

Who's Got the Booze? The Role of Access to Alcohol in the Relations Between Social Status and Individual Use

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ABSTRACT. Objective: The findings of previous research that examined relationships between popularity and alcohol use in adolescents have been mixed, and few hypotheses have proposed mechanisms for this relationship. The current study expands on previous literature (a) by examining a possible mechanism that can explain the relation between popularity and alcohol use (home access to alcohol) and (b) by using another sociometric measure (“betweenness”), beyond popularity, that may relate more to home alcohol access. **Method:** Using network-level data from adolescents in 9th–11th grades in eight schools within two in-home waves of the National Longitudinal Study of Adolescent to Adult Health (Add Health), we examined two sociometric measures of social status: popularity (number of schoolmates who nominated participants as a friend) and betweenness (level of ties participants have to multiple social subgroups within a network). **Results:** Betweenness,

but not popularity, related to later alcohol use. Having home access to alcohol positively related to later alcohol use, and having friends with home access to alcohol negatively related to later alcohol use. Alcohol access was also related to later sociometric status. Friends’ alcohol access negatively related to later betweenness, and personal alcohol access moderated other pathways predicting betweenness. **Conclusions:** Betweenness appears to play a unique role in the association between social status and alcohol use in adolescent social networks. This is potentially tied to specific ways in which adolescents may be able to access alcohol (through home or through friends with access at home). More research is necessary to examine the ways in which multiple sociometric statuses relate to the contexts in which adolescents access and use alcohol. (*J. Stud. Alcohol Drugs*, 78, 754–762, 2017)

RESEARCHERS INVESTIGATING LINKS between adolescent alcohol use and social influences have previously examined the role of popularity within a social network (e.g., school). However, the conclusions in the literature examining this relationship are mixed. For example, cross-sectional studies document a positive association between alcohol use and popularity (Ali et al., 2014; Balsa et al., 2011). Longitudinal studies examining the effects of initial popularity on later alcohol use report positive relations (Allen et al., 2005; Choukas-Bradley et al., 2015; Moody et al., 2011; Tucker et al., 2013), negative relations (Cheadle et al., 2015; Mathys et al., 2013), or no relation (Wang et al., 2015). Longitudinal studies examining the effects of initial alcohol use on later popularity report positive relations (Ali

et al., 2014; Killeya-Jones et al., 2007; Wang et al., 2015) or no relation (Choukas-Bradley et al., 2015; Lansford et al., 2009; Tucker et al., 2013). There is a lack of proposed explanations for the underlying mechanisms guiding these relations. The most prominent explanation is that popular peers increase or maintain their drinking behavior to maintain their popularity status (Allen et al., 2005; Schwartz & Gorman, 2011).

One possible alternative mechanism is the potential importance of becoming an alcohol source for peers. Peers are a common alcohol source (e.g., Gilligan et al., 2012; Harrison et al., 2000; Hearst et al., 2007), and individuals with access to alcohol at home are well equipped to become sources. Adolescents with access to alcohol at home tend to have higher levels of drinking, and they also select higher drinking friends (Wang et al., 2015). Adolescents increase drinking as the proportion of peers in their school with access to alcohol at home also increases (Fletcher, 2012), suggesting that access to alcohol at home is a source of alcohol for adolescents. The importance of peers as primary drinking contexts (Goncy & Mrug, 2013; Kuntsche & Cooper, 2010; Kuntsche et al., 2005) indicates that individual access to alcohol at home is a risk factor both for individuals (e.g., Komro et al., 2007) and for friends of these adolescents (e.g., Kuntsche et al., 2006) as individuals become alcohol sources. Although this instrumentality may be important for popularity, it is possible that being an alcohol source will increase aspects of social standing beyond popularity.

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Previous work has overlooked other potentially important sociometric statuses. Most alcohol research with social network analysis uses in-degree or out-degree centrality, i.e., direct friendship nominations given or received (e.g., Balsa et al., 2011; Choukas-Bradley, 2015; Fujimoto & Valente, 2015; Moody et al., 2011). Few studies have examined sociometric measures other than popularity, although study results indicate that such measures may offer unique information about social standing and alcohol use. For example, two studies have used Bonacich centrality (e.g., overall connectivity within a network; Bonacich, 1987, 2007) as a sociometric measure, although these studies give conflicting results. When accounting for popularity, overall connectivity to others has been related to both lower levels of drinking (Gallupe & Bouchard, 2015) and higher levels of drinking (Ali et al., 2014). Another measure capturing distinct characteristics of social positions is betweenness, which, like Bonacich centrality, takes into account all connections between all individuals within the entire network, rather than individual connections.

Figure 1 provides an example of how popularity fails to depict overall social position within a network and how betweenness may provide additional information about social network position. Figure 1 depicts three full networks that have one person (Individual 1) connected to two friends (Friends 2 and 3). In all networks, Individual 1 has the same popularity score (2) but different betweenness scores.

Betweenness is calculated by adding the number of times one is between two other individuals, divided by the total number of pairs of people that the individual is not involved with. Individual 1 has low betweenness in Figure 1A because the individual does not lie between any two unconnected people (Friends 2 and 3 are also connected to each other), and there are comparable numbers of pairs with whom Individual 1 is not involved. Comparatively, Individual 1 has a high betweenness score in Figure 1B, as the individual serves as a connection point for all individuals connected with Friend 2 (e.g., 4, 5, and 6) and all individuals connected with Friend 3 (9 and 10), all of whom are otherwise unconnected to each other. Therefore, Individual 1 is involved in a high number of the total pairs within this network. In Figure 1C, betweenness is reduced because of the added connection between individuals 6 and 9. This eliminates Individual 1's opportunity to be a tie between individuals 6 and 9, as well as everyone connected to Individual 6 or 9.

Betweenness may be a more relevant sociometric measure compared with popularity when examining the importance of access to alcohol at home. Individuals with access to alcohol at home may have contacts from various groups within a social network if they are a noted alcohol source. Connections to one individual within a specific group would allow that entire group easier access to alcohol. Christakis and Fowler (2013) documented that individuals with similar traits

can "cluster" up to three degrees of geodesic distance (i.e., degrees of separation), arguing that an individual's influence does not have to be direct but can be exerted indirectly through ties with others.

Current study

The current study examined relations between alcohol availability, two measures of sociometric status, and the drinking behavior of individuals. We were interested in two main effects: the role of access to alcohol at home and initial sociometric status on next-year drinking behavior, and the role of individual access to alcohol at home and friends' access to alcohol at home on relations between initial drinking and next-year sociometric status. We hypothesized that (a) sociometric measures would have positive relations with next-year drinking. We also hypothesized that (b) friend or individual access to alcohol at home would moderate the effect of sociometric statuses on next-year drinking because individuals who had individual or friend access to alcohol at home would be well positioned to use alcohol as a way to maintain higher sociometric status.

For predicting next-year sociometric status, we hypothesized that (c) adolescents with individual or friend access to alcohol at home would be more popular (e.g., have more nominations) and would have higher betweenness. We also hypothesized that (d) access to alcohol at home would moderate the effect of initial sociometric status and drinking on subsequent sociometric status, such that access to alcohol at home would facilitate an increase in next-year standing.

Method

Participants

Participants were from Wave I and Wave II of the National Longitudinal Study of Adolescent to Adult Health (Add Health). Add Health uses a complex data sampling design for a nationally representative sample of students from Grades 7 to 12, from 132 middle school and high schools, stratified by enrollment, region, urbanicity, and type of school, and racial/ethnic mix to be representative of U.S. schools (Blum et al. 2000). A representative subsample of participants from the initial school survey was selected for an in-home component. Students still in middle school or high school were followed up at home 1 year later. The present study used participants from the saturated subsample, in which all students within 16 schools ($n = 3,702$ at Wave I) were interviewed to obtain complete network information. The sample was restricted to students who completed both Wave I and Wave II and attended the same school at both waves. All students at Wave I who graduated were missing the next year because of the design of the study ($n = 793$). Eight sample schools were removed from the analysis (total

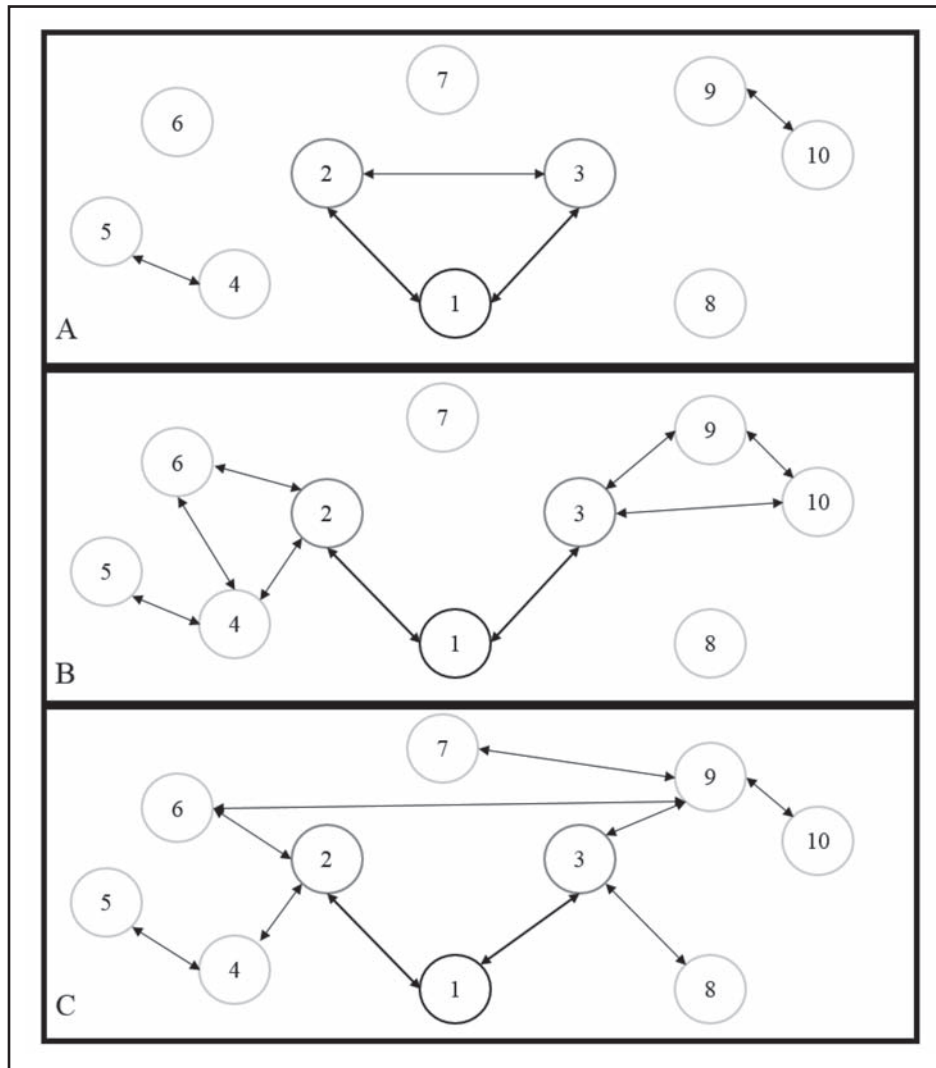


FIGURE 1. Visual depiction of three separate networks with Individual 1 having the same in-degree (popularity) score but different levels of betweenness scores

n at Wave I = 380). Two were removed because of an administrative error in which students were asked to nominate only one male and one female friend, one was removed because of an inability to calculate betweenness measures for students within the school, and six were removed because these schools were middle or junior high schools (not extending to 12th graders) or special education schools. The final sample included 2,199 students from eight high schools. Compared with the entire Add Health sample, there were no significant differences in access to alcohol at home, $\chi^2(1) = 0.60, p > .05$; Wave I drinking, $F(1, 11565) = 0.03, p > .05$; Wave II drinking, $F(1, 6892) = 1.24, p > .05$; age, $F(1, 20726) = .24, p > .05$; and gender, $\chi^2(1) = 0.08, p > .05$. However, the study sample did have a significantly higher proportion of non-White individuals, $F(1, 20605) = 28.75, p < .05$, than the entire Add Health sample.

Measures

Alcohol consumption. The frequency of drinking over the past year was measured with the question "During the past 12 months, on how many days did you drink alcohol?" This variable was scored using a 7-point scale (6 initial points, with an added "never" category) from 0 (*never*) to 6 (*every day or almost every day*). This item was then recoded into an ordered, polytomous variable in which abstainers were coded with a 0 and nonabstainers were coded with 1 (*infrequent: less than once a month*), 2 (*regular drinking: at least once a month*), or 3 (*weekly drinking: at least once a week*).

Home alcohol access. Home alcohol access was assessed at Wave I by a binary item asking, "Is alcohol easily available in your home?", which was coded by either a 1 (*yes*) or 0 (*no*).

Average friends' alcohol use and access to alcohol at home. Friends' alcohol use average was calculated by averaging the self-reported alcohol consumption ordinal scores for all members of each adolescent's ego network. Similarly, self-reports on access to alcohol at home were averaged for all members of each adolescent's ego network.¹

Sociometric measures. All participants nominated up to five male and five female friends, starting with their "best friend," at Wave I and Wave II. Individuals who reported having a romantic partner were asked to nominate that individual first. Romantic partners and outside-network nominated individuals were specially coded and not included in the social networks.

Friendship nominations were used to calculate two sociometric measures. Popularity was measured by in-degree centrality (nominations received). Because of a high range of skewness, scores were truncated, such that scores could range from 0 to 11 (>99% of the sample). Betweenness is the extent to which one individual/node lies between all other pairs of nodes. These individuals act as intermediaries for connecting groups to each other. This is expressed by the sum of how involved each individual is in all ties between all other pairs of nodes (the proportion of all pathways connecting two actors that occur on geodesic tie paths; i.e., the shortest path between two nodes [individuals] through their connections with others). It is standardized by dividing each individual's betweenness by the total number of pairs of actors not involving the individual, resulting in a standardized measure that ranges between 0 and 1 (Wasserman & Faust, 1994, p. 190). However, because of high skewness, betweenness was transformed into a categorical variable with four categories (no betweenness, low betweenness [scores ranging from 0 to 0.2], moderate betweenness [scores ranging from higher than 0.2 to 0.4], and high betweenness [scores higher than 0.4]).

Analytic plan

Alcohol use models were fit using multinomial logistic regression. Because of the high collinearity between betweenness and popularity (Table 1), sociometric effects were estimated separately. Therefore, two models predicted alcohol use (one for popularity, one for betweenness). Popularity was estimated using negative binomial regression for count variables, and the betweenness model was estimated using multinomial logistic regression. Multilevel modeling accounted for interdependence within the social networks (for alcohol use and overall social network shape). Models

were group-mean centered (i.e., individual student estimate subtracted from the average school estimate), such that Level 1 and Level 2 predictors represented direct within-school (comparison against fellow classmates) and between-school (comparison against other schools) effects (Enders & Tofighi, 2007).

Results

Table 1 displays means, standard deviations, and correlations among all study variables, as well as overall ranges for schools. Alcohol use at Wave II positively related to Wave I popularity. Individual access to alcohol at home positively related to Wave I popularity, whereas friends' access to alcohol at home negatively related to Wave I and II popularity. The majority of individuals also had changes in sociometric measures, 72% of individuals differed in Wave I and Wave II popularity scores, and 75% had a change in betweenness scores.

Table 2 displays the main-effect popularity and betweenness models for predicting Wave II alcohol use. Abstainers were the reference category for all models. Individual access to alcohol at home related to higher odds of weekly or regular drinking when compared with abstinence. Friends' access to alcohol at home related to lower odds of weekly drinking compared with abstinence. Popularity did not relate to any Wave II drinking behavior. However, popularity did moderate relationships between Wave I access to alcohol at home and the odds of infrequent drinking compared with abstinence. Popularity weakened the positive relationship between individual access to alcohol at home and infrequent drinking (odds ratio [OR] = 0.89, 95% CI [0.84, 0.94], $p < .05$) and strengthened the negative relationship with friends' access to alcohol at home (OR = 0.77, 95% CI [0.68, 0.91], $p < .05$) and the odds of infrequent drinking. As seen in Supplemental Figures S1A and S1B, respectively, this moderation was minimal. (Four supplemental figures appear as online-only accompaniments to the article on the journal's website.)

Wave I betweenness positively predicted drinking such that those with higher betweenness were more likely to be infrequent or regular drinkers compared with abstainers. Individual access to alcohol at home moderated the effect of betweenness for predicting odds of regular (OR = 0.80, 95% CI [0.66, 0.98], $p < .05$) and infrequent drinking versus abstinence (OR = 0.75, 95% CI [0.64, 0.89]). The effect of betweenness on the odds of regular drinking was weaker for those who did not have individual access to alcohol at home (Supplemental Figure S2A). The reverse was found for odds of infrequent drinking, such that the effect of betweenness was stronger for those who did not have individual access to alcohol at home (Supplemental Figure S2B). Moderation effects were minor for both outcomes. Friends' access to alcohol at home also moderated the effect of betweenness on infrequent drinking versus abstinence (OR = 0.39, 95% CI

¹Friends' drinking networks were based on self-reported perception of friendship (whom each individual nominated), and therefore the nominations did not have to be reciprocated (where both the nominee and the nominator mutually reported friendship). This was attributable to findings indicating that even nonreciprocated, perceived friendships can have socializing effects (Bot et al., 2005).

TABLE 1. Correlations^a and means for all variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Alcohol use Wave I	–											
2. Alcohol use Wave II	.55*	–										
	(.49–.66)											
3. Popularity Wave I	.08**	.09**	–									
	(-.38–.12)	(-.29–.22)										
4. Popularity Wave II	-.01	.03	.62**	–								
	(-.30–.05)	(-.30–.06)	(.56–.70)									
5. Betweenness Wave I	-.06	.20	.62**	.54**	–							
	(-.34–.15)	(-.26–.20)	(.34–.69)	(.21–.54)								
6. Betweenness Wave II	-.21	-.01	.40**	.67**	.45**	–						
	(-.22–.09)	(-.34–.09)	(.27–.49)	(.48–.77)	(.13–.45)							
7. Individual home alcohol access Wave I	.14**	.15**	.08**	.03	.20	.20	–					
	(-.05–.48)	(-.01–.35)	(-.11–.42)	(-.21–.44)	(-.04–.19)	(-.21–.21)						
8. Friends' drinking Wave I	.01	.06**	-.01	-.03	.09	.16	.00	–				
	(-.02–.41)	(.01–.30)	(-.27–.16)	(-.28–.10)	(-.10–.12)	(-.28–.17)	(-.10–.33)					
9. Friends' home alcohol access Wave I	.01	.01	-.04*	-.04*	-.02	.12	.01	.28**	–			
	(-.14–.17)	(-.13–.18)	(-.18–.08)	(-.19–.10)	(-.09–.02)	(-.18–.12)	(-.16–.21)	(.05–.46)				
10. Age	.20**	.16**	-.05**	-.21**	-.03	.24	.03	.06**	.03	–		
	(.07–.55)	(.09–.46)	(-.20–.10)	(-.28–.03)	(-.16–.22)	(-.75–.03)	(-.09–.14)	(-.03–.28)	(.02–.12)			
11. Gender	-.08**	-.11**	.06**	.00	.03	-.10	.01	.02	-.01	-.07*	–	
	(-.20–.17)	(-.15–.12)	(-.14–.14)	(-.20–.10)	(-.23–.15)	(-.10–.13)	(-.19–.09)	(-.10–.09)	(-.20–.04)	(-.22–.14)		
12. Race	.05	-.10	-.18	-.07**	-.13	.01	.02	.00	-.02	.24**	-.01	–
	(-.11–.35)	(-.09–.47)	(-.24–.09)	(-.22–.07)	(-.18–.22)	(-.10–.05)	(-.08–.28)	(-.14–.22)	(-.15–.17)	(-.17–.12)	(-.16–.14)	
<i>M (SD)</i>	1.01 (1.02)	0.95 (1.09)	2.8 (2.61)	2.15 (2.27)	0.94 (0.83)	0.97 (0.85)	0.27 (0.44)	0.75 (0.75)	0.21 (0.29)	16.04 (1.32)	1.5 (0.5)	1.5 (0.5)
Range between schools	0.17–1.31	0.25–1.32	1.71–4.15	1.42–3.12	0.62–1.24	0.46–1.09	0.06–0.34	0.73–0.78	0.17–0.28	14.74–16.48	1.43–1.64	1.01–1.94

^aRanges are in parentheses below correlations.

p* < .05; *p* < .01.

TABLE 2. Odds ratios and confidence intervals for all three multilevel regression models predicting multinomial Wave II alcohol use

Variable	Betweenness Model			Popularity Model		
	Heavy drinking vs. abstinence OR [95% CI]	Moderate drinking vs. abstinence OR [95% CI]	Light drinking vs. abstinence OR [95% CI]	Heavy drinking vs. abstinence OR [95% CI]	Moderate drinking vs. abstinence OR [95% CI]	Light drinking vs. abstinence OR [95% CI]
Gender (<i>male</i> = 1, <i>female</i> = 2)	0.53** [0.46, 0.61]	1.02 [0.89, 1.18]	1.29** [1.12, 1.49]	0.55** [0.48, 0.62]	1.05 [0.92, 1.20]	1.31** [1.15, 1.48]
Age	1.49** [1.39, 1.61]	1.08 [0.97, 1.18]	1.06 [0.98, 1.14]	1.49** [1.37, 1.62]	1.07 [0.96, 1.20]	1.07 [0.98, 1.16]
Race (<i>White</i> = 1, <i>non-White</i> = 2)	0.69 [0.36, 1.22]	0.59 [0.32, 1.07]	0.98 [0.65, 1.43]	0.76 [0.45, 1.29]	0.6 [0.39, 0.93]	1.02 [0.74, 1.42]
Level 1 alcohol use Wave I	5.35** [4.49, 6.39]	3.63** [3.03, 4.36]	2.11 [1.88, 2.36]	5.20** [4.59, 5.40]	3.65** [3.05, 4.36]	2.11** [1.89, 2.35]
Individual home alcohol access Wave I	1.64* [1.09, 2.49]	1.65** [1.37, 1.98]	1.09 [0.76, 1.73]	1.67* [1.07, 2.61]	1.69** [1.40, 2.04]	1.11 [0.68, 1.80]
Friends' alcohol use	1.34** [1.25, 1.44]	1.19 [0.99, 1.44]	1.08 [0.77, 1.53]	1.36** [1.27, 1.46]	1.2 [0.98, 1.45]	1.08 [0.77, 1.53]
Friends' home alcohol access Wave I	0.53** [0.40, 0.71]	0.71 [0.50, 1.01]	0.87 [0.65, 1.16]	0.52** [0.40, 0.69]	0.71 [0.48, 1.04]	0.88 [0.65, 1.19]
Level 1 betweenness/Wave I	1.09 [0.94, 1.25]	1.09* [1.02, 1.15]	1.15 [1.03, 1.28]	–	–	–
Level 1 popularity	–	–	–	0.97 [0.92, 1.03]	0.97 [0.93, 1.00]	1.01 [0.95, 1.06]
Level 2 alcohol use Wave I	8.24** [5.46, 12.45]	12.88** [8.75, 18.93]	6.06** [3.52, 10.43]	7.21** [5.40, 9.62]	13.80** [11.07, 17.20]	6.48** [4.11, 10.20]
Level 2 betweenness Wave I	1.4 [0.04, 52.93]	0.78 [0.25, 2.45]	0.40** [0.24, 0.68]	–	–	–
Level 2 popularity	–	–	–	1.16 [0.93, 1.45]	0.91 [0.72, 1.17]	0.74* [0.61, 0.89]

p* < .05; *p* < .01.

TABLE 3. Unstandardized regression coefficients and 95% confidence intervals for negative binomial regression model predicting Wave II popularity

Variable	Popularity	
	<i>b</i>	[95% CI]
Gender (<i>male</i> = 1, <i>female</i> = 2)	-0.13*	[-0.22, -0.03]
Age	-0.13**	[-0.20, -0.06]
Race (<i>White</i> = 1, <i>non-White</i> = 2)	-0.13	[-0.23, 0.00]
Level 1 alcohol use Wave I	-0.09	[-0.19, 0.01]
Individual home alcohol access Wave I	-0.03	[-0.06, 0.01]
Friends' alcohol use Wave I	-0.02	[-0.05, 0.00]
Friends' home alcohol access Wave I	-0.05	[-0.18, 0.09]
Popularity Wave I	0.20**	[0.17, 0.23]
Level 2 alcohol use Wave I	-0.05	[0.22, 0.11]
Level 2 popularity Wave I	0.20**	[0.14, 0.25]

Note: CI = confidence interval.

p* < .05; *p* < .01.

[-0.27, 0.56]), such that betweenness was related to higher odds of infrequent drinking for individuals with no friends' access to alcohol at home, and lower odds for individuals with friends' access to alcohol at home (Supplemental Figure S3).

Table 3 displays the main-effects model predicting Wave II popularity. Drinking and individual or friends' access to alcohol at home did not relate to Wave II popularity (Table 3). There was an interaction between friends' access to alcohol at home and popularity such that friends' access to alcohol at home weakened the positive relationship between Wave I and Wave II popularity (*b* = -0.02, 95% CI [-0.04, -0.01], *p* < .05). As seen in Supplemental Figure S4, the positive relationship between Wave I and Wave II popular-

ity was stronger for adolescents without friends' access to alcohol at home.

Table 4 displays the main-effects multinomial logistic models for Wave II betweenness, with "no betweenness" as the reference category. Friends' access to alcohol at home was related to lower odds of moderate betweenness versus no betweenness, and low betweenness versus no betweenness. In addition, individual access to alcohol at home related to lower odds of low betweenness versus no betweenness. Individual and friends' access to alcohol at home had no moderation effects on Wave I betweenness.

Discussion

The current study had two main purposes. The first was to examine how home access to alcohol related to alcohol use and social status within school networks. The second was to examine an alternative measure of sociometric status (betweenness) that may represent unique aspects of the relation between access to alcohol at home and social status beyond popularity. Overall, it appeared that (a) betweenness positively relates to lower levels of drinking behavior and (b) access to alcohol at home reduces, rather than facilitates, higher social status.

Predictors of next-year drinking

We hypothesized that access to alcohol at home (individual and friends'), popularity, and betweenness would

TABLE 4. Odds ratios (ORs) for multinomial regression models predicting Wave II betweenness

Variable	High betweenness	Moderate betweenness	Low betweenness
	vs. no betweenness	vs. no betweenness	vs. no betweenness
	OR [95% CI]	OR [95% CI]	OR [95% CI]
Gender (<i>male</i> = 1, <i>female</i> = 2)	0.87 [0.55, 1.38]	0.7 [0.49, 1.00]	0.82** [0.74, 0.90]
Age	0.53** [0.40, 0.70]	0.59** [0.49, 0.71]	0.70** [0.63, 0.78]
Race (<i>White</i> = 1, <i>non-White</i> = 2)	0.43 [0.21, 0.91]	0.35** [0.24, 0.54]	1.03 [0.79, 1.33]
Level 1 alcohol use Wave I	0.93 [0.78, 1.10]	1.11 [0.85, 1.45]	0.97 [0.83, 1.14]
Individual home alcohol access Wave I	0.89 [0.70, 1.13]	1.23 [0.78, 1.93]	0.89* [0.81, 0.98]
Friends' alcohol use Wave I	0.92 [0.70, 1.23]	1.01 [0.86, 1.18]	1.13 [1.00, 1.28]
Friends' home alcohol access Wave I	0.73 [0.69, 1.15]	0.36** [0.17, 0.76]	0.66** [0.52, 0.84]
Betweenness Wave I	4.63** [3.24, 6.62]	3.59** [2.24, 5.75]	2.97** [2.43, 3.64]
Level 2 alcohol use Wave I	0.62 [0.63, 1.06]	1.24 [0.70, 2.19]	1.29 [1.00, 1.69]
Level 2 betweenness Wave I	9.43** [2.91, 30.56]	21.91** [7.86, 61.07]	6.69** [3.88, 11.53]

Notes: **p* < .05; ***p* < .01.

positively predict next-year drinking. Individual access to alcohol at home positively predicted drinking, and friends' access to alcohol at home negatively predicted drinking. Given that the effect of friends' access to alcohol at home is significant only for odds of weekly use versus abstinence, it is possible that friends' home availability of alcohol is not conducive to drinking frequently (because individuals may not be able to obtain alcohol from friends on a weekly basis). Individuals who are able to drink weekly may require an easier (e.g., individual access to alcohol at home) way to obtain alcohol. For example, previous research indicates that frequent underage drinkers are less likely to use social (e.g., friend) sources of alcohol compared with heavier drinkers (Harrison et al., 2000).

Contrary to hypotheses, popularity did not relate to individual alcohol use 1 year later, replicating findings from a previous study using the same Add Health saturated subsample (Wang et al., 2015). Overall, Wave I popularity positively correlated with Wave II alcohol use; therefore, the lack of relationship may be attributable to explicitly controlling for group-level effects. Most studies documenting positive effects use a small number of schools, with no accounting for overall school-level popularity (e.g., Allen et al., 2005; Choukas-Bradley et al., 2015; Tucker et al., 2013). Popularity moderated individual and friends' access to alcohol at home but not in the hypothesized direction: popularity weakened relations between access to alcohol at home and drinking. Given that this finding is significant for infrequent drinkers only, it is possible that infrequent drinkers are less likely to associate with drinking peers. Having a larger friendship group of low drinkers or abstainers may foster negative alcohol group norms, encouraging decreases in initial baseline levels of drinking (Allen et al., 2012; Teunissen et al., 2012).

As hypothesized, betweenness positively related to infrequent and regular drinking. Previous literature documents that liaisons (e.g., individuals within a network who have betweenness) have higher alcohol use than those not part of social groups (Henry & Kobus, 2007). Mechanisms underlying this relationship may be similar to how others have hypothesized the relationship between popularity and subsequent drinking behavior (Allen et al., 2005; Schwartz & Gorman, 2011). Adolescents may feel that to maintain their social status (particularly with multiple social groups/cliques within the school) they must maintain higher status behaviors such as drinking. Betweenness may provide adolescents with more opportunities to drink; being involved in multiple social groups may give them more access to alcohol, as well as more times in which different groups are engaging in drinking. This is especially relevant, given that the drinking outcome relates to the frequency of drinking compared with the quantity of drinking. Having higher betweenness may therefore give adolescents more occasions (e.g., parties, hanging out) in which drinking is encouraged.

Access to alcohol at home also moderated betweenness. As hypothesized, individual access to alcohol at home enhanced the effect of betweenness on regular drinking. However, both individual and friends' access to alcohol at home dampened effects of betweenness on infrequent drinking. For infrequent drinkers, betweenness had a stronger relation with drinking for individuals without individual access to alcohol at home. In addition, betweenness only positively related to infrequent drinking for those without friends' access to alcohol at home. Such differences between drinking outcomes may be attributable to the level of connectedness within drinking circles. Because drinkers are more likely to be friends with each other (Osgood et al., 2013), individual access to alcohol at home may facilitate stronger betweenness-drinking associations only for those already embedded within a drinking social group (e.g., those who most likely engaged in some level of drinking at Wave I; Poulin et al., 2011). Association with drinking groups may therefore allow one to use one's own alcohol access as a potential source of alcohol for others.

The negative interaction between access to alcohol at home and betweenness on infrequent drinking is not as straightforward. The odds of infrequent drinking were strongest for those who had high betweenness but no direct connections (through home or friends) to alcohol. Effects may be attributable to qualitative differences between adolescents who are abstinent/low-level users. As home availability of alcohol typically relates to increases in alcohol use (e.g., Komro et al., 2007), those who have access to alcohol at home but are in low drinking/abstaining groups may be more likely to endorse pro-abstaining norms (Rees & Wallace, 2014). These individuals are less likely to engage in subsequent alcohol use.

However, those without access to alcohol at home, but who are connected indirectly to multiple other groups, may use these groups to seek out sources of alcohol, thereby facilitating drinking behavior, as their low levels of alcohol use are attributable more to circumstance. If connections to multiple groups increase their opportunity for drinking, they may be more likely to engage in drinking behavior.

Predictors of next-year sociometric status

Although access to alcohol at home was unrelated to popularity directly, both individual and friends' access to alcohol at home was negatively related to next-year moderate and lower betweenness. It is possible that access to alcohol at home has a role in overall social network connectedness. The theory of transitivity (e.g., Wasserman & Faust, 1994, p. 243) proposes that two unconnected people connected by a third party are likely to become connected to each other. One of the few studies examining sociometric status other than popularity, the Ali et al. (2014) report documented that drinking increased Bonacich centrality (Bonacich, 1987),

which measures the overall connections one has throughout the entire social network. Therefore, if drinking facilitates social connectedness, this would ultimately decrease betweenness (i.e., see the introduction example in Figure 1B vs. Figure 1C). If individuals with access to alcohol at home become access points for alcohol for multiple individuals, these individuals may form ties to each other, eliminating liaison status for alcohol-access individuals. In addition, given that overall alcohol use in a network appears to increase when the proportion of individual access to alcohol at home within the network increases (Fletcher, 2012), reductions in betweenness attributable to transitivity may be a symptom of the overall social contagion model (Christakis & Fowler, 2013) of drinking behavior within a network.

Friends' access to alcohol at home had a moderating effect on the relation between Wave I and Wave II popularity, although again this was relatively minor. The relation between popularity in Wave I and Wave II was stronger for those who did not have friends with access to alcohol at home. Transitivity is not an issue for egocentric networks (e.g., popularity); therefore, it is more difficult to discern the dampening role of access to alcohol at home on popularity. It is possible that individuals without alcohol access via friends will try to engage friendship groups beyond their own immediate ego network to gain access to alcohol. Friendship groups that already have access to alcohol at home (i.e., a member of the group has individual access to alcohol at home) may be less motivated to connect to other groups. However, given the little that we know about the nuances of adolescent alcohol access beyond "peers" or "parents" (rather than friends vs. acquaintances vs. classmates), more research is required to test these hypotheses.

Strengths and limitations

The current study has a number of strengths, including rigorous methodology (i.e., accounting for school-level social statuses and alcohol use), as well as using multiple measures of social status. However, it is possible, as seen in some studies directly comparing different social networks (e.g., Cheadle et al., 2015; Wang et al., 2015), that specific findings may not be generalizable to all adolescent social networks. Bounded networks may have excluded important social influences (e.g., friends outside of school). Adolescents who were in 12th grade at Wave I were excluded because of a lack of follow-up at Wave II; such individuals could potentially be important influences that were not accounted for in this study. The average friends' alcohol use may not reflect differing levels of influential dyads within the network. In addition, although the access-to-alcohol-at-home question is a fair measure of availability (i.e., is alcohol easily available in your home?), actual sources of alcohol (e.g., friends, home) were not measured.

In addition, the small number of schools reduced the power for Level 2 results. Multilevel modeling primarily controlled for interdependence within schools for socio-metric status and alcohol use, and within-school (Level 1) variables, which were less likely to be affected by the small Level 2 sample sizes, were the focus of this study.

Finally, demographic characteristics may have moderated some of the effects, as there were significant race, age, and gender effects. These demographic characteristics relate to differences in drinking behavior (Chen & Jacobson, 2012) and social tie formation (Goodreau et al., 2009).

It is important for future research on peer influences to include variables pertaining to alcohol acquisition. Drinking contexts should also be considered, not only who adolescents are drinking with, but the setting (e.g., hanging out with friends, a large party, alone). In addition, future research should use multiple sociometric measures as well as examining characteristics about the bounded networks themselves (e.g., school characteristics) that may shape the flow of information and the varied ways that adolescents can obtain social standing within these networks.

Although we understand the broad ways in which peers can influence adolescent alcohol use (e.g., socialization vs. selection), we should obtain more nuanced information about the flow of peer use across multiple networks and contexts that can explain underlying mechanisms for alcohol use transmission across individuals. Such information can better inform translational research on peer-level interventions, focusing on social network components that are the most influential for adolescent use.

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