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# Identification of Trajectories of Social Network Composition Change and the Relationship to Alcohol Consumption and Norms

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## Abstract

**Background—**College drinking is embedded in a social context, drawing attention to the effects of social network composition on consumption. The presence of heavy drinking friends in social networks predicts later alcohol misuse, but little is known about how the composition of one's social network composition changes over time. This study identified changes in social network composition in a sample of at-risk students and examined the relationship among network trajectories, alcohol consumption, and descriptive norms.

**Methods—**Participants were 503 students (64% male) mandated to participate in an alcohol prevention intervention for residence hall alcohol policy violations. At baseline, students provided self-report data about alcohol consumption, perceived peer drinking norms, and peer alcohol involvement. Parallel assessments were completed at 6- and 12-months post-baseline.

**Results—**Growth-mixture models identified four groups of individuals with similar levels of heavy drinkers in their social networks. The majority of students had stable or decreasing numbers of heavy drinkers in their networks across the study, whereas two groups reported relatively stable densities of heavy drinkers from baseline to 6-months and increasing densities from 6- to 12-months. At baseline, the four groups were generally equivalent on consumption and normative perceptions. At 6- and 12-months, however, the groups differed significantly on consumption and norms.

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Contributors

KSD and MAP designed the study. KSD and KBC completed literature searches and summaries of previous work. MAP completed statistical analyses and completed the Results section. KSD completed the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

Conflict of Interest

All authors declare that they have no conflicts of interest.

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**Conclusions—**These results suggest that changes in the number of heavy drinkers in college students' social networks may have significant implications for at-risk drinking.

**Keywords**

college drinking; social networks; alcohol prevention; descriptive norms; trajectories

## 1. INTRODUCTION

Excessive rates of college alcohol consumption continue to pose a public health challenge. Despite the development of efficacious interventions (Carey et al., 2007), the rate of students who reported at least one heavy drinking episode (i.e., consuming five or more drinks on an occasion) in past month rose from 41.7% in 1999 to 44.7% in 2005 (Hingson et al., 2009). Heavy drinking episodes are related to academic, relational, and legal problems (Park, 2004), as well as injury, driving under the influence, and unprotected sex (Hingson et al., 2009).

The persistence of heavy drinking suggests the need to understand better the social context of college drinking. The peer network is a key factor in the initiation, escalation, and de-escalation of alcohol use among adolescents (Musher-Eizenman et al., 2003). The college environment, characterized by prevalent alcohol use and permissive attitudes about drinking acceptability, is unlike any environment emerging adults have previously encountered (Schulenberg et al., 1994). Adolescents entering college may be particularly vulnerable to peer influence because of their need to make new friendships in a context with reduced conventional social controls (Arnett, 2005). College students may increase drinking to facilitate peer interactions (White and Jackson, 2004).

Peer drinking is a strong predictor of how young adults consume alcohol. A prospective study of young adults (19 to 25 years old) found that peer alcohol use predicted binge drinking but not total drinks per week (Andrews et al., 2002). Among young adults who met problem drinking criteria, a larger social network of heavy drinkers was associated with higher levels of binge drinking (Delucchi et al., 2008). Level of close friends' drinking predicts increased drinking in the first semester of college (Talbott et al., 2012). Peer alcohol use is an important contributor to young adult heavy drinking.

Research from adult and treatment samples indicates that it is not merely the presence of peer drinking in a social network (i.e., exposure to peers drinking at a party) that influences consumption. Alcohol-specific social support (i.e., heavy drinking close friends) may have a more direct impact (Longabaugh et al., 2010). Friends who are supportive of drinking can encourage alcohol misuse (Beattie and Longabaugh, 1997). Findings from the Combining Medications and Behavioral Interventions (COMBINE; Anton et al., 2006) trial provide further evidence of the specific impact of having heavy drinkers in-network. Alcohol-specific support, measured by network drinking and level of opposition to patient drinking, was predictive of percent days abstinent (PDA; Longabaugh et al., 2010). Though the percentage of heavy drinkers in network did not predict the PDA latent growth trajectory, the number of daily and frequent drinkers in-network did (Longabaugh et al., 2010). The number of frequent drinkers was negatively related to PDA for within treatment and post-treatment outcomes (Longabaugh et al., 2010). Therefore, whereas the proportion of heavy drinkers was unrelated to outcome, the total number of heavy drinkers in-network may have a unique impact on personal alcohol consumption.

Personal consumption is also related network composition. In a cross-sectional study of 471 couples prior to marriage, heavy drinkers' social networks had a different composition than the networks of regular and lighter drinkers (Leonard et al., 2000). Heavy drinkers'

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networks contained more "drinking buddies," defined as a person who "you got together with on a regular basis to do activities centered around drinking" (Leonard et al., 2000). These "drinking buddies" are comparable to the heavy drinkers identified in COMBINE and further highlight the importance of the number of heavy drinkers in-network. In contrast, Reifman and colleagues (2006) used percentage of heavy drinkers in-network to recursively predict alcohol misuse. Higher percentages of "drinking buddies" in-network were associated with college students' drinking longitudinally (Reifman et al., 2006). The authors note, however, that other literature (e.g., Leonard and Mudar, 2003) has demonstrated that key individuals in a network, rather than the entire network, are most influential. Overall, most research has identified the number of heavy/frequent drinkers as the most important predictor of an individual's alcohol use trajectory. The proportion of heavy drinkers is a useful predictor specifically of autoregressive associations between network composition and alcohol misuse but was unrelated to COMBINE treatment outcome (Reifman et al., 2006; Longabaugh et al., 2010). Heavy drinkers in-network may be uniquely predictive of personal alcohol consumption.

Despite the clear association between network composition and alcohol consumption, little is known about the evolution of social networks over time. One study examined whether changes in college students' drinking were the result of fluctuations in current members' drinking or of participants dropping and adding network members with different drinking levels (Reifman et al., 2006). Changes in network drinking resulted from adding new members and dropping others (Reifman et al., 2006). Thus, it is important to consider *how many* heavy drinkers are in-network and to consider *whether* members are being incorporated over time.

This study sought to determine whether different trajectories could be identified that represent how college students include heavy drinkers in their social networks. Trajectory analysis using social network data has not been used to explain the longitudinal impact of peers on alcohol consumption. Given the significant temporal variability in drinking over the academic year (Del Boca et al., 2004), it is important to consider how students' network composition and alcohol consumption concurrently change. First, we sought to explore patterns in the composition of college students' social networks over one year. Specifically, we examined whether different trajectories could be identified by how many heavy drinkers were included in networks.

If different trajectories could be identified, we sought to determine whether they were associated with different levels of alcohol consumption and drinking norms. Descriptive drinking norms are a key factor in understanding how social context influences personal alcohol consumption. Norms are defined as "self-instructions to do what is perceived to be correct by members of a culture" (Solomon and Harford, 1984, p. 460); descriptive norms are perceptions of what others do, including estimates of others' alcohol consumption. College students often overestimate drinking norms (Borsari and Carey, 2003); this overestimation predicts current and future drinking (Carey et al., 2006; Neighbors et al., 2007). Descriptive norms, therefore, are important to consider when examining network composition and network effects. Students who incorporate more heavy drinkers are likely to concurrently increase their descriptive norms. Research has not investigated the relationship between network composition and drinking norms. Second, we sought to determine whether trajectory classes had different levels of alcohol consumption and norms over one year.

To accomplish these goals, we measured alcohol consumption, norms, and social network composition during the baseline, 6-month (6M), and 12-month (12M) follow-up appointments of a randomized controlled trial of alcohol prevention interventions for

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mandated college student drinkers (Carey et al., 2011). After identifying trajectory groups, we compared groups on alcohol consumption and descriptive norms at baseline, 6M, and 12M.

## 2. Method

### 2.1 Participants

Participants were students enrolled in a private university who had violated campus alcohol policy and were required to complete an alcohol intervention program. Participants were eligible if the violation was a first, on-campus disciplinary, alcohol-related violation. A total of 677 students consented and were randomized into one of four conditions: two computer-based interventions, one face-to-face motivational feedback-based intervention, and one wait-list control condition. The Consolidated Standards of Reporting Trials (CONSORT) diagram is available in the published main outcomes report (Carey et al., 2011). Of the 677 participants who completed baseline, 96% completed 1-month assessments, 58% at 6-months, and 68% at 12-months. Demographics and condition were unrelated to attrition. To control for any differential effects an intervention delay may have had, participants in the delay condition ($n = 174$) were excluded from these analyses. A total of 503 participants were included in this study. The current sample was primarily white (85%), male (64%), and freshman (64%).

### 2.2 Measures

**2.2.1 Demographics—**Participants provided information about age, gender, year in college, and racial and ethnic background.

***2.2.2 Brief Important People Interview* (BIPI; Adapted from Zwyiak et al., 2002)—**The BIPI is a shortened form of the Important People and Activities Interview (Clifford and Longabaugh, 1991), which was administered in Project MATCH (Project Match Research Group, 1997) and the COMBINE trial (Anton et al., 2006), and measured social support for drinking. The BIPI retained the components of the original interview that best predicted treatment response in COMBINE. Administration followed the BIPI manual (Zywiak and Longabaugh, 2002), with slight adaptations to tailor the assessment to college drinkers. As in COMBINE, participants identified up to 10 network members. At baseline, 6M, and 12M, participants listed up to 10 important friends, defined in the current study as "friends on-campus that have been important to you and with whom you have had regular face-to-face contact during the past six months," in their current social network. For each person listed, the participant specified the nature of the relationship (e.g., friend, significant other/partner), frequency of contact, and drinking status (e.g., light, moderate, or heavy drinker). The total number of heavy drinkers identified by each participant was used in these analyses.

**2.2.3 Alcohol use—**A standard drink was defined as a 12 oz. can or bottle of beer; a 5 oz. glass of wine; or a 1.5 oz. shot of hard liquor either straight or in a mixed drink. The baseline assessment covered the month prior to and including the sanction violation event. Subsequent assessments covered the 30 days prior to the assessment. The Daily Drinking Questionnaire (Collins et al., 1985) used a 7-day grid to assess typical week drinking.

**2.2.4 Drinking norms—**Perceived drinking norms of typical on-campus student drinking in the past 30 days were assessed with the Drinking Norms Rating Form (DNRF: Baer et al., 1991). Participants estimated the number of drinks they think the typical college student consumes on each day of the week. Perceived weekly descriptive drinking was calculated by summing the daily estimates to create a total perceived weekly drinking variable.

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### 2.3 Analysis Plan

A series of five growth mixture models (GMMs) was conducted to discern distinct groups of individuals with similar levels of heavy drinkers in-network from baseline through 12M. Analyses were conducted using Mplus version 5 (Muthèn and Muthèn, 1998–2009). Models with 1–5 growth classes were fit. Missing data was handled using the Maximum Likelihood (ML) method, which is a best practice strategy for managing missing data (Schafer and Graham, 2002). Gender and intervention condition were controlled. Gender was controlled, because it is a known college drinking correlate, and we wanted to model overall change patterns. Intervention condition was controlled to remove the potential influence of changes in drinking related to intervention condition. We chose model fit statistics based on recommendations from a Monte Carlo study that determined the most appropriate fit indices for GMM (Nylund et al., 2007) and four recommended criteria (Muthén and Muthén, 2000).

The first criterion was the Bootstrapped Parametric Likelihood Ratio Test (BLRT; McLachlan and Peel, 2000). The BLRT extrapolates data to represent better the true distribution; it tests for model improvement in each successive model over a model with one fewer class (Nylund et al., 2007). The second criterion was the Sample Size Adjusted Bayesian Information Criterion (saBIC; Sclove, 1987). The saBIC maximizes the likelihood ratio statistic while rewarding parsimony. Low values indicate better model fit, and the model with the lowest saBIC is generally preferred (Muthèn and Muthèn, 2000).

Third, entropy values provided an index of model classification quality. Values range from 0 to 1; higher values indicate better classification quality (Celeux and Soromenho, 1996). Values greater than 0.80 are generally considered to have adequate classification quality (Jung and Wickrama, 2008). The fourth criterion was the average latent class probabilities for the most likely latent class membership by latent class discrimination. Values close to 1 in the primary diagonal and values close to 0 in off-diagonal represent good fit. Values close to 0.50 indicate that individuals in a particular group would fit equally well in another group. These values provide an index of how likely the individuals within a latent class belong in that class. The usefulness of the GMM classes to differentiate participants on variables of interest was also considered. We were interested in a model that could be used to differentiate levels of drinking and norms at 6M and 12M. Final model selection was based on goodness of model fit indices, parsimony, and substantive interpretability of the model.

Wald tests of mean equality determined whether classes had different levels of alcohol consumption and norms at baseline, 6M, and 12M (Asparouhov, 2007). Wald tests use chi-square ($\chi^2$) to compare latent groups with a posterior probability-based multiple imputation strategy. These analyses are conducted simultaneously with GMMs and allow consideration of the probabilistic class membership of participants to control error. Finally, we examined baseline to follow-up differences in drinking and norms within each latent class by calculating within-class change scores (Change Score = follow-up – baseline) and then conducting one-sample t-tests to compare the change within each class to zero.

## 3. RESULTS

### 3.1 Sample Characteristics

Participants reported an average of 13.55 drinks per week (SD = 9.95) and 4.67 drinks per drinking day (SD = 2.54) at baseline. Participants believed their peers drank an average of 19.27 drinks per week (SD = 10.84). Participants reported an average of 7.30 (SD = 1.99) total friends in their social networks at baseline. Female participants reported an average of 7.53 (SD = 1.89) friends and male participants reported 7.19 (SD = 2.00) friends. Participants reported an average of 1.52 (SD = 1.69, range 0 – 10) heavy drinking friends. Female participants reported an average of 1.41 (SD = 1.58) heavy drinkers, and males

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reported 1.49 (SD = 1.66) heavy drinkers. There were no significant differences in the number of friends ($t$ (500) = −1.85, $p$ = 0.06) or heavy drinkers reported by males and females ($t$ (500) = 0.60, $p$ = 0.55).

### 3.2 Growth Mixture Model Results: Trajectory Identification

A series of 1- through 5-class GMMs were compared (see Tables 1 and 4). Based on model fit and interpretability, the 4-class model was the best fitting model. Compared to the 5-class model, the 4-class model had similar saBIC and entropy values. Although the BLRT suggests that the 5-class model is an improvement over the 4-class model, the 5-class model included a class with only 4 participants (i.e., 0.80% of the sample), which is not substantively interpretable. The 4-class model showed near perfect average latent class probability for the most likely latent class membership by latent class discrimination (see Table 4), indicating that the 4-class model was a good representation of participant reports.

The 4-class model created the following groups (see Figure 1): (1) a small group that reported a *severely increasing drinking network* (SIDN: n = 10): mean heavy drinkers at baseline = 2.00, 6M = 2.90, 12M = 6.60; (2) a group that reported a *moderately increasing drinking network* (MIDN: n = 32): mean heavy drinkers at baseline = 2.40, 6M = 2.01, 12M = 4.37; (3) a large group that reported a *stable drinking network* (SDN: n = 107): mean heavy drinkers at baseline = 1.48, 6M = 1.46, 12M = 2.39; and (4) a larger group that reported a *decreasing drinking network* (DDN: n = 353): mean heavy drinkers at baseline = 1.35, 6M = 0.55, 12M = 0.17.

### 3.3 Class Comparison of Drinking and Drinking Norms

Mean drinks per week (DPW) and mean perceived drinks per week (descriptive norms (DN) at baseline, 6M and 12M are presented in Table 2 for each group. Table 3 presents Wald test results for group differences in DPW and DN. One group difference emerged in the comparisons of baseline DPW and DN. MIDN and DDN differed on baseline DN, with the MIDN group reporting higher DN [M = 23.23 (SE = 2.02)] than the DDN group [M = 18.75 (SE = 0.57)]. Overall, the groups reported similar consumption and norms at baseline. In contrast at 6M, there were group differences in DPW ($\chi^2$ (3) = 18.99, $p$ < 0.001) and DN ($\chi^2$ (3) = 22.67, $p$ < 0.001). At 6M, most groups differed significantly on DPW and DN. All pairwise differences were significant on DPW with two exceptions. SIDN did not differ from MIDN or SDN. At 6M, all pairwise differences were significant on DN with two exceptions. MIDN did not differ from SIDN or SDN. Similarly, at 12M, there were overall group differences in DPW ($\chi^2$ (3) = 18.98, $p$ < 0.001) and DN ($\chi^2$ (3) = 24.51, $p$ < 0.001). At 12M, most groups differed significantly from one another on both DPW and DN. All pairwise differences were significant on 12M DPW with two exceptions. SDN did not significantly differ from either MIDN or DDN. Similarly, all pairwise differences were significant on 12M DN with two exceptions. SDN did not differ from DDN, and SIDN did not differ from MIDN. Despite similar DPW and DN among the groups at baseline, by 6M and 12M, participants with networks that grew more rapidly and contained more heavy drinkers consumed more drinks in a typical week and had higher norms.

All latent classes demonstrated changes from baseline to 12M on DN and DPW (see Table 5). Again, the two groups that incorporated the most heavy drinkers had the largest increases on DN and DPW, whereas the DDN group reported decreases in drinking and norms.

## 4. DISCUSSION

The results of this study suggest statistically and clinically significant heterogeneity in changes in the number of heavy drinkers in college students' social networks. Trajectories were identified by differential incorporation of heavy drinkers into networks and were

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related to alcohol consumption and descriptive norms. At baseline, there were minimal group differences on alcohol consumption or norms. At 12M, the groups that had incorporated more heavy drinkers reported higher consumption and norms.

This study represents the first attempt to identify trajectories in how heavy drinkers are incorporated into college drinkers' social networks. Most students (70%) demonstrated the DDN trajectory. These students reported fewer heavy drinking friends at each follow-up. The next largest group demonstrated the SDN trajectory (21%). They maintained similar numbers of heavy drinkers from baseline to 6M and slightly increased at 12M. A minority of students were in two trajectories that dramatically increased the number of heavy drinkers. A total of 32 participants (6%) were in the MIDN trajectory, and 10 participants (2%) were in the SIDN trajectory. These groups differentiated themselves by the number of heavy drinkers at 12M (4.37 vs. 6.60), representing 1/3 to 1/2 of the maximum of 10 friends in-network. Approximately 8% of our sample reported marked increases in the number of heavy drinkers in their networks.

Our finding that most students had social networks that were stable or decreased in heavy drinkers is consistent with college alcohol intervention research. Meta analysis results indicate that individual-level alcohol interventions reduce consumption (Carey et al., 2007). Therefore, while the natural course of alcohol consumption increases during college (Park et al., 2009), those who receive interventions are more likely to reduce or keep their drinking stable. Consistent with this, the DDN class reported a slight decrease in alcohol consumption from baseline to 12M.

Some students increased the number of heavy drinkers in their networks. This is consistent with research indicating that alcohol consumption increases during college (Park et al., 2009; Wood et al., 2007). Some students consistently increase their binge drinking after age 18 (Schulenberg et al., 1996) and coping drinking motives are associated with increased binge drinking after high school (Patrick and Schulenberg, 2011). Our results may provide some explanation for these findings.

Students who increase drinking during college may affiliate with more students perceived to be heavy drinkers or may identify more in-network members as heavy drinkers. Selection effects have been shown across studies; own drinking predicts in-network drinking (Bullers et al., 2003; Reifman et al., 2006). Social influence effects could also play a role. Social learning theory would suggest that exposure to heavier drinkers influences own attitudes and behaviors about drinking. Thus, exposure to heavy drinkers could impact one's perception about what a heavy drinker is and cause a re-labeling of others in-network. It is known that elevated drinking norms predict consumption (Perkins et al., 2005). Elevated norms may also impact who is labeled as an in-network heavy drinker.

This study also sought to determine whether network composition changes were related to alcohol consumption and norms. By 12M, the latent groups had different levels of consumption and norms. The SIDN reported more alcohol consumption than all other groups and higher perceived norms than the SDN and DDN groups. Therefore, the group that incorporated the most heavy drinkers also had the largest increase in drinking and norms. At 12M, there were no differences between the SDN and DDN groups. When the number of heavy drinkers in one's network remained stable or decreased, students either decreased consumption (−0.29 in DDN) or increased to a much smaller degree (e.g. change of 1.15 in SDN versus 10.23 in SIDN). Normative perceptions also decreased or remained lower, providing some protection against increases in drinking (Carey et al., 2006).

Utilizing count data has several advantages over the use of other social network variables, including proportion of heavy drinkers. First, it is the influence of "key individuals" that

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impacts drinking, rather than the entire network (Leonard and Mudar, 2003). Second, the count of heavy drinkers is easier to collect and use in time-limited clinical settings than calculating proportions. Third, the count of heavy drinkers is less ambiguous than the proportion. For example, a person whose network changed from 2 heavy drinkers out of 2 total individuals to 6 heavy drinkers out 6 total individuals would remain at 100%, though the count increased by 4 drinkers. The same is true of someone who changes from 2 out of 3 to 6 out of 8; there is an overall loss of information compared to the count.

Our findings should be considered in light of study limitations. First, results rely on self-reports of alcohol consumption, norms, and network composition. Studies have supported the validity of drinking self-report data (Borsari and Muellerleile, 2009), but studies do not exist on the accuracy of reporting on network composition. Despite confidentiality assurances, some students may have under-reported their friends' drinking habits. The BIPI relied on subjective classification of friends into drinking categories. Students' criteria for heavy drinking may vary and may be elevated given the exaggerated descriptive norms observed in college samples. Students' estimates of who is a heavy drinker may be underestimates relative to an objective assessment. Emerging adults' definitions of "heavy drinker" may change; if so, the shape of the trajectories may have been impacted. These potential biases could have impacted the latent class composition and should be replicated to verify the number and shape of the classes. Second, this was a sample of mandated students. Replication using a larger sample of students who are not mandated would enhance the generalizability of these findings. Replication using a sample of non-college attending peers would also help determine how these trajectories differ by student status. Lastly, because this study is the first to examine these relationships, these results should be replicated, particularly because one class was small (i.e., 10) and, as such, could be unstable. Despite this potential limitation, there are no recommendations for the number of participants that should be in a class to ensure stability (Nylund et al., 2007), and our model fit indices were good and indicated that the 4-class model represented the best fit.

In summary, college students exhibit markedly different trajectories in the way heavy drinking peers are incorporated into their social networks. Trajectories are related to subsequent group differences in alcohol consumption and descriptive norms. Students with increasing trajectories report more alcohol consumption and higher norms than students with stable or decreasing trajectories. These findings suggest that a key risk factor for increasing alcohol involvement during college could be the number of heavy drinkers in a student's social network. The inclusion of social network assessments into harm reduction interventions could provide important insight into the trajectory of a student's alcohol consumption.

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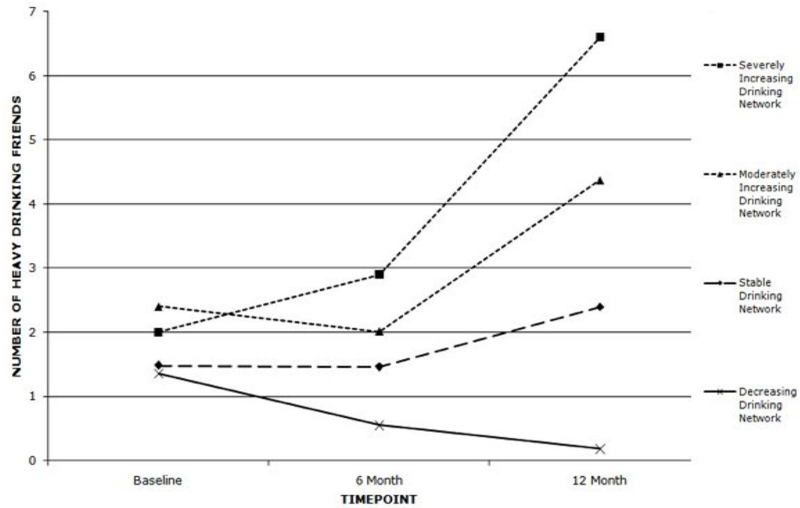


**Figure 1.**
4-class growth mixture model of number of heavy drinking friends across study

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**Table 1**

Comparison of Overall Model Fit Indices for 1- through 5-class Growth Mixture

| **Number of Classes** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| SABIC | 5582 | 5430 | 5260 | 5142 | 5120 |
| Entropy | 1 | 0.89 | 0.96 | 0.99 | 0.99 |
| BLRT | | | | | |
| $\chi^2$ | -- | 161.61 | 178.73 | 127.93 | 30.41 |
| DF | | 3 | 3 | 3 | 3 |
| P | | .00 | .00 | .00 | .00 |
| Class Counts | | | | | |
| 1 | 502 | 85 | 41 | 107 | 107 |
| 2 | | 417 | 353 | 10 | 10 |
| 3 | | | 108 | 32 | 353 |
| 4 | | | | 353 | 28 |
| 5 | | | | | 4 |

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## Table 2

Means and Standard Errors of Latent Groups for 4-Class Growth Mixture Model

| | Baseline DPW | 6-Month DPW | 12-Month DPW | Baseline DN | 6-Month DN | 12-Month DN |
|---|---|---|---|---|---|---|
| | **M (SE)** | **M (SE)** | **M (SE)** | **M (SE)** | **M (SE)** | **M (SE)** |
| SIDN (N = 10) | 19.92 (3.77) | 20.51 (3.47) | 30.15 (4.98) | 23.30 (3.34) | 29.72 (3.35) | 32.72 (5.89) |
| MIDN (N = 32) | 16.44 (1.80) | 20.55 (2.43) | 18.59 (1.99) | 23.23 (2.02) | 25.08 (2.41) | 28.23 (2.08) |
| SDN (N = 107) | 13.32 (.98) | 14.48 (1.26) | 14.47 (1.12) | 19.40 (1.06) | 21.25 (1.47) | 20.73 (1.17) |
| DDN (N = 353) | 13.18 (.52) | 11.66 (0.74) | 12.81 (.69) | 18.75 (.57) | 7.51 (0.77) | 18.60 (.76) |

*Note:* DPW = Drinks Per Week; DN = Descriptive Norms; SIDN = Severely Increasing Drinking Network; MIDN = Moderately Increasing Drinking Network; SDN = Stable Drinking Network; DDN = Decreasing Drinking Network.

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**Table 3**

Tests of Group Differences on Baseline and Follow-up Alcohol Consumption and Descriptive Norms.

| | **Baseline DPW** | **6-Month DPW** | **12-Month DPW** | **Baseline DN** | **6-Month DN** | **12-Month DN** |
|---|---|---|---|---|---|---|
| | $\chi^2$ | $\chi^2$ | $\chi^2$ | $\chi^2$ | $\chi^2$ | $\chi^2$ |
| Overall | 6.02 | 18.99*** | 18.98*** | 6.12 | 22.67*** | 24.51*** |
| SIDN vs. MIDN | .69 | 0.00 | 4.65* | 0.00 | 1.25 | .57 |
| SIDN vs. SDN | 2.87 | 2.67 | 9.45** | 1.24 | 5.36* | 4.41* |
| SIDN vs. DDN | 3.13 | 6.22* | 11.93** | 1.80 | 12.62*** | 6.27* |
| MIDN vs. SDN | 2.31 | 4.84* | 3.25 | 2.80 | 1.82 | 9.88** |
| MIDN vs. DDN | 3.04 | 12.20*** | 7.57** | 4.56* | 8.97** | 19.01*** |
| SDN vs. DDN | .02 | 3.71* | 1.59 | .29 | 5.09* | 2.33 |

Note:

* $p < .05$,

** $p < .01$,

*** $p < .001$;

DPW = Drinks Per Week; DN = Descriptive Norms; SIDN = Severely Increasing Drinking Network; MIDN = Moderately Increasing Drinking Network; SDN = Stable Drinking Network; DDN = Decreasing Drinking Network.

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**Table 4**

Average Latent Class Probabilities for most likely latent class membership by latent class for the 4-class growth mixture model.

| | SIDN | MIDN | SDN | DDN |
|---|---|---|---|---|
| SIDN | .998 | .002 | .000 | .000 |
| MIDN | .000 | .997 | .003 | .000 |
| SDN | .000 | .002 | .998 | .000 |
| DDN | .000 | .000 | .002 | .998 |

*Note:* SIDN = Severely Increasing Drinking Network; MIDN = Moderately Increasing Drinking Network; SDN = Stable Drinking Network; DDN = Decreasing Drinking Network.

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### Table 5

Within class changes in drinking and descriptive norms from baseline to 12M follow-up.

| | N | FU - BL | SD | SEM | t | df | p | 95% CI |
|---|---|---|---|---|---|---|---|---|
| Drinks per Week | | | | | | | | |
| SIDN | 10 | 10.23 | 3.74 | 1.18 | 8.64 | 9 | .00 | 7.55, 12.91 |
| MIDN | 32 | 2.15 | 1.85 | .33 | 6.56 | 31 | .00 | 1.48, 2.81 |
| SDN | 107 | 1.15 | 1.05 | .10 | 11/24 | 106 | .00 | 0.94, 1.35 |
| DDN | 353 | −0.29 | .70 | .04 | 7.72 | 352 | .00 | 0.21, 0.36 |
| Descriptive Norms | | | | | | | | |
| SIDN | 10 | 9.42 | 4.10 | 1.29 | 7.26 | 9 | .00 | 6.48, 12.36 |
| MIDN | 32 | 5.34 | 1.62 | .29 | 18.64 | 31 | .00 | 4.76, 5.93 |
| SDN | 107 | 1.34 | 1.06 | .10 | 13.00 | 106 | .00 | 1.13, 1.53 |
| DDN | 353 | −0.89 | .72 | .04 | 23.25 | 352 | .00 | 0.82, 0.97 |

*Note:* FU = follow-up; BL = Baseline; SIDN = Severely Increasing Drinking Network; MIDN = Moderately Increasing Drinking Network; SDN = Stable Drinking Network; DDN = Decreasing Drinking Network.