



## Childhood cigarette and alcohol use: Negative links with adjustment



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### HIGHLIGHTS

- Childhood substance use carries long-term developmental and health risks.
- Links of childhood alcohol and cigarette use with adjustment may be spurious.
- 3% smoked and 13% drank alcohol by age 11 in large nationally representative sample.
- Early initiators and non-users differ on wide range of early childhood risk factors.
- Early initiation predicts low age 11 school engagement, wellbeing beyond early risk.

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### ABSTRACT

Children who initiate cigarette or alcohol use early—during childhood or early adolescence—experience a heightened risk of nicotine and alcohol dependence in later life as well as school failure, crime, injury, and mortality. Using prospective intergenerational data from the Millennium Cohort Study (MCS), we investigate the association between early substance use initiation (cigarettes or alcohol) and age 11 school engagement, academic achievement, and wellbeing. The ongoing MCS tracks the development of a nationally representative sample of children in the United Kingdom (born 2000–2002) from infancy through adolescence. At age 11, MCS children ( $n = 13,221$ ) indicated whether they had ever used cigarettes or alcohol; at age 7 and 11 they reported on school engagement and wellbeing and completed investigator-assessed tests of academic achievement. Using propensity score methods, children who had initiated cigarette or alcohol use by age 11 were matched to abstaining children with similar risks (or propensities) of early substance use, based on numerous early life risk and protective factors assessed from infancy to age 7. We then examined whether early initiators differed from non-initiators in age 11 adjustment and achievement. Results show that substance use by age 11 was uncommon (3% cigarettes; 13% alcohol). After matching for propensity for early initiation, school engagement and wellbeing were significantly lower among initiators compared to non-initiators. Academic achievement was not consistently related to early initiation. We conclude that initiation of smoking and drinking in childhood is associated with poorer adjustment.

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### 1. Introduction

Most children do not smoke cigarettes or drink alcohol (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016; U.S. Department of Health and Human Services, 2012). Despite low prevalence, long-term developmental and health risks of early substance use are substantial. Early initiation of cigarette or alcohol use—during childhood or early adolescence—has been linked to: nicotine addiction, alcohol misuse

and dependence, and use of marijuana and other illicit drugs; fighting, arrest, and deviant peer group affiliation; reduced educational attainment; unintentional injury, and poor health (U.S. Department of Health and Human Services, 2012; Doubeni, Reed, & DiFranza, 2010; Ellickson, Tucker, & Klein, 2003; Hingson & Zha, 2009; Jackson, Barnett, Colby, & Rogers, 2015; Gruber, DiClemente, Anderson, & Lodico, 1996; Hingson, Heeren, & Edwards, 2008; Agrawal, Grant, Waldron, et al., 2006; Palmer, Young, Hopfer, et al., 2009; McCluskey, Krohn, Lizotte, & Rodriguez, 2002; Dawson, Goldstein, Chou, Ruan, & Grant, 2008; Pitkänen, Lyyra, & Pulkkinen, 2005; Van Ryzin & Dishion, 2014). Given the consensus linking early substance use with negative consequences, the American Academy of Pediatrics recommends

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standard pediatric health care screening include alcohol and drug use beginning at age 11 (Committee on Practice and Ambulatory Medicine, Bright Futures Periodicity Schedule Workgroup, 2014).

The literature is unclear, however, whether these long-term links of early substance use with poor adjustment are due to a process that is set in motion by early use or simply reflect existing differences in childhood risk and protective factors (Chassin, Colder, Hussong, & Sher, 2016; Kuntsche, Rossow, Engels, & Kuntsche, 2016; Prescott & Kendler, 1999; Ystrom, Kendler, & Reichborn-Kjennerud, 2014). Children who have a difficult temperament, display conduct problems, are hyperactive or inattentive, dislike school or have poor cognitive functioning, have a family history of substance problems, or are from disadvantaged socioeconomic backgrounds are at elevated risk of using cigarettes and alcohol before they reach adolescence (Wills et al., 2001; Guo, Hawkins, Hill, & Abbott, 2001; Kuperman, Chan, Kramer, et al., 2013; Stanton, Flay, Colder, & Mehta, 2004; Tarter, Kirisci, Mezzich, et al., 2003; Clark, Cornelius, Kirisci, & Tarter, 2005; Vuolo & Staff, 2013; Gilman, Rende, Boergers, et al., 2009; Macleod et al., 2008). These early life risk factors call into question whether observed negative effects should be blamed solely on early initiation, unless early childhood risk factors are adequately controlled. Rarely are prospective data available to control for likely spurious risk factors assessed from infancy through childhood, particularly in large, nationally representative samples (Donovan, 2007; Zucker, Donovan, Masten, Mattson, & Moss, 2008; Masten, Faden, Zucker, & Spear, 2008).

We use longitudinal data from the ongoing UK Millennium Cohort Study (MCS), which tracks the development of a nationally representative sample of UK children (born 2000–2002) prospectively from infancy, to document the association of cigarette and alcohol initiation with three key indicators of positive youth development measured at age 11 (school engagement, academic achievement, and wellbeing). We hypothesize that early initiators will differ substantially from children who have not used cigarettes or alcohol, so our first set of analyses assess how a wide range of risk and protective factors measured prospectively from infancy to age 7 distinguish early- and non-initiators of both cigarettes and alcohol. We also predict that early substance use initiation will be negatively associated with adjustment, so our second set of analyses considers whether early cigarette or alcohol initiation is negatively related to age 11 school engagement, academic achievement, and wellbeing, even after adjusting the estimates for early life risk and protective factors using OLS regressions. To increase confidence that these regression results are not biased by the hypothesized early life differences between initiators and non-initiators, we use propensity score methods (PSM) to compare “like with like” individuals (Firebaugh, 2008).

## 2. Method

### 2.1. Participants

Nine-month-old children born between September 1, 2000 and January 11, 2002 were selected from a sample of electoral wards from England, Northern Ireland, Scotland, and Wales. MCS investigators oversampled children residing in areas of high child poverty, areas with high concentrations of Indian, Pakistani, Bangladeshi, and Black families, and families residing in Northern Ireland, Scotland, and Wales (Hansen, 2014). At Wave 1, parents of 18,552 nine-month old children participated (approximately 91% of targeted sample) (Plewis, 2007). Analyses here focus on follow-up parent surveys that occurred when the child was ages 3, 5, 7, and 11 years, along with child surveys at age 7 and during the final year in primary school (modal age 11). By this wave, 13,287 families were retained (81.4% of eligible families who had not emigrated, permanently withdrawn, or died) (Gallop, Rose, Wallace, et al., 2013; Mostafa, 2014).

Table 1 shows descriptive statistics as well as the percentage of each variable with missing data for 13,221 children. Since our focus is on

**Table 1**  
Weighted descriptive statistics.

	Mean or %	SE	% imputed
<i>Early life risk and protective factors: Matching variables</i>			
<i>Sociodemographic characteristics</i>			
Male gender	51.6%	0.005	0.0%
Child ethnicity			<1%
White	84.5%	0.014	
Indian	2.0%	0.003	
Pakistani and Bangladeshi	5.0%	0.010	
Black	3.5%	0.006	
Other	5.0%	0.004	
Parent married	54.6%	0.009	1.3%
Parent highest education level			2.2%
No qualifications	10.0%	0.006	
NVQ1	6.0%	0.003	
NVQ2	24.7%	0.007	
NVQ3	15.8%	0.005	
NVQ4	32.6%	0.008	
NVQ5	10.9%	0.005	
Parent highest occupational status			1.3%
Not working	23.6%	0.008	
Semi-routine or routine	14.2%	0.005	
Low supervisory or technical	5.7%	0.003	
Small employer or self-employed	9.0%	0.003	
Intermediate level	10.0%	0.004	
Managerial/professional job	37.4%	0.010	
<i>Parent substance use</i>			
Parent smoked	53.4%	0.007	<1%
Parent drank	85.8%	0.011	2.5%
Parent used illicit drug	10.1%	0.004	6.3%
No smoking near infant	84.7%	0.006	3.7%
Heavy prenatal alcohol exposure	2.2%	0.002	3.8%
<i>Child characteristics and behaviors</i>			
Low birthweight (<2.5 kg)	7.2%	0.003	3.8%
Child behaviors, parent reported, age 7			
Hyperactive/inattentive	0.702	0.007	2.1%
Frequent temper tantrums	14.6%	0.004	2.2%
Disobedient	4.4%	0.003	2.3%
Aggressive	1.7%	0.002	2.2%
Adjustment, age 7			
School engagement, child reported	1.86	0.004	15.6%
Academic achievement, investigator assessed	−0.033	0.017	9.5%
Wellbeing, child reported	2.29	0.004	15.2%
<i>Childhood substance use initiation: Treatment variables</i>			
Ever smoked by age 11	3.2%	0.002	3.9%
Ever drank alcohol by age 11	13.4%	0.005	4.8%
<i>Adjustment, age 11: Outcome variables</i>			
School engagement, child-reported	2.81	0.005	2.6%
Academic achievement, investigator-assessed	58.23	0.253	2.2%
Wellbeing, child-reported	3.73	0.006	2.6%

Note. Sample size = 13,221. Descriptive statistics based upon 20 imputed datasets.

children in primary school, 66 children who had already transitioned to secondary school when interviewed were excluded. The weighted descriptive statistics were adjusted for the complex sampling design as well as nonrandom sample attrition by age 11. To handle item-missing data, we relied on the “mi” command in Stata 14 to impute 20 datasets using chained regressions (Johnson & Young, 2011). We used the “mi estimate” command to combine results across the 20 datasets and adjust standard errors and significance tests (Rubin, 1987). The percentage of missing values that were imputed for each variable ranged from 0% (gender) to just over 15% (child’s self-reported school engagement at age 7).

### 2.2. Measures

#### 2.2.1. Outcome variables: school engagement, academic achievement, and wellbeing, age 11

School engagement is an average of 10 child-reported items ( $\alpha = 0.71$ ) indicating how well the child likes math, science, English, physical education, and school overall, as well as how often they try their best at

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