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Cigarette smoking and alcohol drinking in a representative sample of English school pupils: Cross-sectional and longitudinal associations

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ABSTRACT

Objective. The aim of our study was to examine cross-sectional and longitudinal associations between cigarette smoking and alcohol drinking, in a representative sample of English pupils.

Method. Data from 13,635 school pupils in the Longitudinal Study of Young People in England (LSYPE) on usage of cigarettes from 2004 (typical age 14) to 2006 (age 16) and alcohol from 2004 to 2007 (age 17), analyzed with latent growth curve models.

Results. The weighted percentage of pupils drinking alcohol increased from 26% at age 14 to 71% by age 17, smoking from 12% to 27% by age 16. Pupils with lower socio-economic status were more likely to smoke but less likely to drink alcohol regularly. Both behaviors were positively correlated at age 14, adjusted for several confounding factors. The rate of increase over time was also positively correlated.

Conclusion. Cigarette smoking and alcohol drinking are already correlated by age 14, are socio-economically patterned, and 'move together' during adolescence. Future studies and interventions should be targeted at a younger age range, to identify early smoking and potentially hazardous alcohol drinking patterns.

Introduction

Cigarette smoking in adolescence has been associated with alcohol use both cross-sectionally (NHS Information Centre, 2011) and longitudinally (Donovan, 2004; Mathers et al., 2006). There have been reductions in the overall prevalence of smoking by English school pupils since the mid-1990s (NHS Information Centre, 2011). Factors such as age, sex, parental socio-economic status (SES) and parental educational attainment may influence the onset of smoking and alcohol use. In a cohort of adolescents in the UK (Boyd et al., in press), higher SES was associated with earlier alcohol use, lower SES with earlier smoking and more hazardous alcohol use (Melotti et al., 2011). Repeated measurements of smoking and alcohol are relatively rare (Melotti et al., 2011; Schoon and Parsons, 2003).

Reported associations between smoking and alcohol use in adolescence are mostly cross-sectional, making it difficult to determine the causal sequence. It is possible that (a) both behaviors could be adopted together, (b) smoking could be a risk factor for later alcohol use, or conversely, (c) alcohol use could be a risk factor for later smoking. Evidence for 'gateway' effects has acquired mixed support (Biederman and Monuteaux, 2005; Chen et al., 2002; Gold and Frost-Pineda, 2006; Mathers et al., 2006), limited by the scarcity of population studies having repeated measures of both behaviors.

To our knowledge, no study has examined both cross-sectional and longitudinal associations between cigarette smoking and alcohol drinking, in a representative sample of school pupils providing data on both behaviors over several repeated measures covering early to late adolescence. The aim of the current study was to identify these associations, using data from a large cohort of school pupils.

Method

The Longitudinal Study of Young People in England (LSYPE) is a prospective cohort study of English school pupils. The study began in 2004, when the cohort was typically aged 13 to 14. Socio-economically deprived schools, defined as the quintile with the highest proportion of pupils receiving free school meals, were over-sampled by a factor of 1.5 and each ethnic minority group to N = 1000. Annual interviews incorporated computer-assisted self-completion elements, including smoking (2004 to 2006) and alcohol consumption (2004 to 2007).

Measures

Cigarette smoking

Pupils were asked, 'Now read all the following statements carefully and type in the number next to the one which best describes you'. Responses were coded as: I have never smoked (1), I have only ever tried smoking once (2), I used to smoke sometimes but I never smoke a cigarette now

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(3), I sometimes smoke cigarettes now but I don't smoke as many as one a week (4), I usually smoke between one and six cigarettes a week (5), I usually smoke more than six cigarettes a week (6). Options 4 to 6 were recoded as 'current smoker' and options 1 to 3 as non-smoker.

Alcohol drinking

Pupils were asked, 'Thinking about the last 12 months, about how often did you usually have an alcoholic drink? Was it…' Responses were coded as: most days (1), once or twice a week (2), 2 or 3 times a month (3), once a month (4), once every couple of months (5), less often (6) or not applicable. Options 1 to 4 were coded as current alcohol drinker (at least monthly). These questions were preceded by a routing question used to identify 'never' alcohol drinkers: 'Have you ever had a proper alcoholic drink? That is a whole drink, not just a sip. Please do not count drinks labeled low alcohol' which had response options no (0) or yes (1). Non-current drinkers were coded as 0.

Demographic covariates

Age and sex were recorded at baseline in 2004. Pupils self-reported their ethnic group and responses were grouped into five categories: White, Mixed, Indian/Pakistani/Bangladeshi, Black Caribbean/Black African, and Chinese. The maximum of either parent's educational attainment was recorded on a six-point scale ranging from 'no qualification' (0) to 'degree or equivalent' (6). Occupational social class was recorded on an eight-point scale ranging from 'never worked or long term unemployed' (1) to 'higher managerial and professional occupations' (8), for one or both parents.

Statistical analysis

A small proportion of pupils reported cigarette or alcohol consumption in a given wave and then subsequently reported never having engaged in the behavior; known as recanting (Shillington et al., 2011). For example, 0.6% of pupils who self-reported as smokers in 2004 recanted this behavior in 2005 and 2006. Pupils who reported alcohol use in 2004 had recanting rates of 4.6% in 2005, 2.4% in 2006, and 1.6% in 2007. These pupils were removed from the analysis, resulting in an analytic sample size of 13,635 pupils who had data on covariates and either smoking or alcohol use at least once.

Logistic regression with sample weights in Mplus version 6.11 was used to explore the cross-sectional association between each behavior at baseline separately (2004), in a smaller sample of pupils with available data on both outcomes (N = 12,356). Logistic regression within the Generalized Estimating Equation (GEE) framework in Stata version 12.1 was used to explore the association between current regular cigarette smoking and current regular alcohol from baseline (2004) to the end of follow-up for each behavior separately, taking the repeated measures design into account (N = 10,516). For the main analysis, multivariate latent growth curve modeling (Bollen and Curran, 2006; Curran et al., 2010) using Mplus version 6.11 (Muthén and Muthén, 1998–2010) and the WLSMV estimator was used. The mean and the variance for each behavior's intercept (initial status) and linear slope (rate of change over time) were estimated in a single model, capturing individual differences in the change in the log odds of engaging in each behavior over time. The hypothesized model is shown in Fig. 1. Sample weights were used to obtain correct standard errors, taking over-sampling into account. Age, sex, ethnic minority status (reference = White), parental social class and parental educational attainment were covariates. For associations between intercepts and slopes, which are continuous variables, both unstandardized (B) and standardized coefficients (β) are reported for completeness.

In sensitivity analyses, we evaluated whether different cut points for regular smoking and alcohol drinking influenced the findings. We also repeated models on a nested sample of 7707 pupils who provided complete data on both behaviors at all possible waves, allowing us to evaluate possible bias resulting from non-random dropout over time. We also repeated GEE models after excluding smokers/drinkers who subsequently stopped.

Results

Of the main analytic sample, 70.3% of pupils had three waves of smoking data, 83.8% had at least two waves. 59.1% of pupils had four waves of alcohol data, 75.0% had at least three waves, and 83.9% had at least two waves. In preliminary analyses, results were not materially different for male/female pupils, leading us to analyze all pupils together.

Table 1 shows the unweighted descriptive statistics for the available sample at each study wave. At baseline in 2004 (age 13/14), 19.6% of pupils reported current regular alcohol drinking and 9.6% reported current cigarette smoking. By 2007 (age 16/17), 61.1% reported regular

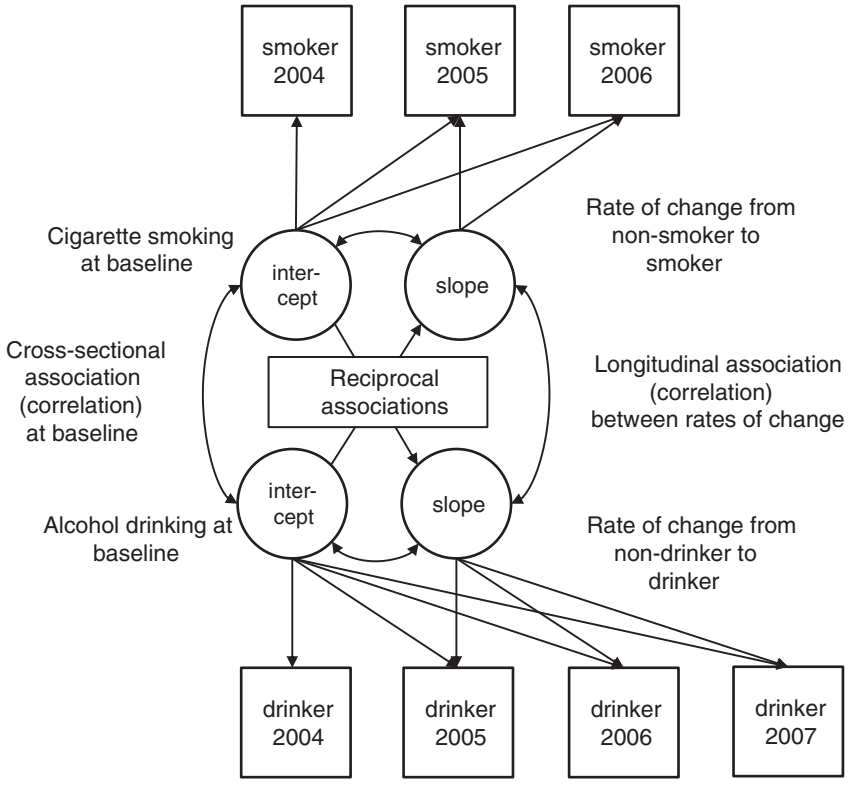

Fig. 1. Conceptual model showing the multivariate latent growth curve model.