

## SHORT REPORT

# Childhood IQ and life course socioeconomic position in relation to alcohol induced hangovers in adulthood: the Aberdeen children of the 1950s study

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**Objective:** To examine the association between scores on IQ tests in childhood and alcohol induced hangovers in middle aged men and women.

**Design, Setting, and Participants:** A cohort of 12 150 people born in Aberdeen (Scotland) who took part in a school based survey in 1962 when IQ test scores were extracted from educational records. Between 2000 and 2003, 7184 (64%) responded to questionnaire inquiries regarding drinking behaviour.

**Main outcome measures:** Self reported hangovers attributable to alcohol consumption on two or more occasions per month.

**Results:** Higher IQ scores at 11 years of age were associated with a lower prevalence of hangovers in middle age (OR<sub>per one SD advantage in IQ score</sub>: 95% CI: 0.80; 0.72, 0.89). This relation was little affected by adjustment for childhood indicators of socioeconomic position (0.82; 0.74, 0.91) but was considerably attenuated after control for adult variables (fully adjusted model: 0.89; 0.79, 1.01).

**Conclusions:** Higher childhood IQ was related to a lower prevalence of alcohol induced hangovers in middle aged men and women. The IQ-hangover effect may at least partially explain the link between early life IQ and adult mortality. This being the first study to examine this relation, more evidence is required.

that these gradients are at least partially mediated via adult risk factors<sup>9 10</sup> which include binge drinking and hangovers.<sup>11 12</sup> To our knowledge, this is the first study to examine the link between childhood IQ and adult hangovers.

## PARTICIPANTS, METHODS, AND RESULTS

The Aberdeen children of the 1950s study is a cohort of 12 150 children born in Aberdeen, Scotland, between 1950 and 1956 who took part in a school based survey beginning in 1962.<sup>13 14</sup> To inform decisions regarding the type of school to which a child would progress (that is, junior or senior secondary (high) school), local authorities routinely administered IQ tests from the widely used Moray House series to school children at 7, 9, and 11 years of age.<sup>13</sup> Correlation coefficients between these test scores were high ( $r \geq 0.73$ ;  $p < 0.001$ ), and each has shown the expected associations with a range of social and health indicators.<sup>13</sup> A priori, we elected to focus on the predictive value of test results at age 11 because, of the three measures of IQ, this provides the most reliable indication of ability in adult life.<sup>15</sup> IQ scores at 11 years were based on two tests of verbal reasoning.<sup>13</sup>

Between 2000 and 2003, subjects (then aged 44–52 years) were mailed a questionnaire that included inquiries regarding socioeconomic circumstances, health, and current health behaviours, including alcohol consumption. Frequency of hangovers was assessed using a structured question: “In the last year how often have you had a hangover from drinking alcohol?” Response options were (N; mean IQ test score at 11 years): “not at all” (2652; 101.4); “less than once per month” (2323; 103.8); “once per month” (425; 101.1); “2–3 times per month” (252; 101.8); and “at least once per week” (128; 95.0). In these analyses, these were dichotomised at two to three times per month or more (6.6%;  $n = 380$ ). Data from this question correlated positively with those from an inquiry regarding frequency of consuming more than four alcoholic drinks in one session in the past year ( $r = 0.50$ ,  $p < 0.001$ ;  $n = 5772$ ), and with total units of alcohol consumed in the past week ( $r = 0.43$ ,  $p < 0.001$ ;  $n = 5780$ ). A similar version of the hangover question was also positively related to both current alcohol consumption and subsequent mortality risk in a Finnish study.<sup>11</sup>

In total, 7184 (64%) men and women responded to the questionnaire mailing. Of these, 6771 stated that they did not currently abstain from alcohol consumption and could therefore be considered at risk of an alcohol induced hangover in these analyses. Further exclusion of subjects with missing data for IQ, covariates, and hangovers resulted in an analytical sample of 5780 (2937 women).

We examined the relation between IQ and hangovers in a series of logistic regression models. There was no strong evidence of a differential IQ-hangover effect by sex ( $p$  value for interaction  $\geq 0.19$ ). In unadjusted analyses, a one standard deviation advantage in IQ at age 11 years was

Alcohol binge drinking is currently of considerable public and governmental concern.<sup>1</sup> Its wide ranging impacts includes increased levels of liver disease, accidents, violence, crime, family disruption, and workplace absenteeism, all of which incur commensurate healthcare and social service costs.<sup>1</sup> Whereas the burden of binge drinking is clear and its population prevalence apparently high, its aetiology is not well understood.<sup>2</sup> Adult smoking, also a risk taking behaviour, has recently been linked to IQ test scores in childhood, such that higher scoring persons are less likely to take up the habit<sup>3</sup> and more likely to stop it once started.<sup>4</sup> These findings have been ascribed to higher IQ scoring persons’ differential interpretation of, and response to, smoking cessation advice.<sup>4</sup> On this basis, we hypothesised that high childhood IQ scores would also be related to an reduced risk of alcohol induced hangovers, a proxy for binge drinking,<sup>2</sup> in men and women followed up into middle age.

Examining the role of early life IQ in the occurrence of adult hangovers or binge drinking has the added benefit of increasing understanding of the mechanisms responsible for the recent finding that high pre-morbid IQ tests scores seem to confer protection against premature mortality, coronary heart disease, and alcohol related causes of death.<sup>5–8</sup> It may be

associated with a reduced prevalence of 20% (0.80; 0.72, 0.89) in hangovers in adulthood (table 1; model A). In this unadjusted model, adult, but not childhood, indices of socioeconomic advantage predicted a reduced risk of hangover. Being female was also strongly protective against experiencing hangovers.

As expected, adjusting for childhood socioeconomic position (model B) had little influence on the IQ-hangover relation (0.82; 0.74, 0.91). Although the risk of hangovers was still reduced in the higher IQ scoring groups after additional control for indicators of adult socioeconomic circumstances (model C), there was attenuation, with significance lost at conventional levels (0.89; 0.79, 1.01). Being female (0.45; 0.34, 0.58), a car owner in adulthood (0.68; 0.57, 0.80), and having more favourable adult housing tenure (0.66; 0.53, 0.84) continued to be associated with lower hangover risk in this fully adjusted model.

When IQ at 7 and 9 years of age were the ability variables of interest there was again no evidence of interaction with sex (p value for interaction = 0.19). A somewhat weaker pattern of association with hangovers was evident for these measures of mental ability. Thus, in unadjusted analyses (model A), higher IQ scores at both 7 (0.89; 0.80, 0.99) and 9 years of age (0.85; 0.77, 0.94) were related to a reduced risk of hangovers. After control for early life socioeconomic conditions (model B), confidence intervals for IQ at 7 (0.93; 0.83, 1.04), but not 9 years (0.88; 0.80, 0.98), crossed unity. There was essentially no evidence of an association with hangovers in a fully adjusted model (model C) for either IQ at 7 (1.04; 0.92, 1.18) or at 9 years (0.97; 0.86, 1.09).

## COMMENT

The main finding of this study was that higher IQ scores at 11 years of age were associated with a reduced risk of alcohol induced hangovers in middle age. This effect did not seem to be incremental with lower IQ test scores largely confined to persons in the most extreme hangover category—that is, those experiencing such an episode once or more a week.

Tests of IQ given later in childhood were more strongly associated with hangovers than those administered earlier. With IQ at 11 years of age likely to provide the most reliable indication of mental ability in adult life,<sup>15</sup> it is probable that the IQ-hangovers gradient for test performance at 11 years is a more accurate indication of the true effect than IQ at either 7 or 9 years. The association between childhood IQ and adult hangovers seemed to be a least partially mediated by adult

## What is already known

- High IQ test scores in childhood have recently been linked to a lower risk of smoking initiation and increased smoking cessation rates in adulthood.
- This finding has been ascribed to higher IQ scoring persons' differential interpretation of, and response to, smoking cessation advice.
- On this basis, we hypothesised that high childhood IQ scores would also be related to a reduced risk of alcohol induced hangovers, a proxy for binge drinking and also a risk taking behaviour, in persons followed up into middle age.

## What this paper adds

- In the first study of which we are aware, higher scores on a childhood IQ test were associated with a reduced prevalence of alcohol induced hangovers in middle age.
- This finding may at least partially explain the link between early life IQ and adult risk of mortality ascribed to all causes, cardiovascular disease and, particularly, alcohol related morbidity.

## Policy implications

The skills captured by IQ tests, such as verbal comprehension and reasoning, may be important in the successful management of a person's health behaviours, including binge drinking.

socioeconomic position, but was not confounded by childhood indicators thereof. Because of the strong relation between IQ and some of the covariates featured in these analyses—IQ and education, for example—it may be that the effect of IQ on hangovers has been overadjusted, leading to some underestimation of the strength of the relation. It is

**Table 1** Association of IQ at 11 years and life course socioeconomic position with alcohol hangovers in middle aged men and women (n = 5780)

	Model A	Model B	Model C
IQ at 11 years*	0.80 (0.72, 0.89)	0.82 (0.74, 0.91)	0.89 (0.79, 1.01)
Sex†	0.41 (0.32, 0.51)	0.41 (0.33, 0.51)	0.45 (0.34, 0.58)
Father's occupational social class at birth of subject	0.97 (0.90, 1.05)	1.04 (0.95, 1.14)	1.07 (0.97, 1.17)
Number of siblings at time of original survey in 1962	0.90 (0.81, 1.00)	0.95 (0.85, 1.05)	0.98 (0.88, 1.09)
Housing tenure 12 years of age	0.88 (0.76, 1.02)	0.95 (0.81, 1.12)	0.96 (0.82, 1.14)
Car ownership at 12 years of age	0.83 (0.67, 1.03)	0.88 (0.71, 1.10)	0.96 (0.77, 1.21)
Educational attainment by age 44–52 years	0.92 (0.87, 0.98)	–	0.98 (0.90, 1.07)
Housing tenure at 44–52 years	0.52 (0.43, 0.65)	–	0.66 (0.53, 0.84)
Car ownership at 44–52 years	0.61 (0.52, 0.71)	–	0.68 (0.57, 0.80)
Income at 44–52 years	1.07 (0.97, 1.18)	–	1.12 (0.97, 1.28)
Occupational social class at 44–52 years	0.84 (0.76, 0.92)	–	0.94 (0.84, 1.06)

\*Odds ratios for IQ are for a one SD advantage in score. †Odds ratios for sex are for female compared with male. Odds ratios for remaining (socioeconomic) factors are per unit advantage in: father's occupational social class at birth of subject (categorised as: unemployed; unskilled; semi-skilled; skilled manual; skilled non-manual; professional); number of siblings at time of original survey in 1962 ( $\geq 4$ ; 3; 2; 1); housing tenure at 12 years of age (other; rented from council; rented privately; owned); car ownership at 12 years of age (no car;  $\geq 1$ ); educational attainment by age 44–52 years of age (CSE and below; O levels; A levels/highers; teaching/nursing qualification; university degree); housing tenure at 44–52 years of age (rent free/other; renting; owned); car ownership at 44–52 years of age (no car; 1;  $\geq 2$ ); occupational social class at 44–52 years of age (unskilled; partly skilled; skilled manual; skilled non-manual; professional/managerial) and income at 44–52 years of age (<£10000; £10–<20000; £20–<20000;  $\geq 30000$  per annum). In Model A the relation of each factor to adult hangovers is unadjusted. In Model B the relation of sex and early life factors to adult hangovers are mutually adjusted. In Model C the relation of all factors to adult hangovers are mutually adjusted.

plausible that the link between IQ and hangovers could at least partially explain the association of IQ with all cause mortality, cardiovascular disease mortality and, particularly, deaths that are alcohol related. However, studies that hold information on early IQ, intermediary risk factors (such as binge drinking/hangovers, smoking,<sup>4, 16</sup> or obesity<sup>17, 18</sup>) and later mortality are best placed to fully examine this suggestion. With rare exceptions,<sup>19</sup> few such datasets exist.

To our knowledge, previous studies of the relation between IQ and alcohol consumption have only considered average amount and beverage preference,<sup>20, 21</sup> as compared with self reported pattern of intake from which data on binge drinking can be ascertained. In a case-cohort study, IQ in early adulthood was not associated with heavy drinking (defined as 21 units over the course of a week) in Danish obese or non-obese men,<sup>20</sup> however, information on binge drinking or hangovers was not available (Laust Mortensen, personal communication). In our analyses, a reduced risk of hangover was also seen in people who were affluent relative to the socioeconomically disadvantaged in adulthood, a finding that was also apparent in cohorts with different indicators of heavy drinking<sup>22, 23</sup> to those used herein.

In this study we excluded 1404 (19.5%) study participants with missing data, a proportion of whom were so omitted because they were alcohol abstainers and therefore could not be considered part of the risk set. In a comparison of persons retained with those excluded, the former had somewhat higher childhood IQ scores and more advantageous contemporaneous socioeconomic circumstances. There was essentially no absolute difference in early life socioeconomic conditions. While these exclusions may have resulted in selection bias, we believe this to be unlikely.

It may be that persons with higher IQ test results interpret and respond more effectively to health promoting advice not to binge drink than their lower scoring counterparts. It is plausible that the skills captured by IQ tests, such as verbal comprehension and reasoning, are important in the successful management of a person's health behaviours, and that levels of such competence should be considered when designing health promotion materials, and in health professional-client interactions.

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## CONTRIBUTIONS

David Batty generated the idea for these analyses, which was developed by Sally Macintyre and Ian Deary. David Batty analysed the data and wrote the first draft of the manuscript to which all coauthors made substantial subsequent contributions. David Batty will act as guarantor.

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