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Trajectory classes of heavy episodic drinking among Asian American college students

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Abstract

Aims—Heavy episodic drinking (HED) among Asian Americans is a growing concern. However, little is known about the etiology and developmental patterns of HED among Asian Americans, even though this group is one of the fastest-growing populations in the United States.

Design—Three year longitudinal design.

Participants—Sample included 404 Asian American college students transitioning from high school, through the college years.

Measurement—Measures included heavy episodic drinking, parental and peer relationships, alcohol expectancies, drinking values, and alcohol-related problems.

Findings—Results from growth-mixture models (GMM) identified two discrete latent classes of HED comprising 59% of our sample: these trajectory classes (high increasers and low increasers) corresponded to expected changes and stability in well-established correlates of drinking behaviour, including alcohol-related problems, personal drinking values and alcohol expectancies. Parental awareness and caring and quality of peer relationships during senior year of high school were associated directly and indirectly with HED class membership.

Conclusion—These findings advance the literature by providing information about the developmental course of HED among Asian American young adults. The significant within-group variability in problematic drinking in this sample highlights the fact that subgroups of high-risk drinkers can be identified even in relatively low-risk groups such as Asian Americans.

Keywords

Alcohol; Asian Americans; heavy episodic drinking; longitudinal

INTRODUCTION

Heavy episodic drinking (HED), defined typically as five or more drinks for men or four or more for women, is a significant problem on college campuses [1]. HED has been linked to a number of serious clinical and public health problems including suicide, violent behaviors, motor vehicle accidents and sexually transmitted diseases [2,3]. Based on available samples

at many universities, the vast majority of research has focused upon higher-risk Caucasian college students. As such, limited research has focused upon identifying high-risk youth within ethnic-minority college samples. This is a topic of critical importance, as high-risk subgroups may exist even within populations that are at low collective risk. For example, Asian Americans are a relatively low-risk group overall, but subgroups of Asian Americans have been found to be at relatively high risk [8]. Further, emerging research indicates that alcohol-related problems are increasing for this group [4–8]. Recent studies indicate that the prevalence of alcohol abuse and dependence have increased significantly from 1991–92 to 2001–02 among 18–29-year-old Asian American men (4.09–10.22%) and women (0.74–3.89%) [9].

Despite recent research documenting increased prevalence of alcohol problems in this population, little knowledge exists regarding the developmental patterns of HED among Asian Americans. Failure to address HED and its related problems among Asian Americans may reflect the ‘model minority myth’, or the false belief that all Asian Americans are academically and economically well off and experience minimal substance abuse [10]. Failure to acknowledge high-risk subgroups within this population may have significant negative public health consequences, as Asian Americans are one of the fastest-growing populations in the United States [4].

Thus, it is important to examine the developmental courses of HED in Asian Americans, which allows for identification of distinct subgroups for whom drinking is problematic [11–13]. Theoretical models of alcohol highlight the importance of charting the developmental course of drinking and distinguishing patterns of drinking that are normative from those that are problematic [11,14]. Previous research has identified three to six classes of drinkers among emerging adults (aged 18–25 years) [15,16], but these studies have not explicated possible racial differences in trajectory classes. The current study extends the literature by using growth mixture modeling to identify distinct developmental trajectories of HED among Asian Americans transitioning from senior year of high school to the third year of college.

PARENTAL AND PEER INFLUENCE ON HEAVY DRINKING

In addition to identifying high-risk patterns of drinking among Asian Americans, it is critical to identify potentially modifiable factors that contribute to these patterns. There is evidence for such as communication and caring/awareness regarding the child’s activities and social group [17,18]. Parental factors include parental communication and caring/awareness regarding the child’s activities and social group. These parental behaviors allow parents to help their children regulate and establish norms about their drinking behavior [19]. Low parental involvement increases the risk for binge drinking [17,20], and this appears to be equally true for Asian American youth. Lower parental attachment and support have been found to increase the odds of heavy drinking among Asian American adolescents [21], and parental influence remains strong among Asian American college students [22]. Unfortunately, little is known about the mechanisms through which parents may serve a protective function in this population. Previous studies suggest that individuals develop drinking values and model drinking behavior on their parent’s behaviors and beliefs [23,24], and parents who communicate openly and monitor the behavior of their children may convey (either explicitly or implicitly) less permissive values regarding alcohol consumption. Thus, personal values about the acceptability of alcohol use may be one factor that serves to mediate parental influence.

Like parents, peers might protect against heavy drinking through awareness and caring about engagement in high-risk behavior [19]. Peers might encourage their friends to drink in

moderation or express disapproval of heavy drinking. There is evidence that suggests that peer awareness and caring influence individuals' behaviors and decision making [25]. Another possible risk/protective peer factor is quality of peer relationships [25,26; Patel A., Harden E., Fromme K., unpublished data], as a breakdown in quality of peer relationships increases alcohol use [27,28]. Although these data are compelling, other findings suggest that the association between quality of peer relations and alcohol use is more complex. Bartholow, Sher & Krull [29] found that relationship quality was rated high when individuals 'bonded over drinks', suggesting that high-quality peer relations may relate to heavier drinking due to shared expectations regarding the social benefits of drinking. This idea is consistent with a large body of evidence indicating that positive alcohol expectancies (beliefs about the benefits of drinking) are robust predictors of drinking outcomes [30–32]. Thus, expectancies may serve to mediate the influence of peer relations on drinking behavior.

METHOD

Participants

A sample of 404 Asian American students were drawn from a larger sample of 2245 incoming freshmen participating in a longitudinal study (eight biannual surveys from senior year of high school to junior year, and once during senior year of college). Fifty-seven per cent ($n = 232$) of the participants were female, and 71% attended high school in Texas. A majority lived in on-campus dormitories during freshman year (80%) and only 4% lived with parents or legal guardians. The current study used data from wave 1 (senior year of high school) to wave 7 (spring of junior year of college).

Measures

Demographics—The demographic information relevant to the current study included race/ethnicity and sex.

Heavy episodic drinking (HED)—HED was defined as consuming five or more drinks for men (four or more drinks for women) on a single occasion [33]. The first wave of data was collected prior to the new standard set by NIAAA (within a 2-hour period). At all waves, men responded to the count variable 'During the last 3 months, how many times did you have five or more drinks in a sitting?', while women were asked about having 'four or more drinks in a sitting'.

Parental awareness/caring and communication [17]—The measure of parental awareness/caring during high school included six items ($\alpha = 0.93$) regarding how often there was an adult (e.g. parent, guardian) who knew and cared about the student's behavior (e.g. where the student was going, if the student drank alcohol). Parental communication consisted of four items ($\alpha = 0.67$) evaluating the level of communication between the student and parents (e.g. discussing what the student did at nights or at weekends).

Peer awareness/caring, and quality of peer relationships [17]—The measure of peer awareness/caring during high school comprised seven items ($\alpha = 0.94$) regarding the extent to which members of the student's social group knew and cared about their behavior (e.g. whether or not they were having sex or drinking). A social group was defined as 'the principal group of friends with whom you interact and spend time (i.e. more than just your best friends but not everyone you hung out with)'. Quality of peer relations was measured with five items ($\alpha = 0.89$), such as 'you could count on your social group to help you with a problem?'.

Alcohol expectancies—The 15-item Brief Comprehensive Effects of Alcohol questionnaire [34] was used to evaluate positive alcohol expectancies during high school. Subscales included liquid courage, sociability, tension reduction and enhancement of sexual experiences. The internal consistency estimates for the subscales were good ($\alpha = 0.80$ and 0.91). The current study used a sum of the four positive subscales.

Drinking values—Adapted from Perkins & Berkowitz [35], participants were asked to report their personal drinking values regarding alcohol use. The high school measure consisted of four items ($\alpha = 0.71$) using a five-point Likert scale (e.g. ‘it is okay if I get drunk as long as it doesn’t interfere with my grades or responsibilities’).

Alcohol-related problems—The 23-item Rutgers Alcohol Problem Index (RAPI) [36] assessed the frequency of problems (i.e. relationship, academic, work) resulting from the individual’s alcohol consumption. Internal consistency estimates for the RAPI ranged from 0.90 to 0.93 over time.

Recruitment and data collection procedures

Participants were recruited during summer freshman orientation and eligible students were between 17 and 19 years of age, first-time college students and unmarried. The first survey was completed during the summer prior to college matriculation (regarding senior year of high school). Online surveys were administered each academic semester to the fall of the third year in college and once during fall semester of senior year. If participants did not complete the survey within 10 days, e-mail reminders were sent by the web administrator. Additional details of recruitment procedures are reported in previous studies [37–39].

Data analytical plan

The primary analyses comprised three steps. First, growth mixture modelling (GMM) using Mplus 5 [40] was performed to identify latent trajectory classes of HED. GMM is designed to identify relatively homogeneous clusters of individuals who have similar growth parameters (i.e. slope and intercept), and to provide estimates of the probability of latent class membership [41]. Growth patterns were modeled over seven time-points, and both linear and quadratic models were tested. Because HED was a count variable and positively skewed, we used a Poisson estimator (positively skewed data with low mean values) [42,43] to avoid overextraction of latent trajectory classes [44]. Missing data were handled by full maximum likelihood estimation, based on evidence that the data were missing at random, $\chi^2_{(1155)} = 1117.83$, $P < 0.78$ (Little’s MCAR test in the SPSS missing values program) [45].

The Bayesian information criterion (BIC) and bootstrap likelihood ratio test (BLRT) were used to identify the best model fit [41,46]. The BIC has been found to be superior to other information criteria indexes (i.e. Akaike’s information criterion) in identifying number of classes [46]. Lower absolute values of BIC indicate better fit. BLRT ‘uses bootstrap samples to estimate the distribution of the log likelihood difference test statistic’ (Nylund *et al.* 2007, p. 538), comparing the increase in model fit between the $k-1$ models and k class models. We also required that all latent classes have a prevalence of at least 5% to ensure sufficient sample size for comparing latent growth classes in later analyses [12].

After the latent classes were identified, changes in personal drinking values, expectancies and alcohol-related problems were plotted by HED trajectory class to evaluate the validity of the classes. In the third step, path analyses were used to investigate the direct and indirect effects of high school parental and peer influences on HED classes through the intervening variables of high school drinking values and expectancies. Bias-corrected bootstrap confidence interval tests were used to test for indirect effects [47,48].

RESULTS

Identification of HED classes

Individuals who never engaged in HED at any time-point were not included in the GMM, as their growth rate was already known ('abstainers'; 41% of total sample). The remaining sample size of 237 was deemed to have adequate power, as the number of classes tends to stabilize with sample sizes of 200 or more [49,50]. A series of analyses tested models with two to three classes. Models with four or more classes failed to converge, indicating that they were unstable and unable to replicate. Based on the BIC and bootstrap likelihood ratio tests, the linear two-class solution was deemed the most parsimonious and interpretable model (Table 1), with posterior probabilities of class membership ranging from 0.87 to 0.90. Trajectories for the two classes are presented in Fig. 1.

The 'high increasing' class (30.6% of the sample) engaged in HED roughly four times every 3 months during high school but increased significantly to nearly three times a month by the end of their junior year. The 'low increasing' class (28% of the sample) did not engage in HED in high school but increased their HED throughout college to around twice every 3 months by their junior year. In addition, it appears that there was a spike in HED as students approached their 21st birthdays.

Validation of HED classes

Trajectory classes were validated with respect to expected changes in alcohol-related behaviors and attitudes over time [3,16]. Alcohol-related problems, drinking values and expectancies were plotted to examine whether these classes were reflective of the expected changes based on trajectory classes [3,16]. The abstainers were included in these analyses for comparative purposes.

Trajectories for alcohol-related problems (Fig. 2) largely paralleled the trajectories for alcohol use. At all time-points, the high increasers were at greatest risk and the abstainers were at lowest risk. The high increasers showed an increase in alcohol problems from high school to freshman year, which leveled off until junior year when problems again escalated. During high school, the low increasers and abstainers reported no alcohol problems. However, over the following 3 years the low increasers began to engage in HED and reported more problems related to their drinking.

The patterns for drinking values by classes were also congruent with patterns of HED, although drinking values became more permissive for all groups over time. The largest increases in drinking values occurred for the low increasing group, although absolute levels of permissiveness were higher for the high increasers at every time-point. The most notable difference between values and HED was that the low increasers had higher values than abstainers in high school, even though neither group reported engaging in HED.

The pattern of expectancies across latent classes was consistent with the pattern for HED. During high school, all groups differed in levels of expectancies, with the high increasers reporting the highest, followed by the low increasers and abstainers. Although the abstainers reported the least positive expectancies at all time-points, there was much less clear separation between groups, and all the groups' expectancies slightly increased over the 3 years.

Path analysis

Two path analyses examined direct and indirect effects of high school peer and parental influences on HED trajectory classes through the intervening variables of high school

personal drinking values and expectancies. In the first path analysis the outcome was classification of individuals who engaged in HED versus abstainers, and in the second model the low increasers were compared to the high increasers.

Heavy episodic drinkers versus abstainers

Greater perceived parental awareness/caring was associated with less permissive drinking values ($\beta = -0.14$, $P < 0.01$), while parental communication was not associated significantly with drinking values ($P = 0.08$) (Fig. 3). More permissive drinking values during high school were associated with an increased likelihood of HED ($\beta = 0.36$, $P < 0.001$), whereas parental communication ($P = 0.62$) and parental awareness/caring ($P = 0.10$) had no direct effect on HED. Indirect test revealed that parental knowledge/caring ($\alpha*\beta = -0.05$, $P < 0.01$) had effects on HED through drinking values.

Individuals with better-quality peer relationships reported more positive expectancies ($\beta = 0.20$, $P < 0.001$) and a greater likelihood of engaging in HED ($\beta = 0.23$, $P < 0.05$). Peer awareness and caring had no effect on expectancies or HED. Expectancies were associated with HED status ($\beta = 0.10$, $P < 0.05$), suggesting that HED drinkers had higher expectancies than abstainers. Although the paths from quality of peer relationships to expectancies and from expectancies to HED class were both significant, the indirect test indicated that the indirect effect was not significant ($P = 0.08$).

Low increasers versus high increasers class

The second path model predicted membership in the low increasing versus high increasing class. With respect to parental influence, only parental knowledge/caring was associated significantly with drinking values (Fig. 4), and drinking values increased the probability of being in the heavier drinking class ($\beta = 0.38$, $P < 0.001$). The indirect effect of parental knowledge/caring through values was not significant ($P = 0.06$). Quality of peer relationships was the only peer variable associated with alcohol expectancies ($\beta = 0.16$, $P < 0.05$), but expectancies were not associated with drinking class membership ($P = 0.53$).

DISCUSSION

This study is the first to identify latent trajectory classes of HED within an Asian American college sample. These findings advance the literature by demonstrating significant within-group variability in problematic drinking and highlighting subgroups of high-risk drinkers who can be identified in relatively low-risk groups such as Asian Americans. Findings further suggest the possibility of later onset of alcohol problems among Asian Americans compared to other racial groups [3], as the majority (59%) of the sample increased their HED by the end of their junior year. Although overall rates of HED were generally lower among Asian Americans than other racial/ethnic groups in this sample [37], the heaviest drinking class reported comparable rates of HED to other high-risk groups in this developmental period [15,16]. The high increasers reported engaging in HED roughly once a month during senior year in high school, and their HED escalated steadily to approximately three episodes per month by their junior year.

The low increasers did not engage in any HED in high school, but increased their drinking to over one HED per month by junior year. The later initiation and significant growth in HED throughout the college years seen in both drinking classes of Asian Americans may be reflective of a telescoped development of HED [51]. Telescoping effects or the rapid progression to clinically significant alcohol problems has been found in women, and typically occurs developmentally later than other alcohol-related problems. While it is possible that this phenomenon is present among Asian Americans, this hypothesis is

speculative and more research is needed to examine whether the escalating developmental course of HED continues beyond the college years.

Drinking values, expectancies and alcohol-related problems largely tracked with rates of heavy drinking across drinking classes. The most interesting departures from the patterns seen for HED occurred at the high-school assessment. Although rates of alcohol use were comparable for abstainers and the low increasers in high school, the low increasers reported more permissive drinking values and higher expectancies. These differences in alcohol-related cognitions may presage the divergence in trajectories that occurred over the college years. Marked increases in values and expectancies were evident over time in the HED groups, raising concerns about the potential long-term pattern of HED, particularly for the high increasing group.

Parental awareness and caring had an indirect influence on HED class, such that students whose parents were less aware of their activities tended to have more permissive drinking values, which were associated with HED. These findings support previous research showing that parental influence can protect against heavy drinking among more acculturated adolescent Asian Americans [21], and emphasize the importance of the protective role of parental awareness [18]. Contrary to study hypotheses, parental communication was not associated with HED.

Consistent with a large body of research on peer influence, aspects of peer relationships were significantly predictive of patterns of HED. Compared to abstainers, individuals engaging in HED reported higher-quality peer relationships. This is consistent with prior research, indicating that adolescents who abstain from alcohol use may be less adapted socially than their counterparts who engage in some alcohol use [52]. However, among those engaging in HED, quality of peer relationships had neither direct nor indirect effects on drinking class (high versus low increasers). Thus, whatever social benefits were conferred from being a drinker were present at the lowest levels of HED. Peer awareness and caring did not have a direct or indirect protective effect on HED. It is possible that young adults do not value the opinions of their peer network in the same way that they value parental opinions. Wetherill & Fromme [19] found that peer awareness and caring is only protective for individuals with high social motives. In other words, peer influence matters most for those who value the opinions of their social group highly [53]. Although expectancies were predictive of HED status (non-HED versus HED), they did not mediate significantly the influence of quality of peer relations on HED status.

The findings have important implications for prevention with Asian Americans. The analyses validating the classes provide support for targeting drinking values and expectancies among incoming freshmen, including those not engaged in HED. Elevated drinking values and expectancies at baseline in the two HED classes suggest that successful efforts to target these alcohol-related cognitions might help prevent the onset of HED. The fact that drinking values appeared to be an important mechanism through which parental influence operated highlights further the utility of targeting these values in prevention efforts. The results reinforce the importance of the content of parental influence beyond high school [18].

Being a drinker was associated with better quality of peer relations. Thus, another potential target of prevention efforts might be to provide alternative social activities, such as expanding hours for intramural sports or screening free movies on Friday and Saturday evenings [54,55]. Provision of more social activities that do not involve alcohol might provide a way for students to forge new social bonds without the assistance of alcohol. Prevention programs for Asian American students might incorporate both group-specific

targets (i.e. cultural aspects such as acculturation), along with the more global targets identified in the current study (i.e. drinking values and expectancies). Such an approach is supported by a recent meta-analysis indicating that interventions targeting specific cultural groups were four times more effective than interventions that included groups of all backgrounds [56].

Although the current study extends the literature on the etiology of HED among an understudied population, there are some limitations. There is great variability in drinking behavior across different Asian subpopulations (i.e. Hawaiian, Chinese) [8] that could not be accounted for in the current study. Also, the study did not include cultural measures such as acculturation that may be associated with overall levels of HED. It is important to recognize that data were obtained from a single campus and may not be generalizable to Asian American students at other universities. Additionally, while drinking classes represent changes over time, the predictors and mediators were assessed concurrently, making it difficult to draw causal inferences. A larger sample may have also allowed for the emergence of additional classes. Finally, studies might consider using a multi-dimensional alcohol-related problems measure (i.e. Young Adult Alcohol Consequences Questionnaire) [57] to examine specific problems experienced by various classes of drinkers.

Despite these limitations, the results contribute to the literature on problematic alcohol use among Asian Americans by identifying discrete trajectory classes of HED. Strengths include the relatively large sample of Asian Americans and the longitudinal design. The findings underscore the existence of subgroups of Asian Americans who engage in HED frequently, despite overall lower levels of risk. In addition, parental awareness and caring was identified as a protective factor which contributed indirectly to reduced risk of engaging in HED through the development of less permissive drinking values. Finally, results suggest that alcohol-free alternative functions, facilitating new social networks among incoming students, may have utility in reducing heavy drinking.

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Figure 1.
Heavy episodic drinking growth trajectories classes

Figure 2.
Alcohol-related problems over 3 years

Figure 3.
Heavy episodic drinkers versus abstainer. * $P < 0.05$; ** $P < 0.01$

Figure 4.
High increasers versus low increasers. * $P < 0.05$; ** $P < 0.01$

Table 1

Poisson growth mixture models of heavy episodic drinking.

Models	BIC	Log-likelihood
Linear 1-Class	6223.19	−3097.93
Linear 2-Class ^a	6228.48	−3092.36
Linear 3-Class	6250.53	−3084.69

BIC: Bayesian information criterion.

^aLinear 2-Class was deemed most parsimonious as evidenced by fit indices and interpretability.