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Contextual Influences on Early Drinking: Characteristics of Drinking and Non-Drinking Days

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Abstract

Research characterizing the adolescent drinking context is limited, often relies on samples of current drinkers reporting on recent/last or typical drinking experiences, and provides little information about the context of very early use. The present study uses repeated monthly assessments to describe the context of drinking days and matched non-drinking days to determine the unique risk associated with different drinking-related characteristics. Additionally, we used latent class analysis to empirically identify key configurations of drinking-related characteristics and both family- and non-family-related environmental characteristics (social context, physical location, source of alcohol). Data included 688 days (344 drinking days, 344 non-drinking days) from 164 middle-school students enrolled in a prospective study on drinking initiation and progression (62% female; 26% non-White, 11% Hispanic). Results supported four patterns: (1) heavier drinking occurring in a peer context, lighter drinking occurring in (2) a family context or (3) a peer context, and (4) drinking alcohol obtained at home without permission. Latent classes varied as a function of gender, age, peer norms, and parenting behaviors as well as alcohol type and perceived alcohol availability. Findings indicated that highly endorsed contexts were not necessarily the riskiest ones, and simply targeting an oft-reported source of alcohol, physical location, or social context may not be an effective strategy for reducing underage drinking. Additionally, although greater monitoring and anticipated parent reaction to drinking are typically protective against adolescent drinking, we found they were associated with parent-sanctioned

drinking, suggesting the role of parenting practices must be considered in the context of drinking pattern.

Keywords

context; drinking; alcohol; adolescence

Introduction

Adolescence is the peak period of risk for initiation of alcohol use (Chen & Jacobson, 2012; Johnston et al., 2015). Early alcohol consumption is particularly concerning, as alcohol use may have acute and prolonged neurobiological effects specific to the adolescent brain (Monti et al. 2005). Moreover, alcohol use contributes to the leading causes of death for underage drinkers, including unintentional injury, homicide, and suicide (Hingson, Edwards, Heeren, & Rosenbloom, 2009; Swahn, Bossarte, & Sullivent, 2008). As such, a research priority in public health is to identify markers of risk for adolescent alcohol use, especially use at an early stage that may be more responsive to preventive intervention.

Environmental influences have been shown to be more predictive of initial alcohol experiences than individual-level variables (Fowler et al., 2006; Pagan et al., 2006). These include various social and familial factors as well as situational factors, such as the social context (who the individual is with), the physical setting, and the availability/source of the alcohol. Harford (1979) noted long ago that drinking is situationally specific, rather than a static individual-level behavior. The few studies providing information about drinking context in adolescent samples often rely on samples of current drinkers reporting on recent/last or typical drinking experiences. However, evaluating these drinking events among current drinkers is less informative for understanding the context of *initiation* and very early use. The use of between-person designs also limits inferences about directionality, as more experienced drinkers may self-select into certain environments.

With respect to social context, youth first experimenting with alcohol most often report drinking alcohol with parents (Ary et al., 1993; Jackson et al., 1999; Strycker et al., 2003) or friends (Anderson & Brown, 2011; Strycker et al., 2003), with a shift in the prominence of the two, from parents to peers, with age (Mayer, Forster, Murray, & Wagenaar, 1998; Strycker et al., 2003). Although solitary drinking in this age group is rare, it has been shown to be associated with problem drinking and problem outcomes when it does occur (McCabe et al., 2014; Tucker, Ellickson, Collins, & Klein, 2006). Regarding physical setting, among younger adolescents, the most frequently cited setting for drinking is in a home, typically their own home but also the home of friends or relatives (e.g., Anderson & Brown, 2011; Goncy & Mrug, 2013; Lipperman-Kreda et al., 2015; Mayer et al., 1998; Siegel et al. 2011; Strycker et al., 2003). Parties are frequently endorsed settings, although more often for older adolescents; older adolescents also more commonly endorse drinking in a car, outdoors, or at school (Anderson & Brown, 2011; Goncy & Mrug, 2013; McCabe et al., 2014; Strycker et al., 2003).

Another important aspect of the setting conducive to drinking is having ready access to alcohol, which presents an opportunity to drink, even for those not intending to drink (Casswell, Pledger, & Pratap, 2002; Komro et al., 2007). Access to alcohol is greatest when explicitly offered to the adolescent, typically by family or friends (Pettigrew, Miller-Day, Krieger, & Hecht, 2012), suggesting that adolescents may be obtaining alcohol from passive means to a greater extent than actively seeking the alcohol. Social sources of alcohol predominate among adolescents, particularly when first experimenting (Harrison, Fulkerson, & Park, 2000; Hearst et al., 2007), with the most common sources of alcohol for underage drinkers being own parents' or friends' parents' supplies (Gilligan et al., 2012; Ward & Snow, 2011), older siblings (Samek, McGue, Keyes, & Iacono, 2014), and older friends/co-workers (Jones-Webb et al., 1997). In addition, liquor is the most frequently consumed type of alcohol by adolescents (Cremeens et al., 2009; Siegel et al., 2011), perhaps because it is more easily accessed from parental supplies.

Together these findings indicate parents and family are common influences in the adolescent drinking environment. However, the degree to which the family context is protective against alcohol misuse vs. risk-promoting is unresolved. Relative to drinking outside the home and with non-family members, drinking in the home and with parents is associated with less heavy drinking, less drunkenness, and fewer problems (Donnermeyer & Park, 1995; Forsyth & Barnard, 2000; Hayes et al. 2004; Lipperman-Kreda et al., 2015; Mayer et al., 1998; Wells et al., 2005), which is likely due to greater parental supervision in the home (van der Vorst, Burk, & Engels, 2010). However, when parents permit their children to drink at home and especially when they explicitly provide the alcohol, subsequent rates of drinking, heavy drinking, and drunkenness rise (Komro et al., 2007; McMorris et al., 2011; Shortt et al., 2007). This suggests that although drinking in a family context may be less risky than drinking in a non-family context, it is still risky relative to no drinking, and may represent greater risk in the long run, when the drinking behavior transitions to outside the home. Youth also sometimes report intentionally taking alcohol from a parent without permission (Dent et al., 2005; Friese et al., 2011; Siegel et al., 2011), which is associated with even more marked increases in subsequent drunkenness and heavy drinking relative to receiving it from the parent (Bellis et al., 2007; Komro et al., 2007). This raises the importance of making differentiations as a function of whether the alcohol use in the home was sanctioned (or perhaps even provided), as well as whether the outcomes of drinking in a family context are being compared to any drinking or to drinking in a non-family context.

The Present Study

The overarching goal of the present study is to characterize the context of very early alcohol use in a sample of young adolescents. Unique repeated daily data collected on a monthly basis are used to describe the context of drinking days and matched non-drinking days. Aspects of the *drinking* day investigated here include amount and type of alcohol consumed, subjective effects experienced (buzzed/drunken), whether alcohol-related problems were reported, time of day and day of week, and how the alcohol was acquired, with particular focus on social sources of alcohol. We characterize *non-drinking* days in terms of what the adolescent was doing, whether alcohol was available (and if so, the location), and whether alcohol was offered (and if so, the source). Where the adolescent was and who the

adolescent was with was assessed on both the drinking and matched non-drinking day, and could therefore be compared. Our data also enabled us to compare differences in the location and source of alcohol for drinking days vs. non-drinking days where alcohol was available and/or offered.

In addition to describing drinking- and non-drinking days, we sought to empirically identify key configurations of important factors that jointly describe the context of a drinking day. These included drinking-related characteristics: amount of alcohol, getting drunk, experiencing problems, and the physical/social setting of the drinking episode including who the participant was with, the physical location, and the source of alcohol. The current study extends recent work using latent class analysis (LCA) to derive configurations of alcohol involvement and context (i.e., location, day of week) in young adults (Cleveland et al, 2012; 2013; Sunderland, Chalmers, McKetin, & Bright, 2014), and with a more comprehensive assessment of contextual variables. We expected to detect a grouping (class) characterized by drinking in a family context, but had no a priori hypotheses about other patterns.

Finally, we examined differences in classes of drinking episodes as a function of the broader context. In particular, we examined differences as a function of drinking norms, both peer and parent, parenting behaviors (alcohol-specific and general), and perceived availability of alcohol. We also examined class differences in gender, age, and type of alcohol consumed on that episode. As proposed by social learning theory (Bandura, 1977), youth are influenced by the drinking behavior of a target person, so we would expect that greater perceived peer and parent drinking would be higher in the classes characterized by drinking in the peer or family context; we also examined correlates of any drinking occurring in the context of siblings and cousins. We did not have hypotheses about class differences regarding alcohol type, gender, or availability of alcohol, but we expected more severe classes to be positively associated with age.

Method

Participants

Data were from an ongoing prospective study on early adolescent alcohol initiation and progression (cite removed for blinding). Participants were 1,023 students in Rhode Island middle schools (one urban, two rural, three suburban). The composition of our sample reflected that of the schools from which participants were drawn with regard to gender and grade, but our sample was more ethnically diverse (greater proportion of Hispanic youth) and less disadvantaged (lower rates of subsidized lunch) than the school populations (<http://infoworks.ride.ri.gov/>). The present study sample included 164 participants who contributed data from the monthly surveys (see below) and was 62% female; 26% non-White (5% Black, 3% Asian, 3% American Indian, 8% mixed race, 7% other/unknown), and 11% Hispanic¹.

¹Milestone days were more likely to be days on which participants endorsed getting drunk, consuming more than one drink, experiencing an alcohol-related problem, and not drinking as part of a family gathering.

Procedure

Interested students who provided written informed parental consent were invited to attend a two-hour in-person group orientation session. During this session, project staff collected contact information and assent from each student, explained how participants would engage with the project, provided the definition of a standard drink, and provided a notebook which included project contact information, the definition of a standard drink, and incentive information.

The full study entailed a series of longer surveys (six over the course of three years) as well as shorter monthly surveys for a two-year period (24 monthly surveys total). These monthly web-based assessments took 10-15-minutes to complete. During the orientation sessions, emphasis was placed on finding a private location to take the survey. Participants were provided with multiple reminders (mailed card, email, text, phone calls) alerting that the survey was open (7 days total), and access was granted with an ID and password provided at the orientation session. For each monthly survey completed, participants were compensated with \$10 cash. The Brown University Institutional Review Board approved all project procedures.

The mean monthly response rate was 89.2% and ranged from 83.7% (Month 19) to 95.4% (Month 1). The average number of monthly surveys completed per respondent was 21.3 of 24 surveys ($SD=4.9$). A series of chi-square tests (for categorical variables) and t-tests (for continuous variables) were conducted to determine whether response rates differed across socio-demographic variables and alcohol consumption. Girls completed more surveys than boys ($p < .001$; $M=21.6$ surveys vs. $M=21.0$ surveys, respectively) but there were no significant differences as a function of age, grade, race (White vs. non-White), Hispanic ethnicity, or SES (free or reduced lunch status). There were also no significant differences in average number of drinking days, number of days drunk, drinks per drinking day, or maximum number of drinks.

In addition, one self-selected parent (86% were mothers) completed a 30-minute paper-and-pencil survey at baseline; parents received a \$30 grocery store gift card for completing each survey. Parent report was obtained on 91% of the participants on the present study sample.

Measures

To aid in recall in the web-based survey, participants were presented with a calendar of the previous month and asked to fill in any events and activities they participated in on the days of that month (e.g., basketball game, birthday party, school project due). They were then asked to indicate any days on which they drank (except as part of a religious ceremony), and to indicate the number of drinks they had on each drinking day. Response options included “just a sip,” “half a drink/a swig of hard alcohol,” and full drinks up to “more than 12 drinks.”

Drinking days—Respondents who reported drinking in a given month were asked questions about the context of the drinking event. The larger study is focused on identifying drinking milestones; if the drinking event reported by a participant was the first time he/she

reported drinking alcohol, getting drunk, drinking three or more drinks on a single occasion, or experiencing an alcohol-related problem, the participant was asked context questions about this drinking event. These milestone events accounted for 23% (80/344) of the drinking days reported, of which half (40/80) were the first-full drink milestone². For months in which a milestone was not attained but drinking occurred, participants answered detailed questions about the occasion with the greatest number of drinks reported that month (77% of the days reported). For all events, respondents indicated the type of alcohol that was consumed, the source of alcohol, when they consumed the alcohol (time of day; day of week was coded from the calendar); location (where they were when they were drinking), and who they were with when they drank (response options and descriptive data are provided in Tables 1-4). In addition, respondents indicated whether they got “buzzed” and/or drunk, and whether they experienced any of a list of 13 alcohol-related problems that were drawn from the Rutgers Alcohol Problems Index (RAPI; White & Labouvie, 1989).

Matched non-drinking days—To compare the context of drinking days and non-drinking days, participants provided information about a non-drinking day that was matched to the day of the week using the date closest (and prior) to the drinking day (e.g., if a participant reported drinking on a Friday, the matched non-drinking day was the prior Friday if no drinking was reported on that day). For each matched non-drinking day, participants were oriented to the same time of day that drinking had occurred (before school/in the morning; during school/in the middle of the day; after school/in the afternoon; during the evening) and were asked what they were doing, as well as their location and who they were with (same items as for drinking days). They also indicated whether alcohol was available to them (“Were you at a place where alcohol was available to you if you had wanted to drink it?”) and if so, where the alcohol was available, and whether alcohol was offered to them (“Were you offered alcohol?”) and by whom.

Follow-up surveys—Injunctive norms were measured with the item “How do most of your close friends feel about kids your age drinking alcohol?”; response options ranged from Strongly Disapprove (0) to Strongly Approve (4). Descriptive norms were measured by asking “When your close friends drink, how much on average does each person drink at a sitting?”; response options ranged from They Don’t Drink (0) to More than 3 Drinks (4). Both items were adapted from Wood et al. (2004). Parental monitoring, operationalized as parents’ knowledge of children’s activities, whereabouts, and friends, was a 9-item scale taken from Kerr and Stattin (2000). Response options ranged from No, never (0%) to Yes, always (100%). Perceptions about parents’ reactions to finding out that the student was drinking was an 8-item measure adapted from Chassin et al. (1998), modified to focus on drinking rather than smoking. Response options ranged from Not at all likely (1) to Very likely (5). Perceived availability of alcohol was measured with a binary item from Arthur et al. (2000): “If you wanted to get some beer, wine, or hard liquor (for example: vodka, whiskey, or gin) could you get some?”

²The present study sample (N=164) was more likely to be female and older than the full study sample, but did not differ as a function of race, ethnicity, or free lunch status.

Parent surveys—Parents completed the 10-item Alcohol Use Disorders Identification Test (AUDIT, Saunders et al., 1993) with an added item “Have you felt you have a drinking problem?” All responses were summed. Parents also were asked to indicate whether the child’s biological mother and/or biological father ever had a drinking problem.

Analytic Plan

Data included 688 separate days (344 drinking days and 344 non-drinking days) reported on by 164 participants; 62% of these respondents reported drinking on just one monthly survey, 16% reported drinking on two monthly surveys, and the rest (22%) reported drinking on three or more monthly surveys.

To characterize drinking context, descriptive statistics about the context of the drinking days and matched non-drinking days were computed; this allowed us to make direct comparisons of a drinking day with a non-drinking day experienced by the same individual (i.e., a “case-crossover” design). Although prior research that describes the characteristics of drinking events without direct comparison to non-drinking events is informative, without a within-subjects comparison it is difficult to conclude that the context is directly related to the drinking event—the context may simply be one regularly experienced by the adolescent. The case-crossover design distinguishes between the effects of changes in the context of particular drinking episodes (e.g., drinking outside the home with friends) from stable differences between individuals (e.g., young adolescents who more frequently spend time with friends).

We compared drinking days and matched non-drinking days by predicting type of day (drinking vs. non-drinking) from each contextual predictor using a series of multilevel models (MLM; also called hierarchical linear models; Raudenbush & Bryk, 2002; Snijders & Bosker, 1999), which permit analysis of data with days clustered within person. MLMs also allow for varying numbers of observations and missing data. All predictors were modeled as within-person (Level 1) effects. Models were conducted using HLM 7.0 (Raudenbush et al., 2011) using a Bernoulli (unit-specific) model for binary data estimated with robust standard errors.

Latent class analysis—We also explored configurations of the drinking context using drinking day data, including alcohol use, the social context, the physical setting, and the source of alcohol, using latent class analysis (LCA; Bartholomew, 1987; McCutcheon, 1987). In LCA, mutually exclusive discrete latent variables are extracted from two or more discrete observed variables. Due to the clustering inherent in these data (days within person), we ran a multilevel LCA (Asparouhov & Muthén, 2008). The parameters produced in a latent class solution include class membership probabilities, which reflect the proportion of individuals who are categorized in a given class, and item endorsement probabilities, which represent the probability of endorsement of an item given membership in a particular class.

Model fit was evaluated on the basis of the Bayesian Information Criteria (BIC) fit index (Schwarz, 1978) and a likelihood ratio test for relative improvement in fit, the Vuong-Lo-Mendell-Rubin test (VLMR; Lo, Mendell & Rubin, 2001). We also considered theoretical interpretability and parsimony. Models were estimated using Mplus Version 7.3 (Muthén &

Muthén, 1998-2012). Full information maximum likelihood was used to account for any missing data, which were assumed to be missing at random. Finally, we examined third-variable prediction of class membership by including covariates³ in the latent class model within Mplus, using multinomial logistic regression to conduct pairwise comparisons (Agresti, 1990).

Results

Characterization of the Drinking Context

Descriptive information for drinking days—Drinking was sporadic, with a mean time elapsed since last drinking day of 114.38 days ($SD=115.09$) for respondents reporting two or more drinking days. Mean number of standard drinks consumed per episode was 2.13 ($SD=3.01$) drinks, with a range from just a sip to 13 drinks; 92% of the 344 reports involved 5 or fewer drinks; 58.1% indicated consumption of at least one full drink, 16.0% half a drink, and 25.9% just a sip. On days when respondents reported consuming alcohol, including just a sip or a half drink, feeling buzzed was reported on 38.5% of days and feeling drunk on 24.8% of days.

Table 1 provides information about the context of the drinking events. Consumption predominately occurred during the evening (80%) and on Thursdays through Sundays. The most highly endorsed types of alcohol were shots of hard alcohol and mixed drinks, with wine and beer also frequently endorsed. Very few respondents reported consuming malt liquor or fortified wine. For each event reported, an average of 1.20 ($SD=0.84$) sources were endorsed, with the most common source of alcohol being a close friend. Very few received alcohol from a boyfriend or girlfriend. Youth also frequently reported that they obtained alcohol from family members, usually a parent or cousin. A sizeable number (14%) reported taking the alcohol from their home without permission. There were few reports (2% or less) of obtaining alcohol from a restaurant/bar or a liquor store (either by purchasing or by asking an adult to buy it). Finally, at least one alcohol-related negative problem was experienced on 35.2% of the drinking days, with the mean number of problems experienced $M=0.92$ ($SD=1.83$) across all drinking events and $M=2.63$ ($SD=2.25$) on drinking days on which any problems occurred. The most commonly endorsed problems were having a headache after drinking, not remembering part of the event, and noticing a change in personality.

Descriptive information for non-drinking days—On matched non-drinking days, alcohol was available on 43.1% of the days and offered on 16.2% of the days. Youth who reported that alcohol was available indicated where it was available. As shown in Table 2, the most commonly reported locations were at a close friend's home and at their own home, either when parents were awake or when they were not there (but few indicating alcohol was available to them at home when parents were asleep). Youth who were offered alcohol were usually offered it by a close friend or a boyfriend/girlfriend, somebody from school, or a family member (parent, cousin).

³For type of alcohol, which was a within-level covariate, we modeled the compositional effect by partitioning the variance into between and within; only the within-level influences are reported here as our primary interest was in the context of a drinking event.

Comparison of drinking days vs. non-drinking days—For the contextual factors that were measured on both drinking days and matched non-drinking days, a series of multilevel models tested whether each of these factors differed as a function of type of day. Table 3 shows location and who the participant reported being with. Not surprisingly, participants were more likely to report being at a special occasion (e.g., a wedding, holiday) on a drinking day. They were also more likely to report being at a close friend's home, or at home when parents were asleep. Drinking days were associated with being with a cousin or other family member and being with a parent. On non-drinking days, respondents were more likely to be at home when parents were not there or outdoors, and to be with a boyfriend/girlfriend.

Context of drinking event compared to non-drinking days when alcohol was available or offered—We conducted one last set of comparisons to understand whether there were differences in location on days when alcohol was available (i.e., comparing events when the respondent consumed vs. did not consume available alcohol) and differences in source of alcohol for events when the participant accepted the offer vs. did not accept the offer. As shown in Table 4, on days when alcohol was available at home and parents were not there, respondents often did not drink the available alcohol. For example, on days when alcohol was available but not consumed, 16.5% were days at home with parents absent, vs. 11.2% of days when alcohol was available and consumed. Somewhat surprisingly, for as many times as alcohol was consumed at a special occasion, it was available but not consumed. In addition, on non-drinking days youth were more likely to be offered alcohol by boyfriends/girlfriends and by peers they work with compared to days that they drank, which suggests that they were more likely to decline than accept offers from these individuals. Although it only approached significance ($p=.06$), it appears that when parents offer alcohol, it is more likely to be consumed than not.

Latent Class Analysis

Latent class solution—For the latent class analysis with drinking days we tested 2-class through 5-class models. For the 2-class model, BIC= 4073.01, entropy=.83, and VLMR LR test $p=.01$; for the 3-class model, BIC= 3921.52, entropy=.85, and VLMR LR test $p=.11$; for the 4-class model BIC=3847.56, entropy=.88, and VLMR LR test $p=.16$, and for the 5-class model BIC=3856.75, entropy=.90, and VLMR LR test $p=.15$. Although the VLMR LR test suggested that the improvement in fit for the 4-class model over the 3-class model was non-significant, we chose the 4-class model, as the BIC favored this model and the fourth class yielded substantive information (see Figure 1). The classes were named (1) “Heavy,” characterized by high levels of feeling buzzed/drunken, consuming more than a single drink, and experiencing an alcohol-related problem; this drinking tended to occur at a friend's home and the alcohol was obtained from an underage youth; (2) “Family, light drinking,” characterized by drinking at a family gathering, with a parent, and obtaining the alcohol from a parent with permission but low levels of alcohol consumption and effects; (3) “Friend, light drinking,” also characterized by drinking at a friend's home and endorsing an underage source but with low levels of alcohol consumption and effects; and (4) “Sneaky,” characterized by drinking alcohol at home and taking it from a parent without permission, and a moderate endorsement of alcohol problems on that day.

Prediction of class membership—Finally, we made pairwise comparisons between latent classes as a function of the broader context, gender, age, and type of alcohol consumed. Table 5 shows odds ratios and significance values for univariate prediction of latent classes. Compared to the Heavy class, the Light Family class was associated with being male, being younger, was less likely to involve drinking liquor, and was associated with lower injunctive and descriptive peer norms favoring drinking, and lower perceived availability but higher parental monitoring and parental reactions to drinking. The Light Family class differed from the Light Friend class with regard to being associated with more wine consumption, lower injunctive and descriptive peer norms, lower parent drinking problems, and greater parental reactions to drinking.

The Sneaky class differed from the Heavy class in terms of being associated with lower peer norms (injunctive and descriptive), and lower parent alcohol involvement, with similar results when compared to the Light Friend class. The only significant difference between the Light Family and Sneaky classes was that the Light Family class was associated with younger age. Finally, the Heavy class had greater liquor consumption than the Light Friend class and was associated with older age but there were no other significant differences between the two groups.

Stability of class membership—In one last analysis, we examined within-participant stability over time, assigning participants to most likely class membership by outputting their class membership probabilities and class assignment in MPlus. We focused on the 63 (38%) who reported more than one drinking month. We found that almost half (31/63) of participants who contributed more than one drinking month did not change classes, and the other 32/63 changed at least once. Looking at the data a slightly different way, these 63 participants in total contributed to 180 transitions, 139 (77%) of which were stable (no change) adjacent transitions and 41 (23%) of which were adjacent transitions between different classes.

Discussion

The overarching goal of the present study was to understand heterogeneity in early drinking behavior by examining the context of drinking days within individuals. We compared the context of drinking days to a matched non-drinking day reported on by the same person to determine the unique risk associated with different drinking-related characteristics. Then, using latent class analysis, key configurations of drinking-related characteristics and both family-related and non-family related characteristics of the environment including social context, physical location, and source of alcohol were examined. Results supported patterns characterized by heavier alcohol involvement that primarily takes place in a peer context and lighter alcohol involvement that takes place either in a family context or a peer context. A somewhat intriguing fourth and smallest class was defined by drinking alcohol that was taken without permission at home and had a somewhat elevated likelihood of experiencing an alcohol-related problem on that day. Classes tended to be stable over time; that is, there was not a great deal of movement between classes among participants contributing data for multiple occasions. We also examined correlates of class membership including the availability of alcohol and measures reflecting the social context (e.g., norms, parenting).

Findings are discussed below, with the characterization of the drinking context organized by three general areas: drinking (alcohol-specific) characteristics, the role of the episode-level social/physical context, and the influence of the broader context.

Characterization of Drinking Context

Drinking-related characteristics—Examination of drinking-day data indicated that most drinking days consisted of one or two drinks, with reports of getting buzzed and drunk on one-third and one-quarter of the time, respectively. Early drunkenness may be associated with increased likelihood of subsequent alcohol-related harm (Warner, White, & Johnson, 2007) which was supported by the latent class analysis results showing that reports of drunkenness and experiencing one or more alcohol problems clustered together. Consumption was rather sporadic, with several months between drinking days for youth reporting more than a single drinking day. Mixed drinks and shots of hard liquor were heavily endorsed (perhaps by kids taking alcohol without permission, as in the Sneaky class), consistent with the opportunistic nature of adolescent drinking, and liquor consumption was associated with the heavier drinking pattern, consistent with other work showing that liquor is disproportionately popular among heavier drinkers (Siegel, Naimi, Cremeens, & Nelson, 2011). The Light Family-related drinking pattern was associated with greater consumption of wine, consistent with prior research showing wine consumption is associated with drinking in moderation (Lintonen & Konu, 2003). Many kids endorsed drinking beer or beer substitutes, although this did not vary across the different classes. Consumption tended to occur in the evening but did not take part exclusively on weekends, as weekday drinking occurred 58% of the time (although Thursday night drinking accounted for a good portion of the weekday drinking, at 24%).

The role of the context—The physical setting (location) and social setting (who the adolescent was with, who offered/provided the alcohol) were highly intertwined. The most commonly endorsed location (and a feature characteristic of the Heavy latent class) was a friend's home. This is consistent with research showing that adolescents frequently report drinking at a party or social gathering (Davenport et al., 2012; Goncy & Mrug, 2013; McCabe et al., 2014). Moreover, this location was more commonly endorsed on drinking days than non-drinking days, suggesting that teens are not just likely to be at social events in general. The most commonly endorsed source of alcohol was a close friend. Yet, youth also were likely to be with a close friend on non-drinking days, suggesting that simply being with friends is not an indicator of drinking risk. Being with a boyfriend/girlfriend, however, was protective in that very few participants received alcohol from a boyfriend or girlfriend. Further, when comparing drinking days to days when alcohol was available but not consumed, participants were likely to be offered alcohol by boyfriends/girlfriends but they didn't usually accept the alcohol. Findings might vary as a function of whether the boyfriend/girlfriend is older (which may be the case for girls in advanced stages of puberty, also a risk factor for substance use; Castellanos-Ryan et al., 2013).

Although older siblings have been shown by others to be a common source and “facilitator” of alcohol use (Bellis et al., 2007; Samek et al., 2014), we did not observe an association between drinking and being with or being offered alcohol by siblings. However, youth were

much more likely to be with a cousin (or other family member) when drinking, raising the importance of targeting this little studied group. Kendler, Ohlsson, Sundquist, and Sundquist (2008) showed greater risk for drug abuse for youth with an older (but not younger) cousin with drug abuse, but this has not been explored with regard to alcohol use. Cousins are frequently identified as being an influential factor in the decisions to use drugs/alcohol (Hurdle, Okamoto, & Miles, 2003), perhaps because youth are exposed to their cousins in multiple environments such as both home and school (Wagner et al., 2008; Waller, Okamoto, Miles, & Hurdle, 2003). The role of siblings and cousins, both younger and older, in adolescent alcohol involvement is an area that warrants future attention.

Being at home with parents present was also a commonly endorsed drinking location but it was no more likely to be endorsed than on a non-drinking day. Drinking appeared to be less likely to occur when youth were at home without parents present, perhaps due to the elimination of events when parents provided alcohol for their child. Although rarely endorsed, being at home with parents asleep occurred on drinking days more than non-drinking days. The finding (albeit marginally significant) indicating that when parents offer alcohol it is more likely to be consumed than not suggests that parents are a more “successful” source of alcohol – that is, youth are more likely to drink it if the parent offers it.

The influence of the broader context—The latent classes varied across several family and peer norms and practices. Injunctive and descriptive peer norms were highest in the light drinking friend class and the Heavy drinking class, both classes in which drinking occurred at a friend’s home and using alcohol obtained from an underage person. Heavy drinking class membership was associated with lower parental monitoring, consistent with literature showing that adolescent drinking frequently occurs in peer contexts where there may be low levels of parental supervision. At the same time, greater parental monitoring and a stronger anticipated parent reaction to drinking were associated with greater likelihood of reporting drinking that occurs in a family context, relative to the other classes, especially the Heavy class. Although these two parent constructs are repeatedly shown to be protective against adolescent drinking, they may be associated with increased risk of parent-sanctioned drinking (relative to other types of drinking). It may be that parents who supervise their children are permitting their children to drink alcohol in the home in an effort to teach “responsible” consumption of alcohol. Our results suggest that researchers ought to consider the broader context when examining the relationship between parenting practices and drinking.

Reports of both peer and parent drinking were surprisingly lower in the “Sneaky” class, a class characterized by a moderate endorsement of alcohol problems. This suggests that in some circumstances, potentially problematic drinking may be driven by an environmental setting that supports teen alcohol use more than the broader social context (i.e., family and peer norms and practices). One might speculate that parents who drink infrequently may not notice that their alcohol supplies have declined as a result of their child taking alcohol without permission. Simply having alcohol accessible in the home may be sufficient to elevate risk for the early stages of drinking (i.e., regardless of parent and peer behavior).

Perceived availability of alcohol was greater in the Heavy class than the Light Family class, perhaps because spending time in a peer environment supportive of drinking increases access to alcohol. Research shows that adolescents who initiate drinking at an early age outside of a family gathering have heavier drinking and more alcohol-related problems (Chen et al., 2008; Warner & White, 2003), consistent with our findings that subjective effects (feel buzzed, drunk) and alcohol problems were not characteristic of the Light Family-related drinking class. Worth noting is that perceived availability of alcohol in the Light Family class was not greater than in other groups. When interpreted in conjunction with the finding that youth who were offered alcohol from parents more often than not accepted it, we might conclude that a portion of youth receive alcohol from parents yet do not view parents as a ready source of alcohol.

Implications for Prevention/Intervention

Knowing where and when alcohol use occurs, understanding the social processes surrounding alcohol use, and identifying the contexts in which substances are available, is critical for parents and professionals interested in the prevention and treatment of adolescent substance abuse (Hussong, 2000; Shillington et al., 2012). The fact that adolescents are able to modify their drinking behavior to suit the environment (e.g., changing location, type of alcohol) suggests that there is value in targeting the environment rather than the person. Such targeting of the contexts in which drinking occurs has been done in community-based prevention programs (Hawkins, Catalano, & Arthur, 2002; Treno et al., 2009), but at a broader level, rather than at the level of a given drinking episode (especially at early stages of drinking). By identifying specific situations that support episodes of drinking in youth, study findings can enhance prevention efforts and help researchers to accomplish the goal of reducing adolescent substance use.

Our findings show that a highly endorsed context is not necessarily the most risky one, and simply targeting an oft-reported source of alcohol, physical location, or social context may not be an effective strategy for reducing underage alcohol involvement. Yet, based on study findings, the importance of reducing access to alcohol in the home cannot be overstated. Parents should be encouraged to secure and monitor alcohol in the home (Friese et al., 2011), given that homes (either the respondent's own home or the home of a close friend) were overwhelmingly cited as a drinking location. Parents may not be familiar with social host ordinances (or may perceive them to be poorly enforced; Wagoner et al., 2012) and/or parents may believe it is safer for teens to drink in a supervised setting (Dills, 2010; Livingston et al., 2010). Friese and Grube (2014) recently found that a large majority of adolescents who reported having alcohol at a party indicated that at least one of their parents knew that there was alcohol at the party. Prevention programs that target alcohol-specific parenting practices have shown some efficacy (Koning et al., 2011), and our study findings point to several contextual factors that might further be incorporated into these programs. For example, parents should be aware that cousins and friends are regular sources of alcohol, and that friends' homes are common locations for early drinking to occur, so that they can take necessary steps to ensure adult supervision in these situations, for example by confirming the presence of an adult in the home of a close friend. These sorts of "next-step" monitoring behaviors are likely to demonstrate additive preventive efficacy.

In addition, many substance use prevention programs seek to improve parenting skills, such as parental communication and limit-setting (e.g., Spoth et al., 2014). Yet, our findings that the family light-drinking class was associated with *greater* monitoring warrant concern. Parent-sanctioned drinking, although less risky than drinking outside the home, is still associated with increased likelihood of subsequent heavy drinking (McMorris et al., 2011). Thus, sanctioning (or even offering) alcohol may undermine the value of effective monitoring.

Strengths, Limitations, and Future Directions

The present study drew on a rich data source to characterize and compare drinking days to extend prior research on drinking context that focuses on recent/last or typical drinking occasion or is limited to adult or heavier drinkers. Our comprehensive assessment of a wide array of contextual factors minimized recall bias due to the frequency of assessment (monthly). The case-crossover design controlled for stable individual characteristics, eliminating selection bias because cases act as their own controls, and the latent class analysis permitted simultaneous examination of several important components of the drinking context. The analytic approach also allowed for more than one drinking day per person, thus providing a richer dataset.

The prevalence of drinking was relatively low in this young primarily middle school-aged sample, consistent with the intermittent, sporadic nature of young adolescent alcohol use that is concentrated on fewer occasions (Kuntsche et al., 2008). Thus, study findings may not generalize to older adolescents or later stages of alcohol involvement in terms of frequency, heaviness, and consequences. Access to alcohol and physical locations will likely differ with age and drinking experience, and the relative importance of family vs. peers in the drinking context will likewise change. The degree to which siblings and cousins act as family or peers is unknown and is likely a function of their age; unfortunately our study did not assess sibling or cousin age. Younger adolescents are more likely to drink in their own homes than in the homes of others, at school, or outdoors (Goncy & Mrug, 2013; Mayer, Forster, Murray, & Wagenaar, 1998), perhaps because older adolescents are more likely to drive cars and to have greater access to an array of settings for use. In addition to being young, our sample likely reflects a group of relatively low-risk youth whose parents provided consent for participation in a relatively intense study on alcohol use.

As with other studies on adolescent alcohol use, participant reports of drinking can be prone to memory/recall bias, comprehension problems, and social desirability. However, we strove to provide assurances of confidentiality, emphasized privacy, and developed good rapport with participants, which minimize these biases (Stone and Latimer, 2005; Winters et al., 2008). Finally, the context of a drinking day may have been more salient and memorable (and perhaps more valid) than the context of a typical non-drinking day. For example, it is possible that youth might over-report being at home on non-drinking days, which would account for the (unexpected) greater likelihood of being at home with parents not there on non-drinking days. This possibility points to the importance of using fine-grained assessments (e.g., ecological momentary assessments) that minimize recall biases when comparing across contexts.

The next step in this line of research is to examine the context of different stages of alcohol involvement. Specific situations may not only facilitate alcohol use among drinkers but may actually trigger initiation even among youth not intending to drink (Stryker et al., 2003). An important question is whether the characteristics of these situations vary as drinking progresses from first sip or full drink to heavy drinking to alcohol-related problems and maybe even dependence. Class stability over the two-year period was relatively high but having a longer assessment window would permit better examination of change. Our investigation showed that alcohol-related problems can occur even when drinking at relatively low levels, as in the case of the sneaky group. This underscores the need to study the context that possibly triggers problems. Additionally, future research should consider whether youth drinking was volitional – that is, whether youth were intending to drink, or whether drinking was opportunistic due to an alcohol-supportive setting.

Conclusions

It is clear that the likelihood and severity of alcohol use varies as a function of the degree to which the environment facilitates use. The present study indicated that there are different patterns of drinking within different settings, with an apparent distinction between family/parent and peer context. However, youth may adapt their behavior to a given setting (e.g., following one set of rules with family and another set with friends), which can impede preventive efforts, especially when targeting the user, rather than the environment. Public health efforts to reduce underage drinking must consider environmental approaches that focus on changing the social and physical environment prior to initiation of alcohol use.

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Figure 1.

Multilevel latent class solution for characteristics of the drinking context, including alcohol use, the social context, the physical setting, and the source of alcohol. Characteristics are broken out into those that are related to alcohol use, those related to the family, and non-family characteristics.

Table 1

Descriptive information for drinking days.

Got buzzed	38.5%
Got drunk	24.8%
% consumed a full drink	58.1%
Number of drinks ^a	2.13 (3.01)
Number of days since last drinking day ^b	114.38 (115.09)
<i>When consume alcohol</i>	
Weekend (Friday or Saturday)	42.2%
Thursday	24.1%
Weekday (Sunday through Wednesday)	33.7%
Before school/in the morning	2.3%
During school/in the middle of the day	4.9%
After school/in the afternoon	16.3%
During the evening	80.2%
<i>Type of alcohol consumed</i>	
Shots of hard alcohol	31.1%
Mixed drinks	28.6%
Wine/Champagne	23.2%
Beer	22.3%
Wine coolers/Beer substitutes	16.5%
Liquers/Cordials	5.6%
Other ^c	1.5%
<i>Consequences</i>	
Had headache after drinking	21.7%
Not remember day/night or said/did things not remember	13.3%
Noticed change in personality	11.2%
Got physically sick	9.3%
Said something wish had not	6.7%
Caused shame/embarrass to self/others	6.4%
Neglected responsibilities	5.1%
Had fight/bad feelings with friend	4.5%
Passed out from drinking	4.5%
Got in trouble for drinking with parents/school	4.5%
Got in car with teenage drinking driver	4.2%
Missed/late for classes/not do homework/study	3.2%
Drove after drinking	1.6%
<i>Source of alcohol</i>	
Close friend	30.8%
Boyfriend/Girlfriend	4.1%
Somebody from school	5.5%

Parents gave it to me	22.4%
Took from home/parents without asking	14.2%
Cousin or other family member	17.7%
Brother/Sister	4.9%
Someone in neighborhood	3.8%
Somebody work with	0.9%
Asked a man going into a liquor store to buy for me	2.0%
Asked a woman going into a liquor store to buy for me	0.6%
Purchased from a liquor store	0.3%
Ordered a drink at restaurant/bar	1.2%

N ranges from 322 to 344. Percentages do not add up to 100% because participants could endorse more than one option.

^aOptions also included just a sip (0.2) and half a drink (0.5)

^bN=180 respondents who endorsed drinking on two or more days

^cIncludes malt liquor and fortified wine

Table 2

Descriptive information for non-drinking days, matched by day of the week and time of day.

<i>What were you doing?^a</i>	
Hanging out with friends	42.7%
Texting/emailing/instant messaging	35.5%
Watching TV or DVDs	30.0%
Hanging out at home with family	23.6%
Napping	20.1%
Playing computer or video games	15.4%
Playing sports	8.4%
Doing homework or studying	7.6%
Shopping, at the mall, or at a movie	4.9%
Working	3.8%
Participating in a school club or extracurricular activity	3.5%
Religious activity	2.9%
<i>Where were you when alcohol was available to you?^b</i>	
Home, parents awake	13.9%
Home, parents asleep	5.1%
Home, parents not there	16.5%
Close friend's home	30.4%
Home of kid know from school/work	7.6%
Driving/riding in a car	5.1%
Restaurant/bar	6.3%
Outdoors	8.9%
Special occasion	15.2%
<i>Who offered you alcohol?^c</i>	
Close friend	38.9%
Boyfriend/Girlfriend	14.8%
Somebody from school	11.1%
Somebody work with	7.4%
Brother/Sister	5.6%
Cousin or other family member	16.7%
Parent	20.4%
Somebody from the neighborhood	3.7%

^aN=344^bFor days when alcohol was available and the item was administered (due to a programming error, this item was inadvertently skipped for a portion of the sample), N=79^cFor days when alcohol was offered and the item was administered (due to a programming error, this item was inadvertently skipped for a portion of the sample), N=54

Table 3

Descriptive information and tests of significance for drinking days vs. non-drinking days.

	Drinking Day	Non- Drinking Day	Test of differences (OR, 95% CI)
<i>Where were you?</i>			
Home, parents awake	17.9%	16.6%	1.09 (0.82,1.44)
Home, parents asleep	3.3%	1.5%	1.82 *** (1.40,2.38)
Home, parents not there	11.2%	20.2%	0.53 *** (0.40,0.70)
Close friend's home	34.6%	26.2%	1.50 ** (1.15,1.94)
Home of kid know from school/work	4.8%	3.8%	1.28 (0.98,1.69)
Restaurant/bar	3.9%	4.4%	1.02 (0.82,1.26)
Outdoors	5.7%	9.3%	0.66 * (0.45,0.95)
At a special occasion	14.5%	8.7%	1.69 *** (1.29,2.22)
<i>Who were you with?</i>			
Close friend	44.5%	40.7%	1.17 (0.88,1.57)
Boyfriend/Girlfriend	9.9%	17.4%	0.55 *** (0.42,0.71)
Somebody from school	11.3%	8.7%	1.35 (0.99,1.84)
Brother/Sister	17.2%	16.6%	1.06 (0.79,1.44)
Cousin or other family member	28.2%	18.3%	1.71 *** (1.35,2.17)
Parent	30.8%	26.4%	1.26 * (1.01,1.57)
Nobody	7.3%	9.3%	0.80 (0.60,1.07)
Somebody from neighborhood	6.7%	5.1%	1.23 (0.90,1.70)

Note.

N=688 (344 drinking days, 344 non-drinking days)

*
 $p < .05$,**
 $p < .01$,***
 $p < .001$

Table 4

Descriptive information and tests of significance for differences in location and source for drinking days vs. non-drinking days where alcohol was available/offered.

	Drinking Day	Non- Drinking Day	Test of differences (OR, 95% CI)
<i>Where were you?^a</i>	Alcohol available and consumed	Alcohol available but not consumed	
Home, parents awake	17.9%	13.9%	1.47 (0.77,2.82)
Home, parents asleep	3.0%	5.1%	0.86 (0.22,3.42)
Home, parents not there	11.2%	16.5%	0.61 * (0.39,0.94)
Close friend's home	34.6%	30.4%	1.31 (0.82,2.10)
Home of kid know from school/work	4.8%	7.6%	0.62 (0.31,1.24)
Restaurant/bar	3.9%	6.3%	0.61 (0.29,1.27)
Outdoors	5.7%	8.9%	0.62 (0.30,1.31)
At a special occasion	14.5%	15.2%	0.95 (0.57,1.58)
<i>Who offered you alcohol?^b</i>	Alcohol offered and consumed	Alcohol offered but not consumed	
Close friend	30.8%	38.9%	0.54 (0.31,1.08)
Boyfriend/Girlfriend	4.1%	14.8%	0.25 *** (0.11,0.57)
Somebody from school	5.5%	11.1%	0.41 (0.16,1.07)
Somebody work with	0.9%	7.4%	0.14 *** (0.06,0.32)
Brother/Sister	4.9%	5.6%	0.98 (0.22,4.38)
Cousin or other family member	17.7%	16.7%	1.01 (0.58,1.76)
Parent	36.0%	20.4%	1.93 (0.97,3.86)
Somebody from the neighborhood	3.8%	3.7%	0.91 (0.24,3.48)

Note.

** $p < .01$,

* $p < .05$,

*** $p < .001$

^aN=423 (344 drinking days, 79 non-drinking days where alcohol was available and the item was administered)

^bN=398 (344 drinking days, 54 non-drinking days where alcohol was offered and the item was administered)

Table 5

Odds ratios and significance values for univariate prediction of latent classes (pairwise comparisons).

	Light family vs Heavy ^a	Light family vs Sneaky	Light family vs Light friend	Sneaky vs Heavy	Sneaky vs Light friend	Heavy vs Light friend
Gender (male)	9.68 [*]	1.98	7.88 ⁺	4.85 ⁺	3.90	0.79
Age	0.16 ^{**}	0.43 [*]	0.44 ⁺	0.36 ⁺	1.001	02.78 ^{**}
Type of alcohol						
Beer	5.22	6.27	14.98 ⁺	0.84	2.34	2.78
Wine	8.76 ⁺	3.32	35.14 ^{**}	2.54	10.48 ⁺	4.12
Liquor	0.05 ^{**}	0.18 ⁺	0.78	0.30	4.44 ⁺	14.73 ^{**}
Injunctive peer norms	0.07 ^{**}	0.27 ⁺	0.09 [*]	0.26 ^{**}	0.31 ⁺	1.22
Descriptive peer norms	0.02 ^{**}	0.27	0.04 [*]	0.09 ^{**}	0.13 [*]	1.47
Parent AUDIT	0.91	1.20	1.02	0.76 [*]	0.85	1.13
Parent drinking problem	0.08 ⁺	0.30	0.04 [*]	0.27	0.13 ⁺	0.47
Parental monitoring	9.12 [*]	6.04 ⁺	9.20 ⁺	1.49	1.48	1.02
Parent reaction to drinking	4.39 [*]	2.22	4.13 [*]	1.99	1.88	0.94
Alcohol availability	0.08 [*]	0.20	0.26	0.41	1.31	3.25

Note.

*** $p < .001$

N ranged from 337 to 344, with the exception of parent-reported AUDIT (N=315).

⁺ $p < .10$,

^{*} $p < .05$,

^{**} $p < .01$,

^a An odds ratio greater than one indicates that the first group was significantly higher than the second group; an odds ratio less than one indicates that the second group was significantly higher than the first group