000 person-years revealed an overall rise in alcohol-related harm, with a relative increase of 61.3% between the oldest (1979–1985) and youngest (1998–2004) cohort groups. While inpatient events increased by 79.6%, death cases decreased by 62.5%. Average predicted IRs rose slightly across older birth cohorts (1979–1989), followed by a stronger uptick (1990–1994), a moderate decline (1995–1999) and, finally, a more pronounced increase (2000–2004). These patterns were broadly similar for both sexes and SEP variables. The increases were more pronounced among girls and adolescents with a lower SEP, which narrowed the gender gap and widened socioeconomic inequalities. The steepest increase occurred among girls whose parents had no secondary level of education, rising from 6.1 events in 1979 to around 27.4 events per 10,000 person-years among those born in 2004. Across all SEP indicators, lower SEP was associated with an increased rate of harm, with incidence rate ratios significantly rising from approximately 2.0 (1979 cohort) to 3.5 (1999 cohort) among girls with no secondary versus tertiary parental education.

Conclusion

Contrary to reports of declining youth alcohol use, this register-based study identified an increase in alcohol-related inpatient events among Finnish adolescents born between 1979 and 2004. The increase was particularly pronounced among girls from lower socioeconomic backgrounds, contributing to widening social inequalities across birth cohorts. Temporal fluctuations in alcohol-related harms suggest that these trends may be associated with shifts in financial living conditions during economic downturns or periods of alcohol policy liberalisation. Further research is needed to clarify these potential mechanisms.

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