Alcohol Use During the Transition from Middle School to High School: National Panel Data on Prevalence and Moderators

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Abstract

The movement from middle school to high school is a normative transition that is typically associated with increased social and academic stress. Theoretically, this transition may reflect a turning point in terms of initiating or sharply increasing heavy alcohol use, a notion that has received little attention in the empirical literature. The present study draws on a nationally representative dataset, National Longitudinal Survey of Youth-1997 (NLSY97), to examine the impact of the high-school transition on increases in alcohol use. The multi-wave multi-cohort design of NLSY97 permits coding of the high-school transition for 3,360 adolescents (48% female; 54% NonBlack/NonHispanic). Using latent transition analysis, we examined transitions among non-drinking, light drinking, and heavy drinking classes to characterize initiation of use and progression to heavier drinking. NonBlack/NonHispanic youth and those higher on delinquent behaviors were more likely to be involved in alcohol prior to the transition and more likely to rapidly escalate use with the transition. Although no sex differences were observed prior to the high-school transition, girls were more likely to transition from non-drinking to light drinking whereas boys were more likely to transition to heavy drinking. High monitoring was associated with greater progression from light drinking in middle school to heavy drinking in high school; low and moderate parental monitoring were associated with initiation of heavy drinking across the transition. The high-school transition is a time of increased risk for many young people, and greater attention to this important transition as a time that one can and should intervene is warranted.

Keywords

alcohol; drinking; transition; middle school; high school

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The prevalence of alcohol involvement, including any consumption, heavy use, and alcohol-related problems, tends to increase in adolescence, peak in young adulthood, and decline thereafter (Johnston, O'Malley, Bachman, & Schulenberg, 2011a; 2011b). For the majority of individuals, initiation of drinking occurs in early to mid-adolescence. Among youth surveyed in the 2009 Youth Risk Behavior Survey, 63.4% had consumed any alcohol by grade 9 (Centers for Disease Control and Prevention, CDC, 2010). Data from several national surveys indicate that initiation occurs as early as age 12 for a full 23.4% to 36.8% of youth (Newes-Adeyi et al., 2004). At the population level, after relatively constant growth

in alcohol involvement over adolescence, the transition from high school to college is associated with an increase in the frequency of alcohol use, including the frequency of binge drinking (e.g., Baer, Kivlahan, & Marlatt, 1995; Johnston et al., 2011a; 2011b; Schulenberg & Patrick, 2012; White et al., 2006). However, the change in alcohol use in the transition between middle school and high school has received far less attention, despite this being a normative transition that is typically associated with increased social and academic stress (Eccles & Roeser, 2009; Reyes, Gillock, & Kobus, 1994; Seidman et al., 1994; Seidman & French, 2004). Because high school coincides with a rise in substance use as well as other problem behaviors such as delinquency and risky sexual behavior, it is important to determine whether there is an increase in alcohol use specifically during the transition from middle school to high school (Duan, Chou, Andreeva, & Pentz, 2009).

Important life transitions can contribute to new difficulties and the escalation of existing difficulties as a function of individual and contextual changes as well as shifts in the person-context match (Schulenberg & Zarrett, 2006). The transition from middle school to high school typically involves moving to larger and more complex social context, confronting a more demanding and consequential curriculum, and experiencing more freedom and time use options. The match between individual needs and contextual affordances can shift for better (e.g., a more challenging curriculum better suits especially bright and motivated young people) and for worse (e.g., a more challenging curriculum provides a worse fit for marginal students). Thus, whether as a function of increasing stress or shifting the person-context match (Schulenberg & Maggs, 2002; Schulenberg & Zarrett, 2006), the transition from middle school to high school may reflect a turning point in terms of initiating or sharply increasing heavy alcohol use.

A handful of studies have examined changes in alcohol use across the middle school and high school years, with equivocal results in terms of transition effects. Duan et al. (2009) documented a relatively constant increase in drinking frequency over the period spanning 6th – 12th grade, but did not observe a discrete shift in drinking during the transition from middle school to high school. A study by Guo, Collins, Hill, and Hawkins (2000) showed increases in heavy drinking in the transition from the middle school years (ages 13 and 14) to the high-school years (ages 15, 16, and 17); however, this study did not explicitly capture the high school transition. Guilamo-Ramos et al. (2004) failed to detect grade effects in progression from light experimentation to heavy drinking after one year among 7–11th graders, but again, this study did not focus on the transition between middle school and high school. Finally, Simons-Morton (2004) showed that drinking prevalence more than doubled from fall to spring of sixth grade (5.5% vs. 12.6%) but alcohol use was not examined beyond 6th grade. Thus, the extent to which there truly are school transition related increases in alcohol use between middle and high school remains unclear.

Growth in drinking is attributable to two sources: an increase in likelihood (prevalence) of any use, i.e., initiation of drinking, and an increase in degree of use among those who are already drinking. Capaldi, Stoolmiller, Kim, and Yoerger (2009) conducted a two-part growth model to examine both prevalence and volume of alcohol use during the transition from adolescence to early adulthood. They found differential effects of several risk factors (parent and peer alcohol use, depressed mood) for use-versus-nonuse and volume of use. Two other studies that have used two-part growth models (Brown et al., 2005; Wood et al., 2010) showed that a preventive intervention had differential effectiveness on likelihood and frequency outcomes. Together, these findings suggest that there may be distinct processes underlying initiation of any use and progression to heavier use. That is, risk factors for drinking initiation may be quite different from risk factors for other movements along the dimension of adolescent alcohol involvement (Donovan, 2004). Thus, the present study will examine both (1) initiation into any drinking and (2) progression to heavier drinking.

Socio-Demographic and Risk Factor Moderators for Transition-Related Drinking

Although growth in alcohol use over the school transition is expected to be normative, there may be certain subgroups particularly vulnerable to this shift. Drawing on a general risk and protective factor approach to understanding increases in alcohol and other drug use during adolescence (e.g., Brown et al., 2008; Chassin, Hussong, & Beltran, 2009; Maggs & Schulenberg, 2005), we focus here on four potential moderators including gender, race/ethnicity, parental monitoring, and delinquency.

During adolescence, boys have higher rates of alcohol use than girls (CDC, 2010; Johnston et al. 2011a), but there is relatively little evidence to suggest whether boys or girls would increase their drinking more during the transition from middle to high school. Some prospective studies indicate that males are more likely to increase their heavy drinking over adolescence and young adulthood (Chassin, Pitts, & Prost, 2002; Duncan, Duncan, & Strycker, 2006; Hill et al., 2000; Tucker et al., 2003). However, Duncan, Duncan, and Hops (1994) found although their drinking was initially lower than boys, girls aged 14–17 increased their level of drinking at a much faster rate than boys. Interestingly, in a study by Li, Duncan, Duncan, and Hops (2001) being female predicted greater growth in drinking during middle school whereas being male predicted greater growth in drinking during high school, especially for those with low use in middle school. In the present study, we will examine the impact of gender on school-transition based rates of alcohol use.

During adolescence, White youth tend to have higher rates of alcohol use compared especially to African American youth (Jackson et al., 2002; Johnston et al., 2011a), as well as faster rates of growth in alcohol use during adolescence (Barnes et al., 2000; Duncan et al., 2006), suggesting that perhaps the transition from middle school to high school would be associated with a faster increase in alcohol use for White youth compared to racial/ethnic minority youth. In contrast, Sullivan and Farrell (1999) suggest that the transition from middle school is a period of increased vulnerability where negative outcomes are especially apparent among minority students, indicating the possibility of increased rates during the transition for minority youth. In the present study, we examine the extent to which school transition-based rates of alcohol use vary by race/ethnicity.

Movement from a more controlled middle school environment to a less restrictive high school environment is generally associated with increased engagement with peers and less parent influence, which likely contributes to increased alcohol use (e.g., Crosnoe, 2011; Maggs & Schulenberg, 2005). Indeed, one of the most long-studied and robust predictors of adolescent substance use is parental monitoring (Brown, Mounts, Lamborn, & Steinberg, 1993; Crouter & Head, 2002; Dishion & McMahon, 1998). The association between high monitoring and low alcohol use has been demonstrated using both cross-sectional data (e.g., Borawski, Ievers-Landis, Lovegreen, & Trapl, 2003; Dever, Schulenberg, Dworkin, O'Malley, Kloska, & Bachman, in press; Pilgrim et al., 2006) and longitudinal data (e.g., Fallu, Janosz, Brière, Descheneaux, Vitaro, & Tremblay, 2010; Webb, Bray, Getz, & Adams, 2002). Germane to the present study, in a study on patterns of substance-use development between sixth and ninth grade, Connell et al. (2006) found that poor parental monitoring distinguished between a non-using group and a late accelerating group who initially showed a low level of substance use but evinced a steep onset of substance use that coincided with the transition to high school in the 9th grade. In addition, Wang, Dishion, Stormshak, and Willett (2011) found decreased parental monitoring and increased substance use across adolescence were reciprocally related across time; they also found a linear relationship between monitoring and substance use such that very high monitoring did not have adverse effects. Thus, although no study has examined how parental monitoring relates specifically to school transition-based alcohol use, we expect in the present study that

highly-monitored adolescents will have lower transition-based alcohol use compared to low-monitored adolescents.

Arguably one of the strongest correlates of adolescent alcohol use is problem behavior, including indices of delinquency and externalizing behaviors (Fergusson & Horwood, 2000; Hawkins, Catalano, & Miller, 1992; Komro et al., 1999). This is consistent with theories such as the Problem Behavior Theory (PBT; Donovan & Jessor, 1985; Jessor & Jessor, 1977) which posits that risky drinking, illicit drug use, risky sexual behavior, stealing, and aggression cluster together in adolescence as a "problem behavior syndrome" attributable to an underlying deviance proneness (McGue, Iacono, Legrand, & Elkins, 2001). Problem behavior discriminates between non-drinking youth and youth whose drinking escalates over adolescence (e.g., Hill et al., 2000; Stice, Myers, & Brown, 1998; Tucker, Orlando, & Ellickson, 2003). In Li et al. (2001), deviant behavior at high school entry (9th grade) predicted growth in drinking during high school among those with low use in middle school but not among those with high use. Crawford et al. (2003) examined the association between sensation seeking, a temperamental trait associated with delinquency, and drinking in both middle school and high school and found that middle school sensation seeking predicted concurrent growth in drinking during middle school as well as rate of increase in high school. In the present study, although no study has examined how delinquency relates to school transition-based rates of alcohol use, we expect that adolescents with high levels of delinquency will show sharper increases in alcohol use across the transition from middle school to high school.

Overview

The present study draws on a nationally representative sample, the National Longitudinal Survey of Youth 1997 (NLSY97), to examine the impact of the transition from middle school to high school on increases in alcohol use. Despite conceptualizations about the likely effects of school transitions on trajectories of alcohol use, there is little empirical evidence on this specific transition from middle to high school. Thus, the present study is unique in this regard and also in its design that accounts for potential confounds. Its multi-wave multi-cohort design permits explicit coding of the high-school transition, which minimizes confounding between school transition and age/grade, given that there is variability in the timing of school transitions (i.e., high school entry may occur at 9th grade, 10th grade, etc.).

The study examines both initiation of drinking and progression in degree of use among those who are already drinking. We focus on progression as it is arguably of greatest interest in this developmental stage, although we also document rates of regression or remission of use. The study uses latent transition analysis which permits examination of transitions that reflect both initiation of use (transitioning from no drinking in middle school to any use in high school) and progression to heavier drinking. The present study also examines potential moderators that may lead to increased risk of drinking over the transitions, including sex, ethnic/minority status, parental monitoring, and delinquency.[1]

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[1]Although peer influence is a probable proximal risk factor for the transition in drinking, it was not possible to derive a peer drinking status variable in the dataset because it was assessed only at Round 1 (i.e., the pre-transition year for only a small segment of the sample). In addition, although the transition may vary over levels of socio-economic status, the income measure is missing in roughly one quarter of the cases for the NLSY97 sample.

Method

Participants and Procedure

The National Longitudinal Survey of Youth 1997 (NLSY97; Bureau of Labor Statistics, 2006) is comprised of an initial cross-sectional sample of 6,748 adolescents aged 12–16, designed to be representative of the general population, as well as a supplemental sample of 2,236 respondents, designed to oversample Hispanic and Black youth. Together, the sample (N=8,984) is 49.4% female and 57.6% White. The survey currently consists of twelve annual waves or "rounds" of surveys; data for the present study were derived from the first six rounds because the high-school transition did not occur beyond the sixth assessment (and in fact, most occurred during the first three assessments). At each wave, youth completed an in-person or telephone-administered questionnaire; substance use items were administered through the use of audio computer-assisted self-interview (ACASI) technology. Retention in NLSY97 is very high (93.3% at Wave 2, 91.4% at Wave 3, 89.9% at Wave 4, 87.7% at Wave 5, and 87.9% at Wave 6).

Measures

Pre- and post-high school drinking indices—Analyses were based on alcohol use at two timepoints: pre-high school and post-high school. At each round, participants were asked about the school they attended that round, and what type of school it was. If a participant reported being enrolled in a high school at a given round, variables from that round were assigned as the post-high school transition variable. Variables from the prior round were coded as pre-high school, but only if the participant report attending middle school at that round. At Round 1, 48.7% (n=4,374) of the sample reported attending high school, and hence contributed no pre-high school data and are not included here. Among the remaining sample, there were 3,360 (out of 8,984; 40.9%) respondents for whom a consecutive transition from middle school to high school could logically be determined (i.e., a participant had sequential rounds that indicated a pre- to post-high school transition).[2] The mean pre-high-school age (*M*=13.62, *SD*=1.00) was clustered around age 12 (12.4%), age 13 (33.1%), age 14 (39.6%), and age 15 (11.5%). The mean pre-high-school grade (*M*=8.52, *SD*=0.68) was clustered around grade 8 (52.0%), grade 9 (40.5%), and grade 10 (5.0%).

At each round, participants reported past 30-day drinking frequency and typical number of drinks per day (how many drinks they "usually" had), as well as frequency of heavy episodic drinking (HED; defined as five or more drinks per occasion). Pre-high school and post-high school alcohol use was calculated based on the values at the pre-high school and the post-high school round. Four binary indicators of drinking were computed for both pre- and post-high school transition timepoints: (1) any current drinking in past 30 days; (2) report of usually drinking three or more drinks per occasion (high typical quantity drinking) in past 30 days, (3) any heavy episodic drinking (5+ drinks/occasion) in past 30 days, and (4) any drinking each week (high frequency drinking) in past 30 days. Three drinks was selected as the threshold for high typical quantity drinking based on research on alcohol use and blood alcohol level (BAL) in children and young adolescents (Donovan, 2009).

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[2]Preliminary analyses indicated that the final sample in the study (N=3,360) did not differ from the full sample (N=8,984; which included those who were out of age/grade range for, and who attrited from, the sample we used) on sex or age of first drink, but was less likely to be Black, nonHispanic, χ^2 (2, N=8,901) = 6.52, *p* < .05, and was more likely to have consumed a lifetime drink, χ^2 (1, N=8,984) = 6.69, *p* < .01.

Risk factors/subgroup variables

Demographics—Sex and race/ethnicity were ascertained in the Round 1 assessment. Participants were classified by the NLSY97 into three racial/ethnic groups: Black/ nonHispanic, Hispanic, and nonBlack/NonHispanic.

Pre-high school risk factors—At all possible pre-high school transition year rounds, youth-reported parental monitoring was obtained for residential mother and father, each assessed with four items ranging from 0 (knows nothing) to 4 (knows everything), taken from Hetherington, Cox, and Cox (1982) and Maccoby and Mnookin (1992). Items included the degree to which the mother (α=.71) and father (α=.81) know about close friends, close friends' parents, teachers and what the child is doing at school, and who the child is with when not at home. A three-level parental monitoring variable was computed indicating whether monitoring was high, moderate, or low, based on a tertile split on a composite parenting variable. This variable was the average of maternal and paternal parenting (standardized within sex). If data were available only on one parent, the composite consisted of that parent's monitoring score. Delinquency was assessed at each round by surveying participation in ten criminal/delinquent activities: run away from home, belonged to a gang, purposely destroy property, steal anything < $50, steal anything > $50, commit other property crimes, attack anyone to hurt/fight, sell drugs, carried a hand gun, been arrested. As is typical with delinquency measures (e.g., Farrington, 2009), a count was taken across all ten items. To conduct the multi-group analyses, delinquency was dichotomized using a median split.[3] Pre-high school delinquency and monitoring were computed in the same manner as pre-high school drinking behavior.

Data Analytic Strategy

Transitions in drinking behavior from the pre-high school transition year to post-high school transition year were examined using latent transition analysis (LTA; Collins & Lanza, 2010). LTA is a latent variable model for discrete longitudinal data that characterizes movement among latent statuses and provides estimates of likelihood of transitioning to a given status over time. The class (status) structure that accounts for response profiles is estimated, where item endorsement probabilities portray a respondent's likelihood of endorsing a given drinking behavior given membership in a particular class. Models with different numbers of latent statuses are compared, with model fit evaluated using the Bayesian Information Criterion (BIC; Schwartz, 1978) and the Akaike's Information Criterion (AIC; Akaike, 1987), as well as on the basis of theoretical interpretability. Once the number of statuses is selected, LTA models provide estimates of likelihood of membership in a given status as well as transition probabilities (likelihood of transitioning from one status to another). Analyses were conducted using SAS PROC LTA (Lanza, Dziak, Huang, Xu, & Collins, 2011) which handles missing data on the alcohol use class indicators, assuming data are missing at random (although sample sizes vary due to missingness on the moderator variables). Models were run using automatically generated starting values with random seeds.[4]

The Covariates option in PROC LTA was used to predict subgroup differences in initial status. The Covariates option also can be used to examine predictors of transition probabilities. However, the model specifies a multinomial logistic regression model

[3]We examined other codings of delinquency as well. The variable was dichotomized based on quartiles (top 25% versus bottom 75%), and substantive findings were identical. Because more than half (55%) of the sample endorsed zero, it was not possible to create a variable based on a tertile split.
[4]Although NLSY97 provides sampling weights, PROC LTA does not model weights. Weights, however, can be modeled in PROC LCA. Ancillary analyses indicated that the LCA model that included a weight statement was virtually identical to the model without weights with regard to both endorsement probabilities and group prevalences.

corresponding to each row of a given transition probability matrix. That is, because of the way PROC LTA is set up, only transition probabilities in the same row can be compared to one another. Because the study focus was to compare specific transition probabilities (i.e., all transitions that reflected progression), a multiple group LTA was conducted instead in order to compare specific transition probabilities. Models were estimated with freely estimated parameters and with parameters constrained to be equal across subgroup, and nested models were compared using a (hand-calculated) log likelihood difference test where $\Delta G^2 =$ (model A G^2) – (model B G^2). For race/ethnicity and the three-level monitoring variable, dummy codes were created, changing the reference group in order to examine pair-wise comparisons.

Results

Table 1 shows the frequency of endorsement of the four latent status indicator variables. The prevalence of current drinking more than doubles in the year between the pre-high school assessment and the post high-school transition assessment (from 13% to 28%), as does the prevalence for the other three drinking variables.

Identification of Latent Statuses

Using the pre-high school timepoint, two through six-class LCA solutions were estimated for the set of four items. The three-class solution was best fitting according to AIC and BIC (see Table 2). This three-class model was selected for the subsequent LTAs. Endorsement probability parameters were constrained to be equal across the high-school transition; a test of whether this was appropriate indicated that the model with constrained parameters did not significantly differ from a model with freely estimated parameters, ΔLL (12) = 5.75, *ns*, indicating that the same three-class structure fit the post-transition data. Figure 1 portrays the endorsement probabilities for each of the latent classes: Heavy drinkers (5%); Light consumption drinkers (8%); Non-drinkers (87%). The heavy drinking class was characterized by high endorsement probabilities for current drinking, average 3+drinks/occasion, and HED, and moderately high endorsement of weekly drinking. The light consumption class endorsed current drinking but had low endorsement probabilities for all other drinking indicators. The non-drinking class had near-zero endorsement probabilities on all drinking behaviors.

As shown in Table 3, the prevalence of respondents in the drinking classes increased across the transition to high school, with an increase in prevalence of the light consumption class (from 8% to 15%) and the heavy drinking class (from 5% to 12%), and a corresponding decline in prevalence of the non-drinking class (from 87% to 73%).

Latent transition probability estimates (including row percentages and cell counts based on the estimated model) are presented in Table 4. The non-drinking class showed the greatest stability along the diagonal, with 78% of those in the pre-high school non-drinking status remaining in that status at the post-high school transition assessment. For the non-drinking status, the likelihood of progressing to heavier drinking was 14.3% (transition to light drinking status) and 7.7% (transition to heavy drinking status). Over a quarter (28%) of those in the light drinking status transitioned to the heavy drinking status.

Although drinking rates on the whole trended to increase over time, there was also some evidence of regression to lower drinking statuses, although these generally reflected few people: only 102 of 3,360 (3%) participants regressed from the light drinking status and 59 of 3,360 participants (2%) regressed from the heavy drinking status.

Risk Factors for Transition-Related Drinking

In a series of analyses, initial statuses and transition probabilities were compared across potential moderators including gender, race/ethnicity, parental monitoring, and delinquency. For tests of difference in initial status, the reference group was the Non-drinking class.

Pre-high school transition drinking—Table 3 presents the likelihood of membership in the pre-high school and post-high school transition latent statuses for each subgroup. There were no significant differences in initial status across sex, $\Delta G^2(2, N = 3,360) = 2.07$, *ns*, indicating that the prevalences of initial drinking statuses were not different for boys and girls. The Black, NonHispanic youth were less likely than nonBlack/NonHispanic youth to be in the light drinking group (odds ratio=0.54) or the heavy drinking group (OR=0.46) than in the non-drinking group; $\Delta G^2(2, N=3,323)=22.78$, $p < .001$. The Black, NonHispanic youth also significantly differed from Hispanic youth, $\Delta G^2(2, N=3,323)=11.64$, $p < .01$, having lower odds of belonging to the light drinking group (odds ratio=0.65) or the heavy drinking group (OR=0.45). There were no significant differences in initial status between Hispanic and nonBlack/NonHispanic youth, $\Delta G^2(2, N=3,323)=0.97$, *ns*.

Compared to youth with low pre-high school parental monitoring (lower third of distribution), youth with high monitoring (upper third) were less likely to be in the light (OR=0.39) or heavy (OR=0.36) drinking groups, $\Delta G^2(2, N=3,181)=52.41$, $p < .001$. Also compared to youth with low parental monitoring, youth with moderate monitoring (middle third of distribution) were less likely to be in the light (OR=0.68) or heavy (OR=0.60) drinking groups, $\Delta G^2(2, N=3,181)=12.91$, $p < .001$. Youth with high monitoring also were less likely to be in the light (OR=0.58) or heavy (OR=0.61) drinking groups relative to those with moderate monitoring, $\Delta G^2(2, N=3,181)=14.19$, $p < .001$. Thus, parental monitoring in terms of pre-transition drinking works in a linear fashion whereby higher parental monitoring is associated with less drinking.

Finally, those with higher pre-high school delinquency had greater likelihood of being in either the light drinking group (OR=1.38) or the heavy drinking group (OR=1.69), $\Delta G^2(2, N=3,356)=287.13$, $p < .001$, compared to the non-drinking group, than those with low delinquency.

Thus, prior to the transition to high school, we find no gender differences in drinking statuses. During this time, race/ethnicity, delinquency, and parental monitoring served in expected ways as predictors of alcohol involvement, with Whites and Hispanics, low parental monitoring, and high delinquency, being associated with any and more problematic alcohol use.

Post high school transition drinking—The final set of models examined whether transition probabilities (reflecting change as a function of the transition to high school) significantly differed across the four moderator subgroups, starting with sex. First, transition probabilities across sex were freely estimated (see Table 5 for transition probabilities for boys and girls); then, a model was estimated in which all transition probabilities were constrained to be identical across sex. Model fit was significantly worse, $\Delta G^2(6, N = 3,360) = 22.41$, $p < .001$, indicating that transitions among drinking statuses were different for girls and boys. Given the study goals in predicting progression, a model was estimated where parameters only in the upper diagonal were constrained. A decrement in model fit indicated a significant difference in progression between boys and girls, $\Delta G^2(3, N = 3,360) = 21.32$, $p < .001$. Examination of the specific cells indicating progression showed that there were significant differences in the transition from non-drinking to light drinking, $\Delta G^2(1, N = 3,360) = 14.46$, $p < .001$, with girls more likely to progress to low-level drinking than boys (17% versus 12%, respectively). There also were significant differences in the transition

from non-drinking to heavy drinking, $\Delta G^2(1, N = 3,360) = 3.90$, $p < .05$ and the transition from light drinking to heavy drinking, $\Delta G^2(1, N = 3,360) = 5.56$, $p < .05$, with boys more likely to make the transition to a heavier drinking status in both cases than girls (9% versus 7%, 36% versus 20%, respectively). Thus, whereas boys and girls were not significantly different on drinking statuses prior to the transition to high school, the transition to high school was associated with differential drinking status transitions with girls being more likely to progress from no to low-level drinking and boys more likely to progress from no to heavy drinking as well as low-level to heavy drinking.

For racial/ethnic group, the model with all transition probabilities constrained equal across groups fit significantly worse compared to the model with the probabilities freely estimated across groups (see Table 6), ΔG^2 (12, N = 3,323) = 111.08, $p < .001$, indicating non-equivalence across race/ethnicity. NonBlack/NonHispanic youth showed greater stability for the heavy drinking status (70% versus 38% for Black and 58% for Hispanic), and Black youth showed greater stability for the non-drinking status (89% versus 77% for Hispanic and 74% for NonBlack/NonHispanic). There also was a significant decrement in model fit when only the parameters in the upper diagonal were constrained, ΔG^2 (6, N = 3,323) = 88.94, $p < .001$. There was greater progression among NonBlack/NonHispanic (258+152+44/1,788=25%) and Hispanic (22%) youth than Black youth (11%). When considering the specific cells corresponding to progression, there were significant differences in the transition from non-drinking to light drinking, ΔG^2 (2, N = 3,323) = 21.74, $p < .001$, the transition from non-drinking to heavy drinking, ΔG^2 (2, N = 3,323) = 41.47, $p < .001$, and the transition from light drinking to heavy drinking, ΔG^2 (2, N = 3,323) = 8.38, $p < .05$. Black adolescents consistently had slower progression than either Hispanic or NonBlack/NonHispanic youth, who did not differ significantly from each other in any of the comparisons. Thus, the initial racial/ethnic differences evident prior to the transition to high school were amplified across the transition, with Black youth showing both lower problematic drinking prior to the transition and then slower progression to problematic drinking after the transition.

Transition probabilities significantly differed across the pre-high school three-level tertile split parental monitoring variable. The model with all transition probabilities constrained equal across groups fit significantly worse compared to the model with the probabilities freely estimated across groups (see Table 7), ΔG^2 (12, N=3,181) = 33.26, $p < .01$; likewise a significant decrement was observed when the parameters in the upper diagonal were constrained, ΔG^2 (6, N=3,181) = 25.58, $p < .001$. The transition from non-drinking to light drinking was not different across the three parental monitoring groups, ΔG^2 (2, N=3,181) = 4.56, ns. Significant differences were detected, however, in the transition from non-drinking to heavy drinking, ΔG^2 (2, N=3,181) = 10.80, $p < .05$. Further probing of this effect indicated that this was due to the comparison of the low and high monitoring groups (10% versus 5%), ΔG^2 (1, N=3,181) = 10.38, $p < .01$ and between the moderate and high monitoring groups (8% versus 5%), ΔG^2 (1, N=3,181) = 4.60, $p < .05$, but not the comparison between low and moderate monitoring groups. Thus, the low and moderate monitoring groups were more likely to progress from no drinking to heavy drinking across the transition to high school compared to the high monitoring group. There also was a significant difference in progression from light drinking to heavy drinking, ΔG^2 (2, N=3,181) = 6.30, $p < .05$. Further probing indicated that this was due to the comparison of the low and high monitoring groups, with greater likelihood of progression to heavier drinking in the <u>high</u> monitoring group (46%) than the low monitoring group (21%),[5] ΔG^2 (1, N=3,181) = 6.16, $p < .05$, but no significant differences in comparison with the moderate group. It remains true, however, that both before and after the transition, heavy drinking was more common for those reporting low monitoring than the other two groups, and for those reporting medium monitoring than those reporting high monitoring; thus the greater odds of moving from light

drinking to heavy drinking across the transition for those reporting high monitoring (compared to those reporting low monitoring) reflects some "catching up" among the highly monitored youth.

Finally, model fit significantly differed when all transition probabilities were constrained across low and high pre-high school delinquency (see Table 8), $\Delta G^2(6, N = 3,356) = 77.26$, $p < .001$, as well as for models when only the parameters in the upper diagonal were constrained; $\Delta G^2(3, N = 3,356) = 72.29$, $p < .001$. Examining transition probabilities for progression, there were significant differences in the progression from non-drinking to light drinking, $\Delta G^2(1, N = 3,356) = 22.73$, $p < .001$ and the progression from non-drinking to heavy drinking, $\Delta G^2(1, N = 3,356) = 29.32$, $p < .001$, but not the progression from light drinking to heavy drinking, $\Delta G^2(1, N = 3,356) = 0.04$, *ns*. Inspection of transition probabilities indicated that, not surprisingly, those with high delinquency were more likely to progress from non-drinking to both light and heavy drinking (19% versus 12% for the transition from non-drinking to light drinking; 12% versus 5% for non-drinking to heavy consumption). Thus, once again, the sub-group already at risk for problematic drinking prior to the transition showed greater risk with regard to initiation into both low-level and problematic drinking after the transition to high school.

Discussion

The present study provides evidence of both initiation and progression to heavier drinking in the transition from middle school to high school. Based on assessments of four alcohol involvement items, three latent statuses were identified that characterized three typologies of alcohol users. The majority of youth were in the non-drinking class, and this class showed the greatest stability over the high-school transition. A smaller class of low consumption drinkers was observed, with roughly one-quarter of this group progressing to heavy drinking over the transition. Finally, there was a relatively small heavy drinking class that more than doubled in size across the high-school transition.

These findings highlight the potential power of important life transitions and more specifically the point that alcohol use during adolescence typically increases as a function of developmentally related individual and social context changes (Schulenberg & Maggs, 2002). That is, increases in alcohol use across adolescence, which may appear to be gradual and smooth at the population level, are likely to be highly heterogeneous at the individual level given to fits and starts rather than smooth progression, consistent with the experimental, sporadic, and opportunistic nature of adolescent drinking. Among the many potential individual and contextual changes that set the stage for individual initiation and escalation of heavy alcohol use, the transition from middle to high school has not been given much attention, an obvious gap. By isolating this transition within a national data set, essentially controlling for age and grade effects, we were able to find clear evidence that this transition is associated with elevated rates of initiation and escalation.

Important life transitions, especially those that embody moving between two distinct contexts, can contribute to turning points in ongoing behavioral trajectories (Elder & Shannahan, 2006; Rutter, 1996; Schulenberg & Maggs, 2002). Clearly, the transition from middle school to high school qualifies as this sort of transition. As we found here, one-fifth of those who were not drinkers prior to the transition were drinkers post-transition;

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[5]This finding, where those reporting high parental monitoring were more likely to progress from light drinking to heavy drinking across the transition compared to those reporting low parental monitoring, was also evident when we tried other ways of grouping parental monitoring (e.g., based on number of parents in high, medium, and low monitoring). Thus, this finding is unlikely to be due to methodological artifact.

especially noteworthy is that 8% or one in twelve initial non-drinkers went on to heavy drinking post-transition over the course of 12 months. No doubt, several mechanisms embedded within the transition account for this large jump in drinking, and unpacking the transition is important for future research. At a conceptual level, one set of mechanisms reflect an "overload model" whereby the multiple and simultaneous academic and social changes overwhelm one's coping capacity resulting in decrements in health and well-being (Coleman, 1989; Schulenberg & Maggs, 2002). Adolescents who must cope with multiple transitions concurrently (e.g., school transition, pubertal development, dating) are at greater risk for reductions in self-esteem, academic performance, and participation in extracurricular activities (Simmons, Burgeson, Carlton-Ford, & Blyth, 1987). Thus, future research should examine multiple transitions, stress, and coping capacities. Another set of mechanisms reflects a "developmental match/mismatch" model whereby the match between individual needs for optimal development and contextual opportunities declines resulting in decrements in health and well-being (Eccles et al., 1997; Schulenberg & Maggs, 2002). Evidence regarding the transition into middle school underscores the all-too-typical mismatch between the young adolescent's hope for more independence and the middle school's rule-bound context (Eccles & Midgely, 1989); it is likely that a similar developmental mismatch can occur with the transition into high school resulting in behavioral and other difficulties. Similarly, the transition may result in a "better match" between a young person's interest in alcohol use and opportunities and peer support for such use. Thus, future research should examine the match between time varying individual needs and contextual affordances that come with the transition to high school.

Transitions, like this one from middle to high school, do not just contribute to discontinuity. They can also serve to help continue and solidify ongoing trajectories by providing a proving ground. As we found, Whites, those higher on problem behaviors, and those lower on parental monitoring (with the exception noted below) were more likely to be involved in alcohol prior to this transition and more likely to rapidly escalate their use with the transition. This transition effect, where those already having difficulties get progressively worse with major life transitions is consistent with the increased heterogeneity model of transition effects (Schulenberg & Maggs, 2002; Schulenberg & Zarrett, 2006) as well as the accentuation model (Caspi, 2000; Dannifer, 1987) whereby the stress of the transition and demands of the new context bring out individual-level traits and coping capabilities, for better and worse. Thus, with the increased complexity and new demands of the high school context come reduced contextual "brakes" allowing already visible individual proclivities to ascend.

This study builds on the body of literature that has examined the demands that children face in the transition from elementary school to middle school (Eccles & Midgley, 1989; Eccles & Roeser, 2011). This earlier transition is associated with poorer academic performance and problematic emotional outcomes (Eccles, Midgley, & Adler, 1984). Yet, the high-school transition can be viewed as equally it not more problematic than the middle school transition because it coincides with adverse outcomes such as high school dropout, higher rates of teen pregnancy, and higher rates of first episode depressive disorders (Seidman & French, 2004).

Risk Factor Sub-groups

A developmental transition can be interpreted as both a crisis in terms of escalating health risks and as an opportunity for positive development and health improvement. Our focus here was more on the former. We looked at the influence of developmentally proximal influences on transitions in drinking behavior to determine whether certain subgroups for whom a transition is a time of negative, destructive behaviors (e.g., to gain respect of deviant peers) (Seidman & French, 2004). Although no sex differences were observed prior to the high-school transition, girls were more likely to transition from non-drinking to light

drinking whereas boys were more likely to transition to the heavy drinking status. This is somewhat consistent with the findings reported by Li et al. (2001) indicating that girls showed greater growth in drinking during middle school and boys greater growth in drinking during high school (a time arguably associated with heavier drinking rates). Findings with regard to race/ethnicity suggest that the transition to high school, while possibly more turbulent for minority youth (in part perhaps due to ethnic incongruence across the transition, Benner & Graham, 2007), does not necessarily translate to greater alcohol use.

Parental monitoring tends to be a strong deterrent to alcohol and other drug use during adolescence (e.g., Dishion & McMahan, 1998; Fallu et al., 2010; Pilgrim et al., 2006). As we found here, low and medium parental monitoring was associated with greater alcohol use prior to the transition, and then was associated with greater likelihood of progression from non-drinking to heavy drinking across the transition, illustrating the increased heterogeneity and accentuation models discussed above. This finding is consistent with Connell et al. (2006) who found that low parental monitoring was associated with steep onset of substance use during the transition to high school. However, there was no effect of parental monitoring on the transition from no drinking to light drinking across the transition to high school. Furthermore, high parental monitoring (compared to low parental monitoring) was associated with a *greater* likelihood of progressing from light drinking to heavy drinking across the transition. Some limited previous research suggests that the relationship between high parental monitoring and low substance use is linear (Wang et al., 2011) - that is, that there is no such thing as too much monitoring when it comes to protecting against substance use. Our findings suggest the potential limits, if not detriments, of high parental monitoring - whereas it clearly is associated with lower likelihood of being in either the light or heavy drinking sub-groups both prior to and after the transition to high school (compared to both the low and moderate parental monitoring sub-groups), it is also associated with an increased risk of progressing from light drinking to heavy drinking with the transition. This may reflect some "catching up" of highly monitored youth, suggesting that high parental monitoring serves to forestall the transition from light to heavy drinking until high school. Or it may suggest the potential negative effects of exerting too much parental control (Barnes et al., 2000) especially during the transition into high school, a time when increased exploration and independence is possibly expected and advantageous. In addition, the fact that it was only those highly monitored youth who drank lightly before the transition were at greater risk of progressing to heavy drinking suggest a threshold effect whereby once the line is crossed to light drinking, in terms of highly monitored youth figuring out how to get around the high monitoring to start drinking, it is not that difficult to progress to heavy drinking. Nonetheless, it is clear that parental monitoring is multi-faceted (Kerr, Stattin & Burk, 2010; Wang et al., 2011), and attention to the distinction between parental control, parental support, and youth disclosure is needed in future research to isolate any non-linearity in parental monitoring effects.

Extant research indicates that a history of delinquency may place youth on a path that leads to multiple problem behaviors, including drinking (see Loeber & Hay, 1994). The present study suggests that delinquency was associated with greater risk in initiating drinking including heavy drinking, but not progressing from light drinking to heavier drinking. That delinquency sets the stage for initiating alcohol use with the transition and even progressing quickly from non-use to the heaviest drinking sub-group across the transition, suggests the confluence of individual-level problem behaviors and school-level transitions for the rapid escalation of alcohol use. Our finding that delinquency was not predictive of school-transition related increases from low to heavy use was a somewhat surprising one, although it was consistent with Stice et al. (1998) who showed that externalizing symptoms discriminated between a stable abstainer trajectory group and a group showing escalation to

moderate use, but not between a group characterized by stable moderate use and a group showing escalation to heavy use.

Although our focus was not on decline in alcohol use across the transition, the fact is that there was some limited but important decline. For example, among the pre-transition heavy drinkers (n=161, about 5% of the total sample), one-third (n=54) went to "non-drinking" status after the transition, whereas almost two-thirds (n=102) continued in their heavy drinking status. This decline suggests the potential salutary effects of developmental transitions (Schulenberg & Maggs, 2002) as well as the often experimental aspect of substance use - even heavy substance use - during adolescence. It should be noted, however, that some of the cell sizes for the transition from heavy drinking to light consumption were small (n=5 for the full sample; n=0 for girls and Black youth), and tests of these cells may violate the assumptions of a chi-square distribution (Wickens, 1982).

Intervention Implications

A developmental framework suggests that there is value in targeting periods of critical risk, particularly educational and developmental transitions (Crosnoe, 2009; Eccles et al., 1997; Schulenberg & Maggs, 2002), as opposed targeting just individuals at risk. Preliminary evidence suggests that interventions that are tailored to stage of alcohol acquisition (Werch et al., 1996a; Werch et al., 1996b) are successful in reducing alcohol consumption, at least in the short-term, compared to no treatment or minimal intervention control. The value of using a targeted approach lies in the ability to identify risk factors that predict movement among stages (Weinstein et al., 1998). Present study findings, as well as findings by Connell et al. (2006), suggest that prevention programs might target parental monitoring at some point prior to the high-school transition.

Many prevention researchers presume that middle school is a critical developmental stage that calls for intervention. Many universal prevention programs are carried out in middle schools (e.g., Botvin & Griffin, 2004; D'Amico & Edelen, 2007; Ellickson, McCaffrey, Ghosh-Dastidar, & Longshore, 2003; Spoth et al., 2009), perhaps with the implicit goal of targeting behavior prior to the shift in drinking that occurs once an individual has reached high school.

Strengths, Limitations, and Conclusions

There are numerous strengths of this study that help to make unique and needed contributions to the literatures regarding developmental science, alcohol etiology, and developmental transitions. In particular, we drew on a large, nationally representative, multi-wave sample of adolescents, thus avoiding problems associated with small and select samples. The analytic method permitted examination of both initiation and progression in alcohol involvement across the transition from middle school to high school, using error-free latent measures created from four items reflecting any use, quantity of use, frequency of use, and pattern of drinking. In addition, models accounted for the variability in school transition timing and controlled for age and grade-level effects. Given that the mean pre-high-school age spanned Grade 8 to Grade 10, it is critical that large-scale research not assume a school transition at a certain grade when making conclusions about findings and separate out age and grade-level effects when examining transition effects.

There are also limitations in our study that suggest some caution in interpreting the findings. Although NLSY97 is a nationally representative dataset, it was not possible to incorporate sampling weights in our LTA analyses, so our findings are not necessarily generalizable to the U.S. population. Our study is limited by available measurement in the NSLY data set, a typical limitation of secondary data analyses that is often viewed as an acceptable trade-off

given the strengths of large scale national data (Duncan, 1991). In particular, our set of risk factor measures is relatively sparse. Although peer influence is a key factor in predicting initiation of alcohol use (e.g., Pedersen & Skrondal, 1998) as well as the transition from experimental to regular drinking (Brook et al., 1999), NLSY97 unfortunately did not assess peer influence beyond the first wave, so it was not possible to include this variable in these analyses. In addition, we were not able to include family SES because of extensive missing data on this variable in NLSY97. Another limitation regarding the data pertain to the year between measurement waves and how this effects our drinking progression statues. Specifically, although we highlight the progression from no drinking to heavy drinking across the transition, the fact is, our measurement gap likely missed the "light drinking" status in this progression. Nonetheless, this relatively rapid progression from the two extreme statuses is noteworthy. Finally, although multiple annual assessments allow for us to fully consider transition effects spread across different school transition configurations, annual spacing does not permit a fine-grained consideration of transition effects.

In putting the limitations in the context of the strengths, this study offers needed evidence about how the transition from middle to high school relates to initiation and escalation of alcohol use and heavy drinking, highlighting that this transition is a time of increased risk for many young people. Furthermore, we show that those with low parental monitoring and those involved in delinquency were especially at risk for escalation of use from non-drinking to heavy drinking across the transition. Greater attention to this important school transition as a time that one can and should intervene is warranted.

Acknowledgments

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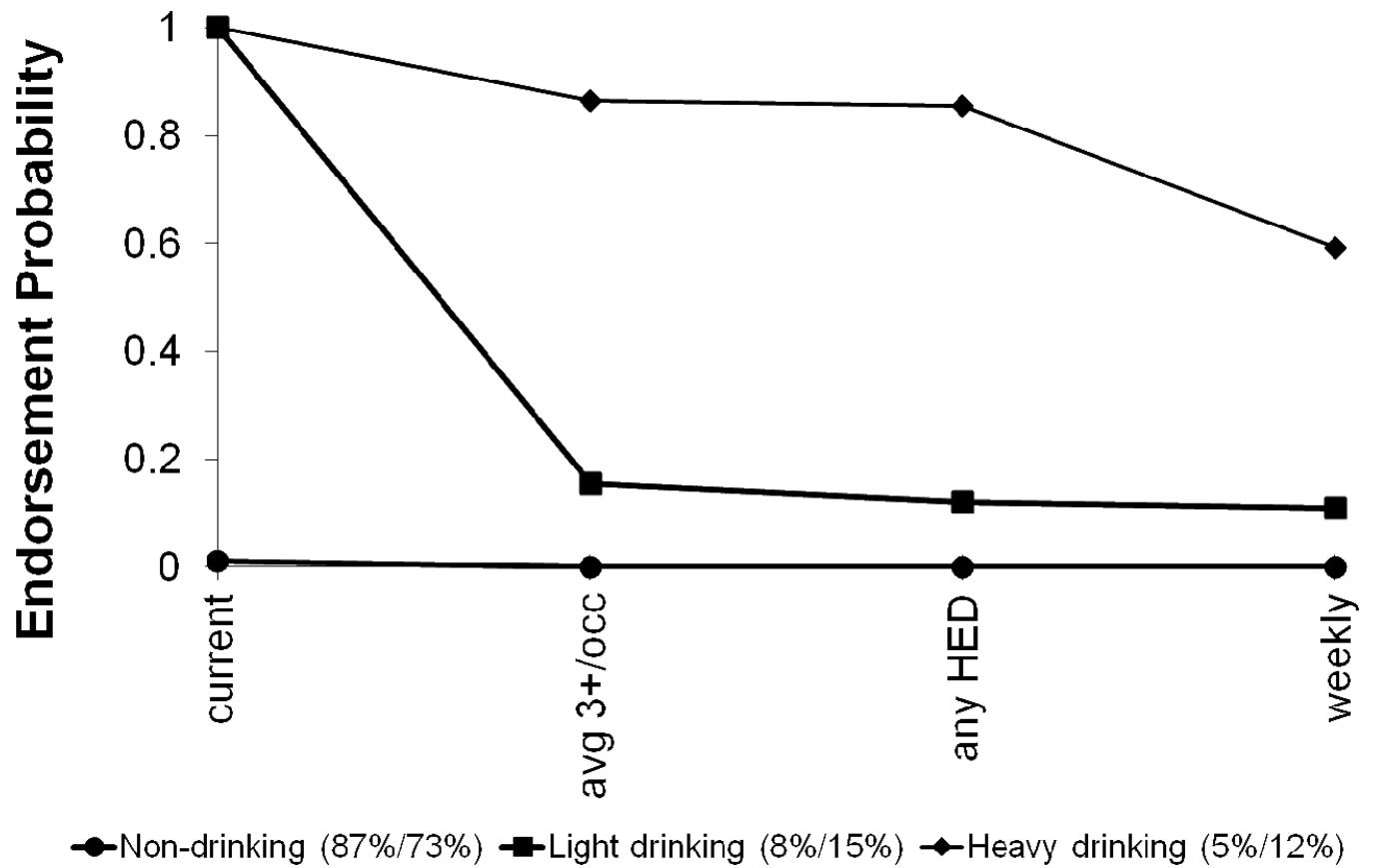
Figure 1.
Endorsement probabilities for each of the three classes, for the solution constrained to be equal across pre-high school and post-high school timepoints. N= 3,360. Class prevalences are given for each latent class group for the pre-high school transition/post-high school transition timepoints.

Table 1

Item frequencies for the alcohol variables at pre-high school and post-high school transition timepoints.

Latent Status Indicator	Pre-high school transition	Post-high school transition
current drinking	13.4% ($n = 457$)	28.0% ($n = 938$)
high typical quantity drinking (3+/occasion)	5.0% ($n = 167$)	13.0% ($n = 434$)
heavy episodic drinking	5.3% ($n = 178$)	11.6% ($n = 389$)
weekly drinking	3.4% ($n = 114$)	9.0% ($n = 302$)

Note. N from 3,348 to 3,352.

Table 2

Fit indices for two- through six-class solutions.

Number of classes (statuses)	LL	G^2	df	AIC	BIC
2 classes	−5666.63	335.14	244	357.14	424.46
3 classes	**−5536.59**	**75.06**	**235**	**115.06**	**237.45**
4 classes	−5531.73	65.34	224	127.34	317.05
5 classes	−5521.01	43.90	211	131.90	401.16
6 classes	−5514.31	30.49	196	148.49	509.55

Note. LL=Log likelihood. AIC = Akaike Information Criteria. BIC = Bayesian Information Criteria. N= 3,360.

Table 3

Latent status membership: Unconditional likelihood of membership for the full sample and across subgroup in latent statuses pre-high school and post-high school transition.

Latent Status	Pre-high school transition Percentage (Estimated n)	Post-high school transition Percentage (Estimated n)
Full sample (*n*=3,360)		
Non-drinking	87% (*n*=2,936)	73% (*n*=2,445)
Light consumption	8% (*n*=263)	15% (*n*=513)
Heavy drinking	5% (*n*=161)	12% (*n*=402)
Boys (*n*=1,756)		
Non-drinking	87% (*n*=1,533)	74% (*n*=1,297)
Light consumption	7% (*n*=129)	13% (*n*=224)
Heavy drinking	5% (*n*=94)	13% (*n*=236)
Girls (*n*=1,604)		
Non-drinking	88% (*n*=1,404)	72% (*n*=1,148)
Light consumption	8% (*n*=132)	18% (*n*=289)
Heavy drinking	4% (*n*=68)	10% (*n*=167)
Black, nonHispanic (*n*=822)		
Non-drinking	91% (*n*=748)	85% (*n*=695)
Light consumption	6% (*n*=50)	11% (*n*=94)
Heavy drinking	3% (*n*=23)	4% (*n*=33)
Hispanic (*n*=713)		
Non-drinking	86% (*n*=610)	72% (*n*=511)
Light consumption	9% (*n*=62)	15% (*n*=107)
Heavy drinking	6% (*n*=40)	13% (*n*=95)
nonBlack, nonHispanic (*n*=1,788)		
Non-drinking	85% (*n*=1,512)	66% (*n*=1,185)
Light consumption	10% (*n*=177)	18% (*n*=325)
Heavy drinking	6% (*n*=99)	16% (*n*=278)
Low monitoring (lower third) (*n*=1,008)		
Non-drinking	82% (*n*=826)	69% (*n*=696)
Light consumption	11% (*n*=113)	16% (*n*=163)
Heavy drinking	7% (*n*=70)	15% (*n*=149)
Moderate monitoring (middle third) (*n*=1,061)		
Non-drinking	88% (*n*=933)	71% (*n*=755)
Light consumption	8% (*n*=81)	17% (*n*=176)
Heavy drinking	4% (*n*=47)	12% (*n*=131)
High monitoring (upper third) (*n*=1,112)		
Non-drinking	93% (*n*=1033)	78% (*n*=867)

Latent Status	Pre-high school transition Percentage (Estimated n)	Post-high school transition Percentage (Estimated n)
Light consumption	4% (*n*=45)	13% (*n*=148)
Heavy drinking	3% (*n*=33)	9% (*n*=96)
Low delinquency (*n*=1,838)		
Non-drinking	94% (*n*=1,726)	80% (*n*=1,470)
Light consumption	4% (*n*=80)	13% (*n*=237)
Heavy drinking	2% (*n*=34)	7% (*n*=131)
High delinquency (*n*=1,518)		
Non-drinking	78% (*n*=1,182)	63% (*n*=951)
Light consumption	14% (*n*=207)	19% (*n*=287)
Heavy drinking	9% (*n*=129)	18% (*n*=280)

Note. Likelihoods sum to 100% (within rounding error) within a column for each subsample.

Table 4

Conditional latent transition probability estimates.

Pre-high school transition	Post-high school transition Row percentages (estimated cell n)			
	Non-drinking	**Light consumption**	**Heavy drinking**	*Marginals*
Non-drinking	**78.0% (*n*=2,289)**	14.3% (*n*=421)	7.7% (*n*=226)	2,936
Light consumption	38.7% (*n*=102)	**33.3% (*n*=88)**	28.0% (*n*=74)	263
Heavy drinking	33.6% (*n*=54)	3.1% (*n*=5)	**63.3% (*n*=102)**	161
Marginals	2,445	513	402	3,360

Note. N=3,360. Percentages sum to 1.0 across a given status (row). Numbers on the diagonal (bolded) reflect stability parameters for the latent statuses. Marginals do not always sum to equal the full sample size due to rounding error.

Table 5

Conditional Latent Transition Probability Estimates for boys and girls shown as transition probabilities and estimated cell n.

Pre-high school transition	Post-high school transition Row percentages and estimated cell n										
	Non-drinking		Light consumption		Heavy drinking		Marginals	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Non-drinking	80% n=1,221	76% n=1,069	12% n=181	17% n=242	9% n=134	7% n=91	1,535	1,402
Light consumption	34% n=47	44% n=55	30% n=41	36% n=46	36% n=50	20% n=25	138	126
Heavy drinking	36% n=31	30% n=23	5% n=5	0% n=0	58% n=49	70% n=53	84	76
Marginals	1,299	1,147	227	288	233	169	1,756	1,604

Note. N=3,360.

Table 6

Conditional Latent Transition Probability Estimates by race-ethnic group shown as transition probabilities and estimated cell n.

	Post-high school transition Row percentages and estimated cell n											
	Non-drinking			Light consumption			Heavy drinking			Marginals		
Pre-high school Transition	Black	Hisp	Non-B/H	Black	Hisp	Non-B/H	Black	Hisp	Non-B/H	Black	Hisp	Non-B/H
Non-drinking	89% n=646	77% n=488	74% n=1177	9% n=66	14% n=90	16% n=258	3% n=17	9% n=55	10% n=152	729	633	1587
Light consumption	55% n=30	46% n=22	25% n=30	36% n=20	26% n=12	38% n=46	9% n=5	28% n=13	36% n=44	55	48	120
Heavy drinking	62% n=23	38% n=13	26% n=21	0% n=0	4% n=1	4% n=3	38% n=15	58% n=19	70% n=58	38	33	82
Marginals	699	523	1,228	86	103	307	37	87	254	822	713	1,788

Note. N=3,323. Non-B/H=NonBlack/NonHispanic.

Table 7

Conditional Latent Transition Probability Estimates for low, moderate, and high levels of parental monitoring shown as transition probabilities and estimated cell n.

Pre-high school Transition	Non-drinking			Light consumption			Heavy drinking			Marginals		
	Low MON	Moderate MON	High MON	Low MON	Moderate MON	High MON	Low MON	Moderate MON	High MON	Low MON	Moderate MO	High MON
Non-drinking	75% n=664	76% n=709	82% n=804	15% n=134	16% n=147	12% n=120	10% n=85	8% n=74	5% n=51	884	930	975
Light consumption	48% n=37	35% n=28	13% n=11	31% n=24	34% n=27	42% n=35	21% n=16	31% n=25	46% n=39	77	81	85
Heavy drinking	29% n=14	33% n=17	42% n=22	5% n=3	3% n=1	2% n=1	65% n=31	64% n=32	56% n=29	47	50	52
Marginals	715	754	837	161	175	156	132	131	119	1,008	1,061	1,112

Post-high school transition
Row percentages and estimated cell n

Note. N=3,181. MON=monitoring. Low monitoring=lower third; Moderate monitoring=middle third; High monitoring=upper third.

Table 8

Conditional Latent Transition Probability Estimates for low versus high delinquency shown as transition probabilities and estimated cell n.

Pre-high school Transition	Post-high school transition Row percentages and estimated cell n							
	Non-drinking		Light consumption		Heavy drinking		Marginals	
	Low Delinq	High Delinq	Low Delinq	High Delinq	Low Delinq	High Delinq	Low Delinq	High Delinq
Non-drinking	83% n=1,298	69% n=899	12% n=190	19% n=248	5% n=85	12% n=152	1,573	1,299
Light consumption	38% n=64	45% n=63	37% n=63	29% n=40	25% n=43	26% n=37	169	139
Heavy drinking	45% n=43	29% n=23	6% n=6	2% n=2	49% n=47	68% n=54	96	79
Marginals	1,405	985	259	290	175	243	1,838	1,518

Note. N=3,356.