Drug and Alcohol Dependence 166 (2016) 243–248

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Short communication

Are area-level effects just a proxy for school-level effects? Socioeconomic differences in alcohol consumption patterns among Swedish adolescents

Per Carlson[a,*], Ylva B. Almquist[b]

[a] School of Social Sciences, Unit of Social Work, Södertörn University, 141 89 Huddinge, Sweden
[b] Centre for Health Equity Studies (CHESS), Stockholm University/Karolinska Institutet, 106 91 Stockholm, Sweden

ARTICLE INFO

Article history:
Received 19 February 2016
Received in revised form 24 May 2016
Accepted 28 May 2016
Available online 29 June 2016

Keywords:
Alcohol use
Binge drinking
Adolescents
City districts
Schools

ABSTRACT

Aims: Although recent studies have found significant variations in adolescent alcohol consumption across neighbourhoods, these investigations did not address another important context in adolescents' lives: schools. The purpose of this study was to not only simultaneously assess variations in adolescent alcohol use and binge drinking at the city district level and the school level but also analyse whether any such variations could be ascribed to the socioeconomic characteristics of the examined city districts, schools, and students.
Design: Cross-sectional study.
Setting: Stockholm, Sweden.
Participants: Ninth-grade students (n = 4349) attending schools (n = 75) located in the city districts of the Stockholm municipality (n = 14).
Measurements: Two measures based on information regarding alcohol consumption were constructed: alcohol use (no or yes) and binge drinking among alcohol users (ranging from "very seldom" to "a few times a week"). A wide range of socioeconomic characteristics was included at the city district, school, and student levels. Alcohol use was analysed using mixed-effects logistic regression, whereas binge drinking among users was modelled using mixed-effects ordered logistic regression.
Findings: The results indicated that the school was more important than the city district in assessments of contextual variations in adolescent alcohol use in general and binge drinking in particular. Moreover, proportions of well-educated parents and high-performing students accounted for part of the school-level variation in alcohol use but not binge drinking.
Conclusions: Failure to account for the school context may have caused past research to overestimate city district differences in alcohol consumption among adolescents.

1. Introduction

The socioeconomic pattern of alcohol consumption is inconsistent compared to many other health behaviours (Harper and Lynch, 2007), particularly in the adolescent population (Hanson and Chen, 2007). Although certain studies have revealed a protective effect of growing up in families with low socioeconomic status, other investigations have highlighted this type of upbringing as a risk factor (Lemstra et al., 2008). In addition to these individual-level associations, researchers have investigated whether socioeconomic disadvantage at the contextual level can play a role in alcohol consumption. Two recent studies examined adolescents living in Oslo, Norway, and demonstrated that the highest levels of alcohol consumption and alcohol intoxication were reported by residents of more affluent city districts while the opposite pattern was observed for alcohol problems (Pedersen and Bakken, 2016; Pedersen et al., 2015). A third study revealed significant variation in adolescent alcohol use across neighbourhoods in the American city of Chicago, Illinois. However, except for immigrant concentration, which was negatively associated with the measured outcome, no indicator of neighbourhood socioeconomic disadvantage had any significant effect (Fagan et al., 2015). Despite the numerous differences between these studies with respect to measurements and design, these investigations shared one feature: neither study addressed schools, which provide another important context in adolescents' lives. Other research has indeed identified significant school-to-

* Corresponding author.
E-mail address: per.carlson@sh.se (P. Carlson).

http://dx.doi.org/10.1016/j.drugalcdep.2016.05.031
0376-8716/

school differences in alcohol consumption that have largely been driven by the lower rates of alcohol consumption in socioeconomically disadvantaged schools (Olsson and Fritzell, 2015). Given the burgeoning number of studies that have concluded that area-level effects in adolescent populations generally are simply a proxy for school-level characteristics (Bernelius and Kauppinen, 2012; Brännström, 2008; Rendón, 2014; Sykes and Musterd, 2010), the current investigation set out to simultaneously assess variations in adolescent alcohol use and binge drinking at the city district and school levels. Moreover, the aim was to analyse whether any such variations could be ascribed to the socioeconomic characteristics of the examined city districts, schools, and students.

2. Methods

The present study included data at the student level, the school level, and the administrative city district level of schools. The student-level data were derived from the Stockholm School Survey 2014, which was conducted among 9th and 11th graders attending schools located in the municipality of Stockholm, Sweden (n = 15,169). While all public schools in Stockholm municipality were urged to participate, private schools participated voluntarily. The response rate was 76% (n = 11,507). The present study was restricted to 9th grade students (n = 4349) who responded to all analysed questions (n = 3276). The reason for excluding the 11th grade students was to focus on elementary school students exclusively, since elementary and secondary schools differ in many respects.

School-level data (n = 75) were derived from registries of the Swedish National Agency for Education, whereas information regarding the schools' city districts (n = 14) was collected from official statistics for the Stockholm municipality (Stockholm City Council, 2015).

Information about alcohol consumption was captured through the question "*How often do you drink the following amounts of alcohol at any one time: 18 cl spirits (half a "kvarting") or a whole bottle of wine or four large bottles of strong cider/alcopop or four cans of class III beer or six cans of class II beer*?" The response options were "*Do not drink alcohol*" (1); "*Never*" (2); "*Very seldom*" (3); "*A few times each year*" (4); "*A few times a month*" (5); "*A couple of times a month*" (6); and "*A few times a week*" (7). Two measures were constructed. The first indicated alcohol use, for which alternatives 1 and 2 were collapsed into "No", and the remaining alternatives (3–7) formed the category "Yes". The second measure reflected binge drinking among alcohol users only; excluding those who answered they did not drink alcohol, while the other categories were kept intact.

The following independent variables were included at the student level: sex, age, years living in Sweden, parents' education, parents' employment, cash margin ('About how much money do you have for you leisure and entertainment every month?'), and average school marks ('What grade did you get last term in the following subjects? Swedish, English, Mathematics'). Regarding school-level measures, the analysis included the proportions of parents with a non-native background and with a tertiary education as well as average results on national tests. At the city district level, measures reflected the proportions of non-native residents, residents with a tertiary education, and unemployed esidents as well as average income levels. Regarding country of birth (i.e., the student's number of years living in Sweden, the school proportions of parents with non-native background, and the city district proportions of non-native residents), data was limited to what was available at the three levels.

In addition, a socioeconomic (SE) index that included all of the aforementioned socioeconomic variables (as a summative score divided by the number of items; standardized to a mean of 0 and a standard deviation of 1) at the district level was used (Cronbach's alpha = 0.97). The operationalization and distribution of the study variables are described in Tables 1a and 1b (by city districts) and the Supplementary Table 1 (by schools).

City district- and school-level variations in alcohol consumption were analysed using multilevel modelling, which is suitable when data are nested (e.g., individuals nested within schools and schools nested within city districts). The analysis was performed in two steps that reflect two dimensions of alcohol consumption. In the first step, mixed-effects logistic regression was applied to analyse the odds of alcohol use (individuals, n = 3276; schools, n = 75; city districts, n = 14). The second step involved using mixed-effects ordered logistic regression to examine binge drinking among alcohol users (individuals, n = 1531; schools, n = 75; city districts, n = 14).

3. Results

Table 2a demonstrates the results for alcohol use. The intra-class correlations (ICC) reflect the variation in alcohol use at the contextual levels. According to Model 1, the ICC for the city district level is 0.03 and significant, indicating that there is significant variation in alcohol use among city districts. Model 2 additionally accounts for the school-level ICC; although significant variation among city districts remains (ICC = 0.02), more variation is observed among schools (ICC = 0.04). Individual-level variables are introduced in Model 3. Alcohol consumption is significantly less likely for boys than for girls (OR = 0.67) and significantly more likely for older students than for younger students. Differences in years living in Sweden, parents' education, and parents' employment status are not associated with significant differences in alcohol use. Cash margin exhibits a significant but weak positive effect on alcohol use (barely observable due to rounding). Finally, school grades have a significant effect, with a lower probability of alcohol use among students with higher grades. All significant individual effects from Model 3 remain significant in the subsequent models. Models 4–7 individually introduce socioeconomic characteristics of city districts. Higher proportions of non-native residents (Model 4) and higher unemployment rates (Model 6) are associated with lower probabilities of adolescent alcohol use. In contrast, higher proportions of residents with a tertiary education (Model 5) and higher average incomes (Model 7) are associated with higher probabilities of adolescent alcohol use. The SE index introduced in Model 8 shows that the probability of adolescent alcohol consumption is lower in city districts with greater socioeconomic difficulties. In Models 4–8, the city district variation (ICC) in adolescent alcohol drinking is eliminated, whereas the variation between schools remains nearly unchanged. Models 9–11 individually incorporate three different school characteristics. Schools with higher proportions of non-native students tend to have lower prevalences of alcohol use (Model 9). Alcohol use is more common in schools with higher proportions of well-educated parents (Model 10) and in schools with higher-performing students (Model 11). In examinations of school variation, it is clear that differences between schools do not change from previous models when the school-level proportion of immigrants is introduced in Model 9. However, the introduction of the proportion of well-educated parents (Model 10) or average results on national tests (Model 11) causes school-level variation to decrease from 0.02 to 0.01.

In Table 2b, the focus shifts from alcohol use to binge drinking among alcohol users. No city district-level variation is observed in any of the examined models (ICC = 0.00). Significant variation among schools exists; this variation remains unchanged across all models (ICC = 0.02). In Model 3, age (OR = 1.28) and school grades (OR = 0.83) are the only individual-level variables that exhibit any