

Protective and Risky Social Network Factors for Drinking During the Transition From High School to College

MATTHEW K. MEISEL, PH.D.,^{a,*} & NANCY P. BARNETT, PH.D.^a

^a*Center for Alcohol and Addiction Studies, Brown University, Providence, Rhode Island*

ABSTRACT. Objective: The transition from high school to college is a unique developmental period to examine the relationship between social networks and alcohol use, because during this transition, students enter new environments and alcohol use becomes more pervasive. The aim of this study was to examine the extent to which personal social networks change during this transition and to examine how changes in the composition of networks are related to alcohol use. **Method:** Participants ($N = 374$, 57.8% female) reported on their alcohol use and provided information about individuals in their social network before and immediately after their first year of college. These network members were matched across the two observations and were classified as either carryover (i.e., named at both assessments), dropped (i.e., named

at only the first assessment), or added (i.e., named at only the second assessment). **Results:** We found robust turnover, such that only 22% of network members were retained from the first observation to the second. Furthermore, heavy drinking in high school was associated with retaining more friends during the transition to college, but once in college, adding more heavy drinkers as friends was associated with the greatest alcohol risk. **Conclusions:** These findings show how changes in the composition of the social network influence an individual's alcohol use during the transition to college. Results from this study could be used to improve interventions that address the composition of the social network as a whole, as well as the characteristics of each individual in their social network. (*J. Stud. Alcohol Drugs*, 78, 922–929, 2017)

THE TRANSITION FROM HIGH SCHOOL to college is a critical period for young adults. This transition has been identified as a period of vulnerability marked by increases in alcohol use and heavy episodic drinking (Baer et al., 1995; Sher & Rutledge, 2007; Walls et al., 2009; White et al., 2006). During this transition, college students establish new relationships with same-age peers, may or may not maintain their relationships with high school peers, and may become less close to their parents. Thus, the transition from high school to college is a period when major changes in relationships and alcohol use occur.

When students enter college, many move out of their parents' homes, yet parental attitudes and behaviors are still influential. For example, high parental monitoring in the senior year of high school is negatively associated with drinking in that year (White et al., 2006) and is negatively associated with alcohol use and consequences in the first year of college (Walls et al., 2009; White et al., 2006). Furthermore, heavy drinkers in college are less likely to retain connections with their parents and grandparents (Reifman et al., 2006). Thus, even if students no longer live with their parents, parents

maintain an important level of influence in the alcohol use of their children in college.

Multiple cross-sectional studies have documented a robust positive association between college student and peer alcohol use (Andrews et al., 2002; MacKillop et al., 2013; Meisel et al., 2015). Specifically, at-risk drinkers' social networks contain a higher number of frequent drinkers (Meisel et al., 2015), and in college residence halls, clustering on heavy drinking has been reported (Barnett et al., 2014b). Heavy drinkers also tended to know their network members longer (Reifman et al., 2006), suggesting that drinking by college students may be related to the drinking by peers and to the longevity of peer relationships.

Social learning theory (Bandura, 1977, 1986) is used widely to understand college student drinking. One central element of this theory is reciprocal determinism, meaning that the person, their behavior, and the environment synergistically interact; this is commonly characterized as the processes of socialization and selection (Capone et al., 2007; McCabe et al., 2005; Park et al., 2009; Read et al., 2005; Stappenbeck et al., 2010). We can use this theory to explain the increase in alcohol use upon the transition to college. In college, individuals who consumed alcohol in high school may gravitate toward relationships with individuals who also consume alcohol (i.e., selection). Once in college, where alcohol use is prevalent and normative, students may modify their behavior as a function of exposure to elevated drinking behavior around them (i.e., socialization). Because of these processes, longitudinal studies with adolescents and college students demonstrate a strong association between personal and peer alcohol use (Read et al., 2005; Stappenbeck et al., 2010).

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*Correspondence may be sent to Matthew K. Meisel, Postdoctoral Research Fellow, Center for Alcohol and Addiction Studies, Department of Behavioral & Social Sciences, Brown University School of Public Health, Box G-S121-4 Providence, RI 02903, or via email at: matthew_meisel@brown.edu.

Although longitudinal research has identified peer drinking as central to the increase in drinking upon the transition to college, research has not examined directly how changes in network composition during the transition to college are related to alcohol use, and specifically, how network turnover (i.e., dropping and adding friends and parents) is related to alcohol use. Reifman and colleagues (2006) found that changes in peer drinking from the fall semester to the spring semester of the first year of college were predominantly driven by the dropping and adding of network members rather than by the retention of network members (i.e., carryover members; Reifman et al., 2006). However, this study did not examine how network turnover was related to participant alcohol use, and it did not examine the transition from high school to college. Studies in the alcohol treatment literature are informative on this point; among individuals in Alcoholics Anonymous, adding a new network member significantly increases the probability that the individual will remain abstinent following treatment (Litt et al., 2007, 2009). Together, these findings suggest that the retention/change in network members and their drinking behavior have implications for an individual's drinking. For first-year college students whose transition to college represents a critical period of increased alcohol-related risks, understanding the relationship between student drinking, network composition, and network drinking will be informative for prevention (Borsari et al., 2007).

Study objectives

The aims of the study were fourfold. First, we described how networks changed from the end of the senior year of high school to the end of the first year of college. We hypothesized that the number of friends in the network would increase and the likelihood of parents being included would decrease. Second, we examined the relationship between network composition and respondent alcohol use. We expected that networks that contained at least one parent in the network would be associated with less participant alcohol use, and that networks with a higher number of friends would be associated with greater alcohol use at both time points. Third, we examined whether turnover in network members was associated with greater alcohol use. We expected that greater turnover would be associated with greater alcohol risk, since turnover reflects a social instability, and alcohol is commonly used to facilitate social connections (Jessor et al., 2006; Patrick & Schulenberg, 2011). Last, we investigated whether the alcohol use of network members interacted with network member status to predict alcohol-related risk in participants concurrently and longitudinally. We expected that retaining or adding network members with higher alcohol use would be associated with greater alcohol use by participants.

Method

Participants

Respondents ($N = 374$) were participants in a longitudinal study of incoming college students at three universities,¹ recruited before the beginning of their first year. The original study had three cohorts, but because of differences in measurement, data from only one cohort were analyzed here. At baseline, respondents were an average of 18.33 years old ($SD = 0.42$). The majority were female (57.8%); 60.7% were White, 12.3% Asian, 7.5% African American, 11.5% multiracial, and 8% other. Of the three college sites (all in the Northeast), 17.6% were from College 1, 16.8% from College 2, and 65.6% from College 3. See Barnett et al. (2014a) for a more detailed description of the sites.

Procedure

In the summer before the first year of college, students who were intending to enroll in one of the three universities were invited to participate.² Inclusion criteria were having full-time enrollment status, being in on-campus housing during the first year, being younger than age 21, and not being an international student. Via mail, potential respondents received \$5 and a written description of the study. They were able to complete the consent and the baseline assessments on paper or online. For those under age 18, parental consent was obtained. The final enrollment rate in this cohort was 43%.

The baseline data (T1) were obtained before students' arrival on campus. Participants were compensated \$20. At the end of the first year of college (T2), respondents completed the second assessment and were compensated \$25 (90.9% retention rate).³ Data for the current investigation used these two assessments. Approval was obtained from the Institutional Review Board at each of the three college sites.

¹College 1 is a public, medium-size, predominantly commuter, 4-year college. College 2 is a public, medium-size, residential, 4-year university. College 3 is a private, medium-size, residential, 4-year university.

²Chi-square analyses were conducted to compare demographic characteristics of students who participated in the survey and those who did not. Differences in race (i.e., White vs. non-White), gender, and adult status (i.e., adult vs. minor) were explored. There was not a significant difference in race, $\chi^2(1) = 1.40, p = .24$, between those who participated in the survey and those who did not. However, compared with males and minors, females, $\chi^2(1) = 4.39, p = .04$, and adults, $\chi^2(1) = 10.73, p = .001$, were more likely to enroll.

³There were no significant differences in demographic characteristics and network variables based on retention. However, compared with those who did not complete the follow-up, those retained had a significantly lower number of drinking days and heavy drinking days per month, $t(35) = 2.74, p = .01$, and $t(37) = 2.20, p = .04$, respectively.

TABLE 1. Indices of respondent alcohol use by time

Alcohol use variables	Time 1 <i>M</i> (<i>SD</i>)	Time 2 <i>M</i> (<i>SD</i>)
Past-year number of drinking days per month	2.41 (4.70)	5.16 (7.01)
Past-year number of heavy drinking days per month	0.90 (2.49)	2.10 (4.06)
Past-year maximum number of drinks in a day	4.56 (5.08)	6.62 (6.02)
Past-year number of alcohol-related consequences	1.58 (2.11)	2.29 (2.37)

Measures

With the exception of demographics, all measures below were administered at both assessment time points.

Demographic characteristics. At baseline, gender, race, ethnicity, and age were collected.

Graduated Frequency for Alcohol (Hilton, 1989). Respondents were provided with the definition of a standard drink and were asked, "Think of all kinds of alcoholic beverages combined, during the past year, what is the largest number of drinks you had on any single day?" Respondents answered numerically. From this, the maximum number of drinks consumed in the past year was derived. Starting with their maximum, respondents were then asked about their frequency of drinking several different quantities of alcohol (i.e., 12 or more, 8–11, 5–7, 3–4, and 1–2 drinks) on a nine-point scale, ranging from *every day or nearly every day to never*. From these responses, two variables were composed: number of drinking days per month and number of heavy drinking days per month. Heavy drinking was defined as four or more drinks for females and five or more for males. See Greenfield and Rogers (1999) for more information on calculations.

Young Adult Alcohol Problems Screening Test (YAAPST) (Hurlbut & Sher, 1992). We used the 20-item shortened version of the YAAPST (Kahler et al., 2004) that measures negative consequences of alcohol use in the past year, since it has better distributional properties than the original YAAPST. Items were dichotomized and summed to indicate the total number of negative consequences experienced in the past year.

Important People and Activities Instrument (Clifford & Longabaugh, 1991). Respondents were instructed to fill in the first name and last initial of a maximum of five people who had been important to them during the past year. "These might be people you socialized with or regularly had fun with during the past year. These people may be parents, friends, people from work, or anyone that you see as having had a significant impact on your life, regardless of whether or not you like them." Respondents reported the age, gender, race/ethnicity, and relationship type for each network member listed. Respondents identified how long they knew each person on a six-point scale, ranging from *0 to 3 months*

to *more than 3 years*. Respondents also reported on each network member's drinking frequency on an eight-point scale, as follows: *daily, 3–6 times a week, 1–2 times a week, about every other week, about once a month, less often than monthly, once in past 6 months, and not in the past 6 months*. Respondents reported on each network member's maximum drinking quantity: "What is the most he/she drinks in a single day?" For both of the drinking questions, respondents had the option to answer "I do not know."

Matching procedure

To determine whether network members were retained, dropped, or added, we reviewed and matched the first name and last initial of network members the participants entered in the network surveys. There were initially 51 cases⁴ (1.7% of all network members at both time points) in which the participant provided similar but not identical names at T1 and T2. For these cases, we examined the age of the network member, relationship type, and the length of time the respondent knew the network member. Both authors coded these discrepant cases and reached consensus on all determinations. The percentage of dropped, added, and carryover members at each time point subsequently were calculated using the total number of all network members at that time point as the denominator.

Data analysis

Dependent samples *t*-tests and chi-square tests were conducted to examine differences in network composition from T1 to T2. Correlations were calculated for respondents' alcohol use, the composition of the social network, and network turnover within and between T1 and T2. Parent inclusion in the network was defined as one or more parents being named. Mann–Whitney tests were conducted to examine differences in personal alcohol use between those who named at least one parent in their network from those who did not. Last, regression analyses were conducted to examine the interaction between the number of unique members in the network and the alcohol use of network members on respondent alcohol use. Because the three college sites differed by the percentage of in-state students, and the distance between participants' hometown and college town may influence the percentage of turnover in the network, we controlled for school in all analyses. Furthermore, in all longitudinal analyses, we controlled for T1 drinking.

⁴We conducted analyses including and then excluding these cases. The pattern of results was consistent, with only one effect becoming nonsignificant when the cases were excluded. Specifically, in Table 3, the relationship between T2 number of friends and past-year number of drinking days per month changed from -0.11 to -0.09. Because of power issues (addressed in the limitation section), we therefore include these cases in the results.

TABLE 2. Descriptive statistics of all the network members by time and by retention

Variable	Time 1 network member status			Time 2 network member status		
	All	Dropped	Carryover	All	Added	Carryover
Number, <i>M</i> (<i>SD</i>)	4.4 (1.04)	3.5 (1.4)	0.9 (1.0)	4.4 (1.06)	3.4 (1.3)	0.9 (1.0)
Age, <i>M</i> (<i>SD</i>)	23.02 (11.74)	22.1 (10.88)	26.03 (13.97)	21.96 (10.00)	20.60 (7.80)	
Friend	18.36 (3.44)	18.38 (3.55)	17.95 (0.77)	18.80 (1.60)	18.84 (1.45)	
Parent	48.93 (5.18)	48.49 (5.64)	49.63 (4.67)	50.15 (6.83)	51.32 (6.28)	
Gender, %						
Male	45.0	44.4	44.6	46.0	46.3	
Female	55.0	55.6	54.9	54.0	53.7	
Relationship, %						
Friend	64.4	70.2	42.2	74.8	83.2	
Significant other	8.5	6.0	18.3	8.3	6.0	
Sibling	7.4	6.6	11.1	4.4	2.7	
Co-worker	0.6	0.8	0.3	0.4	0.4	
Parent	13.0	9.7	24.2	9.0	4.8	
Extended family	2.4	2.6	2.6	1.5	1.1	
Other	3.8	4.1	1.3	1.8	1.9	
Length of relationship, %						
0–3 months	0.6	0.7	0.7	1.3	1.6	
4–6 months	1.4	1.9	0.3	8.6	10.9	
7–12 months	3.3	3.4	2.3	52.4	66.3	
1–2 years	10.0	10.1	10.5	3.9	3.3	
2–3 years	12.3	13.1	9.2	3.6	2.1	
More than 3 years	72.0	70.9	77.1	30.2	15.8	
Drinking frequency, <i>M</i> (<i>SD</i>)	2.79 (2.22)	2.63 (2.19)	2.89 (2.2)	3.49 (2.15)	3.51 (2.14)	3.38 (2.21)
Not in the past 6 months, %	24.5	26.5	23.0	18.2	18.4	18.0
Once in the past 6 months, %	6.4	6.8	7.2	3.6	2.9	6.2
Less often than monthly, %	8.4	7.8	10.2	7.6	7.4	8.8
About once a month, %	11.7	11.9	12.1	8.1	8.2	7.5
About every other week, %	12.6	12.4	12.8	13.6	13.7	13.4
1–2 times a week, %	15.7	14.6	14.8	28.5	30.4	21.2
3–6 times a week, %	7.5	6.3	10.5	12.1	11.1	15.7
Daily, %	2.3	2.1	2.3	2.1	2.1	2.0
Do not know, %	10.9	11.7	7.2	6.1	5.8	7.2
Maximum alcohol consumption, <i>M</i> (<i>SD</i>)	3.61 (4.26)	3.53 (4.35)	3.52 (4.00)	4.88 (5.24)	4.92 (5.27)	4.51 (4.68)

Results

Table 1 displays different indicators of respondent alcohol use at both time points. In general, respondent alcohol use increased from T1 to T2 (all *ps* < .001).

Aim 1: Network change

The total number of people identified in the network did not differ from T1 to T2 (*M* = 4.43, *SD* = 1.04, and *M* = 4.39, *SD* = 1.06, respectively), *t*(323) = -0.92, *p* = .36. However, the number of friends and whether one or more parents were named differed significantly from T1 to T2, *t*(323) = -3.79, *p* < .001, and *t*(323) = 4.51, *p* < .001, respectively, such that parents were less likely and friends were more likely to be listed as network members at T2 than T1.

Table 2 displays descriptive statistics of network members by time and by retention in the network. Of all network members named across both time points, 21.5% were listed at both T1 and T2, and 78.5% were only listed at either T1 or T2. Chi-square tests indicated that friends were less likely to be retained in the network than parents, $\chi^2(1, 1109) = 70.83$, *p* < .001.

Aim 2: Network composition and participant alcohol use

As displayed in Table 3, the number of friends in the network was differentially associated with participant alcohol use at the two time points. The relationship between number of friends at T1 and alcohol use at T1 was negative for number of drinking days and heavy drinking days per month, but the number of friends at T1 was positively associated with changes in maximum alcohol consumption at T2 (after T1 maximum alcohol consumption was controlled for). It is interesting to note that higher frequency of drinking, higher frequency of heavy drinking, and number of alcohol consequences at T1 were related to a decrease in the number of friends from T1 to T2.

As shown in Table 3, Mann–Whitney tests indicated that, at T1, individuals without a parent in their network had a greater number of heavy drinking days in the past month and had higher maximum quantities at T1 than those who named at least one parent in their network, with no other differences between participants who did and did not name a parent at T1. There were no cross-sectional differences in drinking and alcohol consequences between those who had at least one parent in their network at T2 and those who did not.

TABLE 3. Correlation between the number of friends in the network at Time 1 (T1) and Time 2 (T2), and indices of respondent alcohol use at T1 and T2

Variable	Time 1				Time 2			
	Past-year number of drinking days per month	Past-year number of heavy drinking days per month	Past-year maximum number of drinks in a day	Past-year number of alcohol-related consequences	Past-year number of drinking days per month	Past-year number of heavy drinking days per month	Past-year maximum number of drinks in a day	Past-year number of alcohol-related consequences
T1 number of friends	-0.12*	-0.12*	0.03	0.03	0.04	0.05	0.12*	0.05
T2 number of friends	-0.11**	-0.06	-0.12*	-0.12*	0.10	0.08	0.07	0.06
Parent (at least one vs. none) ^a	-1.66	-2.65**	-2.44*	-1.2	-0.49	-0.53	-0.15	-0.67

Notes: Cross-sectional correlations controlled for school. Longitudinal analyses controlled for school and the baseline T1 alcohol variable. ^aAnalyses are Mann-Whitney *U* tests; *z* scores are presented.

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

Aim 3: Network turnover and respondent alcohol use

Next, we investigated the relationship between network turnover, type of turnover, and respondent alcohol use at both time points. As shown in Tables 4 and 5, when all network members were considered, respondent alcohol use at both time points was unrelated to the number of carryover, number dropped, and number added. However, the number of members added was negatively related to the number of alcohol-related consequences at T1 but positively related to changes in the number of alcohol consequences at T2.

When only friends were considered, all four drinking outcomes at T1 were positively associated with the number of carryover friends, but after we controlled for respondent drinking at T1, the number of carryover friends was not related to the drinking variables at T2. None of the drinking variables at T1 were associated with the number of friends dropped during the transition to college, and after we controlled for T1 drinking the number of friends dropped was not related to any of the drinking variables at T2. However, respondent number of drinking days and number of alcohol problems at T1 were negatively related to the number of friends added. After we controlled for T1 drinking, the number of friends added to the network was positively associated with changes in the number of drinking days at T2.

When only parents were considered, individuals who had more heavy drinking days and higher maximum quantities of alcohol consumption at T1 were more likely to drop a parent from their network from T1 to T2. As shown in Tables 4 and 5, T1 drinking was not related to parent carryover or adding, and none of the three network characteristics (carryover, dropped, added) for parents were significantly related to the four T2 indices of alcohol use.

Aim 4: Interaction between network drinking and network turnover

We examined whether the number of dropped members interacted with the dropped members' drinking frequency

and maximum consumption at T1 to predict participant drinking and alcohol consequences at T2. One of the eight interactions was significant. After we controlled for school and T1 drinking, the drinking frequency of dropped members interacted with the number of dropped members to predict participant maximum quantity at T2 ($b = 0.63$, $SE = 0.278$, 95% CI [0.08, 1.18]; $\beta = .10$, $t(5, 299) = 2.26$, $p = .024$). Simple slopes analyses indicated that when the number dropped was high, the drinking frequency of those members predicted participant drinking ($b = 1.39$, $SE = 0.41$, 95% CI [0.59, 2.19]; $\beta = .23$), $t(5, 299) = 3.41$, $p = .001$. However, when the number dropped was low, the drinking frequency of those members was unrelated to participant drinking ($b = 0.13$, $SE = 0.39$, 95% CI [-0.64, 0.90]; $\beta = .02$), $t(5, 299) = 0.34$, $p = .74$).

We also examined whether the number of added members interacted with network member drinking at T2 to predict participant alcohol use outcomes at T2. Four of the eight interactions were statistically significant. The drinking frequency of added members interacted with the number added to predict participant number of drinking days ($b = 0.78$, $SE = 0.34$, 95% CI [0.11, 1.46]; $\beta = .10$), $t(5, 304) = 2.29$, $p = .02$. The drinking quantity of those added interacted with the number added to predict participant number of drinking days ($b = 1.02$, $SE = 0.35$, 95% CI [0.34, 1.69]; $\beta = .14$), $t(5, 303) = 2.95$, $p = .003$; number of heavy drinking days ($b = 0.41$, $SE = 0.20$, 95% CI [0.02, 0.79]; $\beta = .10$, $t(5, 303) = 2.09$, $p = .038$); and maximum drinking quantity ($b = 0.61$, $SE = 0.24$, 95% CI [0.13, 1.08]; $\beta = .10$), $t(5, 303) = 2.52$, $p = .012$. Simple slopes analyses of these interactions consistently demonstrated statistical significance of both simple effects but a stronger effect of network member drinking on participant drinking when the number of added members was high, compared with when the number of added members was low, suggesting that the drinking of added network members was predictive of participant T2 drinking, with a stronger effect when the number of added members was high. In all but one of the 16 interaction analyses, the main effect of network drinking was significant.

TABLE 4. Relationship between indices of respondent alcohol use at Time 1 with network member status

Variable	Respondent Time 1			
	Past-year number of drinking days per month	Past-year number of heavy drinking days per month	Past-year maximum number of drinks in a day	Past-year number of alcohol-related consequences
All members				
Number carryover	0.10	0.03	0.04	0.09
Number dropped	-0.08	-0.01	0.00	-0.03
Number added	-0.11	-0.03	-0.09	-0.14*
Only friends				
Number carryover	0.23***	0.17**	0.19**	0.18**
Number dropped	-0.08	-0.07	0.03	-0.01
Number added	-0.12*	-0.05	-0.10	-0.14*
Only parents (at least one vs. none) ^a				
Number carryover	-1.39	-1.89	-1.94	-0.62
Number dropped	-1.40	-2.43*	-2.01*	-1.46
Number added	-0.20	-0.47	-0.02	-0.03

Notes: All correlations controlled for school. ^aAnalyses are Mann–Whitney *U* tests; *z* scores are presented. **p* < .05; ***p* < .01; ****p* < .001.

Discussion

In this investigation we evaluated the relationship between students’ alcohol use and changes in the composition of their social networks from the end of high school to the end of the first year of college. We found considerable turnover in network members and several network-related protective and risk factors for personal alcohol use during this transition. During the transition from high school to college, alcohol use and related problems increased and the composition of the social network changed drastically, such that only one quarter of network members were retained. In college, individuals were less likely to name their parents and more likely to name friends as network members compared with when they were in high school. Taken together, this suggests

that as individuals enter college, they are forming new social networks that are primarily composed of same-age peers and that there is a lower importance of parents, supporting Arnett’s (2000) emerging adulthood theory.

The relationship between network composition and alcohol use outcomes was intricate. The number of friends in the network in high school was negatively associated with concurrent participant number of drinking days and heavy drinking days in high school, indicating that having more friends may be a protective factor for alcohol use and heavy drinking in high school. However, the number of friends in high school was positively associated with greater maximum alcohol consumption in college. Therefore, although having a higher number of friends in high school is associated with lower alcohol risk in high school, it is associated prospec-

TABLE 5. Relationship between different indices of respondent alcohol use at Time 2 with the number of carryover members, members dropped, and members added

Variable	Respondent Time 2			
	Past-year number of drinking days per month	Past-year number of heavy drinking days per month	Past-year maximum number of drinks in a day	Past-year number of alcohol-related consequences
All members				
Number carryover	-0.05	0.00	-0.04	-0.04
Number dropped	0.02	0.00	0.02	0.00
Number added	0.07	0.01	0.05	0.12*
Only friends				
Number carryover	-0.02	0.03	0.00	0.04
Number dropped	0.00	0.01	0.04	-0.02
Number added	0.11*	0.07	0.05	0.04
Only parents (at least one vs. none) ^a				
Number carryover	-0.67	-0.60	-0.65	-0.05
Number dropped	-0.52	-0.44	-0.95	-0.71
Number added	-0.99	-0.59	-0.53	-0.64

Notes: Correlations controlled for school and the baseline alcohol variable at Time 1. ^aAnalyses are Mann–Whitney *U* tests; *z* scores are presented. **p* < .05.

tively with greater risk of alcohol use in college, after high school use is controlled for. Considering the longitudinal associations, it is possible that students who are more socially connected in high school (i.e., have more friends) are more likely to attend social functions in college, which may increase their exposure to alcohol, thereby increasing their drinking. Further adding to the complexity, heavier drinkers in high school had a lower number of friends in college. This finding may be explained by another of our findings, that drinking in high school is associated with retaining more friends. This retention of high school friends might decrease interest in building larger networks once in college.

When we considered network turnover, the number of carryover network members was unrelated to alcohol use at both time points, but all alcohol use outcomes in high school were positively associated with the number of carryover friends. That is, higher alcohol risk in high school was predictive of more stable friend networks in college, but these more stable friend networks were not associated with higher risk in college after high school behavior was controlled for. The main finding here is that those who drink more in high school are more likely to retain friends upon their transition to college.

With regard to parents, we found that participants who did not include a parent as a member of their social network in high school had higher heavy drinking and maximum number of drinks at the same time point, and that these same drinking variables in high school were positively associated with dropping parents on the transition to college. Contrary to expectations, there were no associations between including a parent in one's network and drinking in college (cross-sectional relationship) or between retaining, dropping, or adding parents and alcohol use in college. These findings suggest that naming a parent as an important person in one's network may be protective for drinking in high school but that these effects diminish once in college, after high school drinking is controlled for. Although parental attitudes and support are important predictors of a child's alcohol use throughout the transition to college (Walls et al., 2009; Wood et al., 2004), our findings suggest that indicating that parents are "important" is protective of drinking but only during high school. That parent inclusion was not related to college student drinking indicates the primacy of same-age peers as driving facilitators of alcohol use in college.

Last, the effect of network turnover on participant drinking was dependent to some extent on the drinking of those network members, and the adding of members was the important network change factor. In half of the interaction analyses with added members, there was a stronger relationship between network drinking and participant drinking in college when the number of members added was high compared with low. In other words, individuals who add heavier drinking members to their college network show the highest risk for drinking across multiple indicators. This is consis-

tent with previous findings (Meisel et al., 2015) that greater alcohol saturation in a student's college network is associated with increased alcohol-related risk for that student. Moreover, it suggests that when students are transitioning to college and meeting new friends, the more people they add to their network, the more the drinking of those members is relevant for the student's own drinking risk.

In summary, our findings indicate that heavy drinking in high school is associated with retaining more friends during the transition to college, but once in college, adding more heavy drinkers to one's own social network is associated with higher alcohol risk. Put another way, heavy drinkers in high school carry over more of their friends, but students who show the highest alcohol risk in college are those who add more heavy drinkers to their network. Parental inclusion in one's network was associated with lower alcohol-related risk for high school only; it is possible this finding is different from prior research because of the difference in methods used (i.e., social network methods).

Limitations

One limitation of the current study is the matching procedure we used to identify whether the network member was unique or carryover. Respondents provided the first name and last initial of each network member, so although we took several precautions, it is possible that network members were misclassified. A second limitation of the study is that respondents reported on their social networks' alcohol use, and we cannot be certain if their perceptions were accurate. This is a common limitation of studies that include reports of peer drinking, but recent research using the same methods has found that college students are generally accurate in their perceptions of their friends' drinking (Kenney et al., 2017). Future studies might use a sociocentric network design to collect self-report of all ties. Third, we were unable to examine the effect of other network members (i.e., siblings, significant others) because of smaller numbers in these categories. Larger future investigations might examine how, for example, network turnover in romantic partners is related to drinking. Fourth, the amount of network turnover may be confounded with the distance between participants' hometown and college town. Although we controlled for school site, which varied by the percentage of in-state students, using school as a proxy for distance from home is not as adequate as using an actual measure of distance.

Clinical implications

Our findings indicate that more than 75% of network members change upon the transition from high school to college, that friends are more prevalent and parents less prevalent, and that the type of turnover and the drinking of

network members have implications for college students. To our knowledge, there are no prevention programs for college students that focus on providing support in friendship development or in conveying the risks associated with network changes and network member drinking. Awareness of these findings could be useful for the development of interventions that address the role of the social network on alcohol use outcomes.

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