Socioeconomic Status and Alcohol-Related Behaviors in Mid- to Late Adolescence in the Avon Longitudinal Study of Parents and Children

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ABSTRACT. Objective: Prior studies of the relationship between socioeconomic status (SES) and alcohol consumption and problems in adolescence have been inconclusive. Few studies have examined all three major SES indicators and a broad range of alcohol-related outcomes at different ages. **Method:** In the Avon Longitudinal Study of Parents and Children cohort, we examined (by logistic regression, with differential weighting to control for attrition) the relationship between family income and parental education and occupational status, and five alcohol outcomes assessed at ages 16 and 18 years. **Results:** At age 16, high SES—as indexed by income and education—significantly predicted frequent alcohol consumption. Low SES—as measured by education and occupational status—predicted alcohol-related problems. At age 18,

high SES—particularly income and education—significantly predicted frequent alcohol consumption and heavy episodic drinking and, more weakly, symptoms of alcohol dependence. All three measures of SES were inversely related to high-quantity consumption and alcohol behavioral problems. **Conclusions:** In adolescents in the United Kingdom, the relationship between SES and alcohol-related behaviors is complex and varies as a function of age, SES measure, and specific outcome. High SES tends to predict increased consumption and, in later adolescence, heavy episodic drinking and perhaps symptoms of alcohol dependence. Low SES predicts alcohol-related behavioral problems and, in later adolescence, high-quantity alcohol consumption. (*J. Stud. Alcohol Drugs*, 75, 541–545, 2014)

ALCOHOL USE AND ESPECIALLY MISUSE among adolescents is a major public health concern (Faden and Goldman, 2008). Early alcohol use and problems are related to a wide range of negative developmental outcomes including self-harm, risky sexual behaviors, injuries, antisocial behaviors, academic underachievement or failure, and mood and substance use disorders (Brown et al., 2008; Ellickson et al., 2003; Stueve and O'Donnell, 2005). To inform prevention efforts, it is crucial to clarify the social processes that may contribute to adolescent alcohol use and misuse. One area of obvious interest is family socioeconomic status (SES).

Prior research into the association between family SES and alcohol consumption in adolescence has been surprisingly inconclusive, with studies suggesting a positive, negative, and null relationship (Hanson and Chen, 2007). The relationship between SES and problematic adolescent alcohol use has been less frequently studied but has also

produced inconclusive findings (Huckle et al., 2010; Patrick et al., 2012; Wiles et al., 2007).

Five methodological points about this literature are noteworthy. First, in measures of problematic use, a wide variety of different specific behaviors have been assessed, including “heavy episodic drinking” (Patrick et al., 2012), and multiple factors assessing “alcohol-related consequences” (Huckle et al., 2010), “heavy alcohol consumption,” “hazardous consumption,” and “alcohol dependence” (Wiles et al., 2007). Second, a range of ages has been studied, and it may be that the SES–alcohol relationship differs meaningfully across adolescence. Third, SES is a complex construct consisting of at least three components: family income, parental education, and occupational status. Prior studies suggest that these measures may not relate to adolescent alcohol use and problems in the same way (Melotti et al., 2011). In a recent review of this literature, most studies used a single measure—typically parental occupation or education—and few had assessed all

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three main SES domains (Hanson and Chen, 2007). Fourth, the timing of the measures of parental income has varied in prior studies from early childhood (Melotti et al., 2011; Wiles et al., 2007) to contemporaneous to the alcohol use measures—that is, during the child's adolescence. Perhaps the relationship between family income and adolescent alcohol use and problems changes over development, and this change might help clarify the mediating mechanisms involved. Fifth, given the broad sex differences in alcohol use and problems, it is worthwhile examining whether the impact of SES on alcohol consumption and problems differs in boys and girls.

This study builds on prior investigations into the relationship between SES and alcohol consumption and problems using data from the Avon Longitudinal Study of Parents and Children (ALSPAC; Boyd et al., 2013; Melotti et al., 2011, 2013). We examined the association between the three components of SES and frequency of alcohol consumption along with four different measures of potential problem drinking in both mid- and late adolescence. We also examined the family income assessed from early childhood to late adolescence.

Method

ALSPAC is an ongoing population-based study investigating a wide range of environmental and other influences on the health and development of children (Boyd et al., 2013) (see <http://www.alspac.bris.ac.uk>). All pregnant women resident in the Avon district of South West England with an expected date of delivery between April 1, 1991, and December 31, 1992, were invited to participate. The achieved sample was 14,541 pregnant women (80% of those eligible) with 13,988 live infants at age 12 months. The sample size when SES measures were first obtained (32 weeks gestation) was 12,441. ALSPAC parents and children have been followed up regularly since recruitment, with data obtained through questionnaires completed by mothers, children, and teachers, and through clinical assessments. Full details of all measures, procedures, sample characteristics, and response rates are available at www.alspac.bris.ac.uk. The sample sizes on which full data were available because of attrition for our age 16 univariate (and multivariate) analyses were 4,117–4,735 (3,831–3,930). Parallel figures for age 18 were 3,337–3,902 (3,157–3,167). Ethical approval for the study was obtained from the ALSPAC Ethics and Law Committee and the Local Research Ethics Committee.

We examined five dichotomous alcohol-related outcomes available on all participating subjects at ages 16 and 18. For each outcome, we defined low and high thresholds, as follows: (a) elevated drinking frequency (low threshold ≥ 2 –4 times a month, high threshold ≥ 2 –3 times a week); (b) elevated drinking quantity (low threshold ≥ 5 –6 drinks, high threshold ≥ 7 –9 drinks); (c) heavy episodic drinking, defined as

consuming six or more drinks per occasion (low threshold $\geq$ monthly, high threshold $\geq$ weekly); (d) symptoms of alcohol dependence as assessed by five items from the Alcohol Use Disorders Identification Test (Babor et al., 2001) and five items reflecting alcohol dependence (based on *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, criteria; American Psychiatric Association, 1994), defined as maximum frequency for any of 10 symptoms (low threshold $\geq$ monthly, high threshold $\geq$ weekly); and (e) alcohol-related problems defined as fights or trouble with police related to alcohol (age 16: low threshold ≥ 1 –2 times in past 2 years, high threshold ≥ 3 –5 times in past 2 years; age 18: low threshold $<$ monthly, high threshold $\geq$ monthly). We report results using the lower threshold and comment on differences observed if the high threshold definition was used.

We used four ordinal definitions of family income, all from maternal interviews. Measures at 33, 47, 85, and 97 months (i.e., age of ALSPAC proband) had five levels of weekly household income (from $<£100$ to $\geq£500$). At ages 11 and 18, there were 10 levels for, respectively, weekly and monthly household incomes (from, respectively, $<£120$ to $\geq£800$ and $<£900$ to $\geq£4,000$). Our primary measure—which we called age 3—was the mean of the two assessments at 33 and 47 months. We also examined three other definitions: age 8—the mean of two assessments at ages 85 and 97 months, and single maternal assessments at ages 11 and 18 years.

We assessed income level across development for two reasons. First, because of attrition, a larger sample size is available for earlier measures. Second, we sought to compare the importance of income-related attitudes toward alcohol use (which would predict no differences in SES association across time) versus greater availability of money to purchase alcohol (which would predict stronger associations for more recent SES measures).

Educational level was the highest attained by mother or partner as assessed at the maternal interview at 32 weeks gestation, updated with data from maternal interviews when the proband was age 61 and 97 months. We used the following four-level ordinal scale: 0 = *less than O level (an examination taken and passed at 16 years of age)*, 1 = *O level*, 2 = *A level (examinations taken and passed at 18 years of age on leaving secondary school)*, and 3 = *university degree*.

As outlined previously (Melotti et al., 2011), parental occupational status was based on the Registrar General's classification of occupations and grouped into four categories: V (unskilled) or IV (semiskilled) manual, III (skilled manual or nonmanual), II (managerial and technical), and I (professional), obtained at interview at 32 weeks gestation.

Univariate and multivariate analyses were carried out using logistic regression in SAS PROC LOGISTIC (SAS Institute Inc., Cary, NC). Sex was used as a covariate for all analyses. The ALSPAC cohort has undergone significant attrition since initial ascertainment that was in part predicted by SES indicators and sex (Boyd et al., 2013). To adjust for

attrition, we determined the proportion missing the outcome variable for each combination of sex and socioeconomic measure to use as a regression weight (adjusted to a mean weight of 1). Thus, nonmissing data from strata with a higher proportion of missing outcomes were more heavily weighted to adjust for their underrepresentation in the nonmissing alcohol-related outcomes. The reference populations for developing weights were 10,004 for income, 13,101 for education, and 11,461 for occupational status.

Results

We first examined the correlations among our main SES predictors and among our outcome measures. Pearson product-moment correlations between family income at 33 months and parental education and occupation status were, respectively, +.48 and +.44, whereas parental education and occupation status were correlated +.54. At age 16, tetrachoric correlations between most of the alcohol-related outcomes ranged from +.40 to +.60 with the following exceptions: frequency-quantity, +.32; frequency-problems, +.39; heavy episodic drinking and dependence symptoms, +.65; and heavy episodic drinking and frequency, +.68. At age 18, outcome tetrachoric correlations outside the range of .40–.60 were as follows: frequency-quantity, +.11; frequency-problems, +.36; quantity-problems, +.39; quantity-heavy episodic drinking, +.61; frequency-heavy episodic drinking, +.64; dependence symptoms-problems, +.65; and heavy episodic drinking-dependence, +.65.

Next, we examined tetrachoric correlations between our key outcome measures between ages 16 and 18. For our lower threshold, all of these correlations were between .50 and .60 except for frequency, which was slightly more stable +.62. For our high threshold, all of the cross-time correlations were between .50 and .60 except for frequency at +.63 and quantity at +.49.

Age 16

In univariate analyses, high frequency of alcohol consumption at age 16 was significantly related to having higher family income, parental education, and occupational status (Table 1). In multivariate analyses, the effect of income and educational status remained significant. By contrast, none of our SES indicators significantly predicted high-quantity consumption or symptoms of alcohol dependence in univariate or multivariate analyses. Heavy episodic drinking was weakly predicted by higher family income in multivariate analyses. Higher levels of alcohol behavioral problems, by contrast, were strongly predicted, in univariate analyses, by lower levels of all three SES indications, although only by parental education in multivariate analyses.

We examined, in our univariate analyses, interactions between the SES predictors and sex. None of the 15 interactions (3 SES measures $\times$ 5 outcomes) was statistically significant.

When we examined income assessed at ages 8 or 11 instead of age 3, we saw moderately weaker positive effects on high-frequency consumption and dependence symptoms with little systematic change for the other alcohol outcomes.

If we examined more deviant alcohol-related outcomes, a strong and significant relationship emerged between low occupational status and dependence symptoms, and all the associations between our SES measures and alcohol behavioral problems strengthened further. However, the positive associations between our SES indicators and drinking frequency declined in strength.

Age 18

All of our SES measures significantly and positively predicted, in univariate analyses, alcohol consumption at age 18. In multivariate analyses, only occupational status lost

TABLE 1. Odds ratio for five alcohol-related outcomes (drinking frequency, drinking quantity, heavy episodic drinking, alcohol-dependence symptoms, and alcohol behavioral problems) assessed at ages 16 and 18 as predicted by sex and three dichotomized measures of socioeconomic status (income, parental education, and occupational status)

Outcome age, years	Predictor	Elevated drinking frequency		Elevated drinking quantity		Heavy episodic drinking		Alcohol-dependence symptoms		Alcohol behavioral problems	
		Uni-variate	Multi-variate	Uni-variate	Multi-variate	Uni-variate	Multi-variate	Uni-variate	Multi-variate	Uni-variate	Multi-variate
16	Female sex	0.80***	0.84**	0.98	0.99	0.91	0.90	1.28***	1.25**	0.87	0.80*
	Income	1.28****	1.22****	1.03	1.06	1.04	1.10*	1.05	1.10	0.84***	0.98
	Parental education	1.21****	1.10*	1.00	0.98	0.98	0.96	0.95	0.94	0.76****	0.78****
	Occupational status	1.11**	0.98	0.99	0.97	0.98	0.98	0.94	0.94	0.79****	0.90
	Female sex	0.73****	0.74***	0.96	0.94	0.76****	0.76***	0.94	0.92	0.38****	0.35****
18	Parental income	1.24****	1.14*	0.88***	0.99	1.08*	1.05	1.07	1.07	0.81****	0.92
	Education	1.32****	1.24****	0.82****	0.85***	1.13***	1.12*	1.09*	1.08	0.84****	0.92
	Occupational status	1.21****	1.02	0.89**	0.95	1.11**	1.02	1.06	0.96	0.85***	0.90
	Female sex	0.73****	0.74***	0.96	0.94	0.76****	0.76***	0.94	0.92	0.38****	0.35****

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$; **** $p \leq .0001$.

significance. High-quantity consumption was associated with lower levels of income, education, and occupational status in univariate analyses, and only with lower education status in multivariate analyses. Heavy episodic drinking was positively and significantly associated with all three SES measures in univariate analyses. Only education significantly and positively predicted heavy episodic drinking in the multivariate analyses. Alcohol-dependence symptoms were weakly predicted by higher educational status and only in univariate analyses. Higher levels of alcohol behavioral problems were strongly predicted by lower levels of all three measures of SES (although none was significant in multivariate analyses).

In our univariate analyses, we examined interactions between our SES predictors and sex. One of the 15 interactions was significant, similar to chance expectations, and showed greater sensitivity to the effects of parental education on heavy episodic drinking in females.

When we examined income assessed at ages 8, 11, or 18 years instead of age 3, we saw stronger positive effects (especially at age 18) on high-frequency consumption, heavy episodic drinking, and alcohol-dependence symptoms with little consistent change in high-quantity consumption or alcohol behavioral problems.

If we examined more deviant outcomes, SES associations with heavy episodic drinking weakened and grew stronger with alcohol behavioral problems.

Discussion

The results of our analyses demonstrate the complexity of the relationship between SES and alcohol-related outcomes in adolescence. The strength of our approach is that we examined—in mid- and late adolescence, in both univariate and multivariate models—the relationship between the three key indicators of SES and five different alcohol-related outcomes. Our sample size was large, and we explored differences between narrow and broad outcome definitions (by the use of low and high thresholds for our outcomes) and family income as assessed at different ages.

We found nine noteworthy results. First, across ages, SES indicators consistently and positively predicted frequent alcohol use. Second, with similar consistency, SES measures negatively predicted alcohol behavioral problems. Third, although high-quantity alcohol consumption was unrelated to SES at age 16, it was inversely related to the same measures at age 18. Fourth, heavy episodic drinking was largely unrelated to SES indices at age 16 but positively associated at age 18. Fifth, alcohol-dependence symptoms were essentially unrelated to our SES measures at both ages. Sixth, across our analyses, income and education tended to be the most predictive of SES measure with interesting variation in their strength. For example, at age 16, high income more strongly predicted high-frequency consumption, whereas low education was stronger at predicting alcohol-related problems.

Seventh, we found no consistent pattern when we examined income assessed at different ages, with sometimes earlier and sometimes later measures proving more predictive. Therefore, these findings do not help to clarify further whether income more directly affects alcohol use through availability of family funds or because high income reflects a range of values about acceptable patterns of alcohol use. Eighth, we found no substantial evidence for sex differences in the relationship between SES measures and our alcohol-related outcomes at either age. Ninth, we also found variable results when we defined outcomes more narrowly. More deviant alcohol-related problems were more strongly predicted by SES at both ages, whereas more deviant levels of alcohol-dependence symptoms were more strongly predicted by SES measures at age 16 and more weakly at age 18.

Our first two findings—an opposite pattern of associations between SES measures and alcohol consumption and alcohol behavioral problems—well illustrate the problem of trying to assess an aggregate relationship between SES and broad constructs such as “alcohol-related behaviors.” These two specific behaviors are clearly reflecting different aspects of social class as they influence alcohol consumption and its effects.

These findings extend into later adolescence results from prior reports on the prediction of alcohol-related outcomes from SES variables in the ALSPAC cohort at age 13 (Melotti et al., 2011) and age 15 (Melotti et al., 2013). Congruent with our findings, at both ages 13 and 15, higher family income was positively associated with alcohol use at both ages and with higher risk for problematic use at age 15 (Melotti et al., 2011, 2013). Parental education, however, was associated with a lower risk for heavy episodic drinking at age 13 and, consistent with our findings, alcohol behavioral problems at age 15 (Melotti et al., 2011, 2013). Somewhat surprisingly, at age 18, higher SES measures were negatively associated with drinking quantity and positively associated with heavy episodic drinking. However, heavy episodic drinking at this age was actually more strongly correlated with frequency of drinking than quantity, and, as with heavy episodic drinking, frequency was positively associated with our SES measures.

One probable source of our diverse findings is the variable mechanisms whereby SES can affect adolescent drinking behaviors. Higher family income might provide the adolescent greater financial resources with which to purchase alcohol products. However, family SES is also likely related to parental, community, and peer attitudes about normative and excess drinking and the baseline frequency of the conduct problems assessed by our measure of alcohol behavioral problems.

Our results are not entirely consistent with the results of a recent review of the literature from 1970 to 2007 that identified 28 studies that examined the association between SES and alcohol consumption in adolescence (Hanson and

Chen, 2007). Most studies found no association, with the remainder nearly evenly divided between those reporting positive and negative associations. The authors noted that among the modest number of studies reporting multiple SES indices, consistent with our findings, a trend was seen for those reporting a positive relationship to use income measures. Our results, however, are broadly congruent with findings in a detailed general adult survey in New Zealand, which noted that high SES was positively related to frequency of alcohol consumption while negatively related to quantity of alcohol consumed and often with subsequent drinking problems (Huckle et al., 2010). Our results also confirm the potential complexity of the association between SES and alcohol use trajectories pointed out by Swendsen et al., who note that particular sociodemographic risk factors may have rather specific associations with different stages of the substance use trajectory (Swendsen et al., 2009).

These results should be interpreted in light of four potential limitations. First, these results may not extrapolate to populations outside the United Kingdom. In particular, regular and heavy alcohol use is more common among adolescents in the United Kingdom than in the United States (Hibell et al., 1997). Second, the ALSPAC cohort has undergone significant attrition since inception (Boyd et al., 2013). We corrected for this effect by differential weighting of subjects. We also conducted the same analyses without weights, and results were very similar, suggesting that substantial attrition-produced biases in our estimates are unlikely. Third, we only had parental occupation assessed during pregnancy. This could have changed over the course of the study. Fourth, one of the two items in our measure of alcohol behavioral problems was alcohol-related problems with the police. Perhaps our findings of a strong inverse association with SES resulted from selective police practices targeting low SES youth. To address this concern, we examined separately the alcohol-related “problems with police” and “fighting” items. At both ages 16 and 18, the inverse associations with our SES measures were similar and significant for both items. These results suggest that our findings for alcohol behavioral problems did not result from possibly biased police practices.

In summary, our report reflects the complexity of the relationship between SES and alcohol-related behaviors over adolescence. In building more comprehensive developmental and etiologic models for alcohol consumption and problems, our findings suggest that global SES measures are unlikely to be helpful because the nature of the relationship differs as a function of the specific measure used, the kind of alcohol-related outcome measured, and the age. Future studies of the impact of SES on alcohol-related behaviors need to use more fine-grained measures along with longitudinal sampling.

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