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Relationship between early symptoms of alcohol craving and binge drinking 2.5 years later



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ABSTRACT

Background: The first self-reported symptoms of nicotine dependence (e.g., as craving) can appear within days to weeks of the onset of occasional use, and the appearance of symptoms predicts future consumption and dependence. We sought to determine whether craving for alcohol occurs in early stages of adolescent alcohol use, and whether it predicts future binge drinking, a prevalent and problematic behavior.

Methods: Longitudinal (30-month) four-wave study of 3415 students ($M = 12.5$ years at baseline) from 29 German schools. Students reported five symptoms of alcohol craving on a scale developed based on well-validated measures for tobacco. Multilevel mixed-effects logistic regression was used to predict having five or more binge episodes by last follow-up, based on the number of symptoms reported before the first lifetime binge. Multiple imputation was used to address study drop-out.

Results: At baseline, 23% reported at least one symptom, increasing to 54% at wave 4. Any report of symptoms at baseline was associated with frequency of alcohol use, being present in 100% of daily, 93% of weekly, 87% of monthly, 48% of infrequent drinkers, and 16% of ever drinkers reporting no current alcohol use. Moreover, symptoms at baseline independently predicted frequent binge drinking 2.5 years later, $AOR = 2.08$ (95% CI 1.39, 3.11; $p < 0.001$) among baseline never-bingers, after adjusting for covariates. **Conclusions:** Some early-onset drinkers reported symptoms of alcohol craving and loss of control after minimal exposure to alcohol. If replicated, an early screener could be developed to identify those at risk for frequent binge drinking.

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1. Introduction

Alcohol is the most popular drug among adolescents in western societies, and binge (“heavy episodic” or “risky single-occasion”) drinking is of particular concern (Anderson and Baumberg, 2006). Binge drinking (i.e., past-month consumption of five or more drinks on a single occasion) was reported by 39% of students in 36 European countries in 2011 (Hibell et al., 2011), by 52% of 44610 ninth-grade students from a representative sample in Germany

in 2007–2008 (Donath et al., 2012), and by 14% of youth ages 12–20 years in the U.S. (Substance Abuse and Mental Health Services Administration, 2014). Underage drinking is associated with a number of negative outcomes, including violence, suicide, and alcohol-related problems, substantially increasing the risk for injury-related morbidity and mortality (Hingson and Zha, 2009; Hingson et al., 2009; O’Malley and Johnston, 2013; Schmid et al., 2003). There is also consistent evidence that higher alcohol consumption in adolescence continues into adulthood and is associated with later alcohol problems and alcohol dependence (McCann et al., 2011), and that binge drinking in adolescence persists into young adulthood (Degenhardt et al., 2013). Moreover, teens who engage in binge drinking have poorer neurocognitive performance when compared to demographically matched non-using controls (Jacobus and Tapert, 2013), and early drunkenness is a risk factor for various other adolescent problem behaviors,

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like smoking tobacco (Kuntsche et al., 2013). Thus, binge drinking increases the likelihood of negative outcomes beyond the risks posed by mere consumption.

Previous investigations of predictors of binge drinking have identified many risk factors, including sociodemographic characteristics, biological/genetic susceptibility, psychological factors (e.g., positive alcohol expectancies, motives for drinking, self-efficacy for refusal, risk taking, sensation-seeking and impulsivity), environmental influences (e.g., peer alcohol use, exposure to alcohol advertising, and similar variables; Sequeira and Smith, 2015). Looking at the high proportion of adolescent and adult alcohol users, which contributes to the overall burden of disease attributable to alcohol (Rehm et al., 2009), it is obvious that not all alcohol users, even frequent users, develop a diagnosed alcohol dependence or any kind of alcohol use disorder (AUD). This can be explained by suggesting a number of interacting biopsychosocial risk factors that are unequally distributed within populations. Research in the field of tobacco addiction has shown that the first self-reported symptoms of nicotine dependence, such as experiencing craving, can appear within days to weeks of the onset of occasional use, typically before the onset of daily smoking (DiFranza et al., 2000; Gervais et al., 2006). Moreover, the appearance of dependence symptoms appears to be reciprocally related to cigarette consumption, with more symptoms driving increased smoking and greater consumption driving increases in symptoms (Doubeni et al., 2010; Hu et al., 2014).

Up to now, there have been no attempts to transfer the methods and findings regarding early tobacco use to early alcohol users. Epidemiological studies on adolescents use either frequency measures alone or screening instruments for the identification of adolescent AUD, e.g., the AUDIT (Babor et al., 1992), the POSIT (Rahdert, 1991), the CAGE (Ewing, 1984), and the CRAFFT (Knight et al., 1999). All of these measures are primarily based on the DSM-IV criteria of AUD and share a focus on alcohol-related problem behaviors, tolerance, and social feedback about alcohol use. While most of these instruments are sensitive in identifying AUD in clinical adolescent samples (Knight et al., 2003), they are not designed to predict which adolescent experimental drinkers will go on to more risky drinking. Similarly, we could identify only few studies that investigated prospectively the development of AUD symptoms in youth. The EDSP study followed 2039 community-based participants in Germany (average age at baseline = 14–24 years) over a ten-year period and tracked the prevalence of DSM-IV symptoms of alcohol abuse and dependence as well as the ICD-10 symptom of craving (Behrendt et al., 2008; 2013). Loss of control over use was reported by approximately 7% of participants at baseline and 4- and 10-year follow-ups, while craving was reported by 2–3% of participants at each time point (Behrendt et al., 2013). Between 5% and 30% of first symptoms of alcohol dependence occurred during the first year after first alcohol use (Behrendt et al., 2008).

Given the dangers inherent in binge drinking, and in light of the findings regarding the early development of symptoms with tobacco use, we chose to investigate the potential relationship between early symptoms of alcohol problems and binge drinking. The aim of the present study was to determine whether craving for and loss of control over use of alcohol develop in early stages of adolescent alcohol use and to assess whether the presence of such symptoms predicts future binge drinking.

2. Methods

2.1. Survey implementation

Data were collected through self-completed anonymous questionnaires during one school hour (45 min period), administered by

trained research staff. Parent consent forms were disseminated by class teachers three weeks prior to the baseline assessment. Students did not receive incentives for participation and irrespective of parental consent, all students were free to refuse participation (none refused). Class teachers assigned tasks for students who did not participate. After completion of the survey, questionnaires were placed in an envelope and sealed in front of the class. Students were assured that their individual information would not be seen by parents or teachers. To permit linking the baseline and follow-up questionnaires, students generated an anonymous seven-digit individual code, a procedure that had been tested in previous studies, slightly modified for this study (Galanti et al., 2007). Implementation was approved by all Ministries of Cultural Affairs of the three involved states, and ethical approval was obtained from the Ethical Committee of the Medical Faculty of the University of Kiel (Ref.: D 417/08).

2.2. Study sample

In the spring of 2008, we invited 120 randomly selected schools from three states of Germany (Brandenburg, Hamburg, and Schleswig-Holstein) to participate in a school-based survey. The German school system has different types of schools (Grundschule, Hauptschule, Realschule, Oberschule, Gemeinschaftsschule, Gymnasium) that mainly differ with regard to the academic skills of their students and graduation level. The selection was stratified by state and type of school, assuring a balanced representation of all school types in the respective states. Twenty-nine schools with 176 classes and 4195 sixth to eighth grade students agreed to participate after a four week recruitment interval. We were able to survey a total of 174 classes with 3415 students (81.4% of the sampled students). Reasons for exclusion were either absence (2 classes, 134 students) or missing parental consent (646 students). From the 3415 students surveyed at baseline, we successfully followed up 3027 (88.6%) after nine months, 1606 (47.0%) after 20 months, and 1318 (38.6%) after 30 months (see Fig. 1). Study drop-out was significantly positively related to baseline reports of past month alcohol use, binge drinking, age, television screen time, sensation seeking, peer drinking, and having favorable alcohol attitudes (all p -values < 0.001). A negative relation was found for study region (lost students were less frequently surveyed in West Germany, $p = 0.006$), socioeconomic status (lost students had lower SES, $p < 0.001$), school performance ($p < 0.001$), and parental frequency of alcohol use ($p < 0.001$). Multiple imputation was used to address loss to follow-up as described below.

2.3. Measures

2.3.1. Alcohol use. Lifetime use of alcohol was assessed with “Have you ever drunk alcohol?” (yes/no). Students who answered “no” to this question skipped the next page which contained questions about frequency of alcohol use, measured with “How often do you currently drink alcohol?” (on a five-point scale with 0 = “Never,” 1 = “Less than once a month,” 2 = “At least once a month, but not every week,” 3 = “At least once a week, but not daily,” 4 = “Daily”) (Hibell et al., 2011), and binge drinking with the question “How often have you had 5 or more drinks on one occasion?” (0 = “Never,” 1 = “Once,” 2 = “2 to 5 times,” 3 = “More than 5 times”) (Johnston et al., 2015; Lintonen et al., 2004). Positive attitudes towards alcohol were reported by rating the four statements that alcohol (a) is relaxing, (b) makes you more outgoing, (c) brings a good mood, and (d) is something positive on a scale from 0 = “Not true at all” to 3 = “Totally true” (Morgenstern et al., 2011a).

2.3.2. Alcohol cravings and loss of control. The main predictor of interest was any of five symptoms of alcohol craving and loss of

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