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Maturing Out of Alcohol Use in Young Adulthood: Latent Class Growth Trajectories and Concurrent Young Adult Correlates

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Abstract

Background: The purpose of this study was to evaluate intra-individual variation in “maturing out” of alcohol use by using latent class growth trajectories of alcohol use from adolescence (age 17 yrs.) through young adulthood (age 33 yrs.). We also modeled trajectory group differences with regard to concurrent, age-relevant domains of substance use, health (e.g., physical health rating, sleep problems), interpersonal functioning (e.g., conflict with partner) and occupational functioning (e.g., intrinsic motivation).

Methods: Growth mixture modeling was used with a sample of 1004 adolescents/young adults, and three trajectory groups were identified: (1) a Normative Use group ($n=646$) with low alcohol use remaining stable from adolescence to young adulthood; (2) a Moderate Increase group ($n=300$) with moderate alcohol use increasing slowly from adolescence to emergent adulthood (age 23 yrs.) and then decreasing slightly from emergent adulthood to young adulthood (age 33 yrs.); and (3) a High Increase group ($n=58$) with a high, increasing pattern of alcohol use from adolescence to emergent adulthood and then a small decrease in use from emergent adulthood to young adulthood.

Results: At age 33 years, trajectory groups differed, with High and Moderate Increase groups differing significantly from the Normative Use group in current alcohol and other substance use and other risk factors (e.g., friends’ alcohol use). Furthermore, the High and Moderate Increase groups differed from the Normative Use group on indicators of health (poorer sleep and more sleep problems), social functioning (higher partner and work-family conflict), and occupational functioning (lower intrinsic work motivation).

Conclusions: These findings suggest that trajectory group membership in alcohol use from adolescence to young adulthood is associated with the domains of substance use, health, and social and occupational functioning. Furthermore, the findings suggest that maturing out applies primarily to a subset of those individuals at moderate to higher levels of alcohol use.

Keywords

Alcohol Use; Maturing Out; Young Adulthood Transition; Sleep Problems

The concept of maturing out of alcohol use refers to a decrease in the prevalence of alcohol disorders and heavy alcohol use that occurs around ages 26-27 years, which is preceded by a peak period of escalation during late adolescence and emergent adulthood (Bachman et al., 2002; Labouvie, 1996; Lee et al., 2013). For example, national prevalence data have indicated that alcohol disorders peak from ages 19-25 and then decrease in subsequent years (Dawson et al., 2006; Verges et al., 2012). Similar findings have been reported for the prevalence of other alcohol phenotypes such as binge drinking and alcohol use (Bachman et al., 2002; Substance Abuse and Mental Health Services Administration, 2013).

In addition to empirical support for the general finding of maturing out of alcohol disorders and alcohol use, more refined analyses have suggested that qualifications are necessary to appreciate more fully the nuances of maturing out. For example, several studies have indicated that, although the age-prevalence curve for alcohol disorders is consistent with maturing out, the decline in prevalence is due principally to a reduction in new onset cases in later young adulthood rather than a large number of people cycling out of their heavier use or alcohol disorder status (Verges et al., 2012; 2013). Other studies have also suggested that maturing out is moderated by a range of variables, including the occurrence and timing of role transitions such as marriage and parenthood (Lee et al., 2015; Staff et al., 2010; Yamaguchi and Kandel, 1985), social contextual factors such as peer networks (Van Ryzin et al., 2012; Windle and Windle, 2018), and variation in personality traits (Lee et al., 2015; Lee and Sher, 2017).

Given the heterogeneity in possible trajectories of alcohol use from adolescence to later young adulthood, this study had two research goals. First, using latent class growth mixture modeling (LCGMM), our first goal was to identify the number of alternative trajectories from adolescence (ages 17-18 years) to later young adulthood (ages 33-34 years). Considerable research has been conducted on alcohol trajectories from adolescence to earlier young adulthood (e.g., ages 23-25) (Chassin et al., 2002; Schulenberg and Maggs, 2002), but fewer studies have extended the age range to include the later young adult years (e.g., ages 28-34 years) (Capaldi et al., 2015; Haller et al., 2010; Newcomb and Bentler, 1988). Second, whereas some studies have focused on childhood/adolescent predictors of trajectories from adolescence to earlier young adulthood (Chassin et al., 2002), our second goal was to evaluate trajectory group differences related to four important domains of healthy young adult functioning during later young adulthood based on a developmental tasks orientation (Bachman et al., 1997; Schulenberg and Maggs, 2002). A developmental tasks orientation views healthy or successful development as contingent on the occurrence of well-functioning in critical life domains (e.g., interpersonal and occupational functioning, indicators of health), and considers such an assessment within a broader context of life functioning in young adulthood (Schulenberg and Maggs, 2002; Windle and Davies, 1999). This perspective complements many alcohol-specific studies in the maturing out literature that have focused exclusively on alcohol-related behaviors (e.g., maturing out of alcohol use predicting subsequent binge drinking or alcohol disorders) versus a more comprehensive focus on multiple domains of functioning.

In this study, four domains were selected to examine as possibly distinguishing the different alcohol use trajectory groups during later young adulthood (i.e., ages 33-34 yrs.). The

variables selected for young adult functioning were based on existing studies suggesting the importance of these developmentally (age) appropriate variables that may differ across trajectory groups (Bachman et al., 1997, 2002; Schulenberg and Maggs, 2002; Windle and Davies, 1999). The first domain related to current substance use and substance-using peers to explore if the trajectory groups differed with respect to the variables selected (e.g., marijuana use, percentage of peers who regularly consume alcohol). Prior substance use and peer substance use have been supported as significant prospective risk factors for young adult problem drinking and substance use disorders (Andrews et al., 2002; Haller et al., 2010). The current study investigates whether these substance use variables distinguish the trajectory groups in later young adulthood (or as outcomes rather than predictors). The second domain included indicators of health such as sleep problems, poor sleep, number of hours of sleep, and self-ratings of physical health (Center for Disease Control, 2004; Roehrs and Roth, 2001; Vitiello, 2006; Wong et al., 2010). Prior research has demonstrated both concurrent and prospective associations between alcohol use and different facets of sleep (e.g., sleep problems, sleep loss) (Vitiello, 2006; Wong et al., 2010). The third domain consisted of indicators of interpersonal conflict, and included the variables of partner conflict and work-family conflict (Frone 2000; 2003). Prior research has demonstrated consistent significant associations between interpersonal conflict and alcohol use (Wiersma and Fischer, 2014), and between work-family conflict and alcohol use (Frone, 2000; 2003). The fourth domain consisted of indicators of occupational functioning, and included the variables of intrinsic work motivation and distributive justice at work, as well as highest educational level attained because of its substantial association with occupational status and income (Frone, 2015; Niehoff and Moorman, 1993; Wiesner et al., 2005). Lower educational attainment, and associated lower income and occupational status, may contribute to a range of daily and chronic stressors that increase alcohol use for the purpose of stress-relief (Haller et al., 2010). Prior research has demonstrated significant associations between dimensions of higher work stress (low distributive justice at work, low intrinsic work motivation) and heavier alcohol and other substance use (Frone, 2015; Wiesner et al., 2005). In addition, higher levels of alcohol use may contribute to lower levels of educational attainment and a history of higher unemployment, lower employment stability, and/or poor work performance (Haller et al., 2010).

Based on prior research (Jackson and Sher, 2005), three trajectory groups were hypothesized to be identified. Some studies have identified four groups by distinguishing an abstainer group from a light user subgroup or identifying a later onset group (Jackson and Sher, 2005). However, these subgroups were not anticipated to emerge in this study (e.g., there were few abstainers across all waves of data collection and late onset subgroups have been inconsistently identified in the literature; Jackson and Sher, 2005). Furthermore, it was hypothesized that a trajectory group identified as manifesting high and often increasing levels of alcohol use across time would report lower levels of functioning in each of the four young adult domains. It was proposed that this trajectory group would manifest a long-term (from adolescence to later young adulthood) cumulative pattern of difficult adjustments to developmental changes and that members of this trajectory were unlikely to demonstrate substantial maturing out of alcohol use. By contrast, a low, stable alcohol use trajectory group was hypothesized that would manifest the highest levels of functioning in the four

domains, though they would be less likely to mature out of alcohol use because they had never achieved high levels of use. Finally, a trajectory group that manifested moderate-to-high levels of use during adolescence and early young adulthood but a decreasing trajectory across young adulthood was hypothesized that would be associated with an intermediate pattern of functioning with regard to the young adult domains (i.e., intermediate between the stable high and stable low trajectory groups). It was proposed that this intermediate trajectory group would not manifest as consistent of a cumulative pattern of functioning across the life domains ((i.e., consistently poorer functioning or consistently higher functioning) and may better represent a pattern of maturing out.

Method

Participants and Procedures

The data were collected as part of a multi-wave panel design focused on risk factors and alcohol and other substance use among 1205 teens during the high-school years, with four waves of assessment at six-month intervals (i.e., Wave 1-Wave 4) occurring from 1988-1990 (for details, see Windle and Wiesner, 2004). Survey data were collected within the adolescents' high-school settings and the student participation rate was 76%. The sample consisted of high-school sophomores (52%) and juniors (48%) recruited from two homogeneous suburban public high-school districts (a total of three high schools) in Western New York. The average age of the respondents at W1 was 15.54 years ($SD=0.66$), 98% were White, and 50.8% were females. Sample retention across the first four waves of measurement was uniformly high, in excess of 90%.

There was a seven-year gap between the W4 assessment in adolescence and the W5 data collection that occurred when the average age of the young adults was 23.8 years, and then five-year gaps between W6 (age=28.9 years) and W7 (age=33.5 years). Participants were paid \$40 to complete a computer-assisted personal interview that lasted approximately 2 hours. At all waves of the study, informed consent was used and confidentiality was assured with a U.S. Department of Health and Human Services Certificate of Confidentiality. This study was approved by the Institutional Review Board of the University at Buffalo.

In this study, we used data from 1004 participants, and 53% were females. These subjects participated at least once during adolescence and at least once during young adulthood. Of the 1004 participants, at Wave 7, 70% were currently married, 64% were parents, the mean household income was approximately \$72,000, 77% were employed full-time, 13% part-time, 5% were homemakers, and 5% were unemployed. Attrition analyses were conducted for those participants in the current study ($n=1004$) and those who did not meet inclusion criteria ($n=201$). A chi-square test indicated that significantly more females (86.4%) than males (78.8%) were included in the study (χ^2 with 1 $df=12.30$, $p<.001$). Because males and females differ on a number of variables used in this study, attrition analyses were conducted using adolescent data separately for males and females. One-way ANOVAS were conducted for each sex group for 14 variables: three sociodemographic variables (family income, number of children in the family, and primary caregiver's highest educational attainment), family cohesion, percentage of alcohol and drug using friends, respectively, past month use of tobacco, alcohol, marijuana, and other illicit drug use, frequency of binge drinking,

delinquency, a rating of physical health, and number of stressful life events in the last six-months. Of these 28 comparisons (14 for each of the sex groups), only two were statistically significant. For males, primary caregiver's educational level was lower for the non-included group ($ES=.22$); for females, delinquency was higher for the non-included group ($ES=.42$). The other 26 comparisons indicated no significant group differences. Based on these findings, I concluded that attrition bias was minimal for the included and non-included groups.

Measures

Alcohol use.—At each wave, a quantity-frequency index (QFI) of alcohol use was derived from questions related to the quantity and frequency with which participants consumed various types of alcohol (beer, wine, hard liquor) in the past six months. After applying standard conversion formulas (for example, see Armor and Polich, 1982) for the average amount of ethanol in each of the various beverage types, we obtained a measure of the average ounces of absolute alcohol consumed per day over the past six months (0.5 oz. of ethanol equals 1 drink). Due to non-normality, the QFI score was log transformed for the analyses ($\ln$ of score+10). Alcohol use measured at the four waves of measurement corresponding to adolescence through young adulthood assessments were used to identify the trajectories in this paper; only Wave 7 (young adulthood; mean age=33.5 yrs.) assessments of other substance use related measures described below (e.g., binge drinking, alcohol problems, marijuana use) and variables from other young adult domains (related to health, occupational, and interpersonal functioning) were used in this paper.

Binge drinking.—At Wave 7, participants were asked how many times they had drunk six or more cans or bottles of beer, glasses of wine, or drinks of liquor on a single occasion in the previous six months. The three responses for the different alcoholic beverages were summed to create a composite variable of binge drinking. The “six or more drinks” threshold for binge drinking was consistently used throughout the course of this long-term longitudinal study that was initiated prior to the more recent 5 (for men) and 4 (for women) binge drinking thresholds used in current research. As such, the prevalence of binge drinking may be underrepresented in this study.

Alcohol problems.—At Wave 7, participants completed thirteen items which were used to assess a range of undesirable consequences of drinking alcohol during the previous six months (Windle and Windle, 2017). Items measured experiences during, or as a consequence of, alcohol use in domains such as compulsive drinking style and loss of behavioral control. Each item was scored “0” if no problem was endorsed and “1” if 1 or more occurrences of the problem was endorsed. Total scores ranged from 0-13 alcohol problems. The alpha with this sample was .79, and prior reports of test-retest reliability coefficients across six-month intervals have ranged from .61-.69 (Davies and Windle, 1997). *Marijuana use.* At Wave 7, participants were asked to self-report the frequency of their marijuana use during the last 6 months using a 7-point Likert scale that ranged from “*never used*” to “*used every day*”.

Other illicit substance use.—At Wave 7, participants were asked to self-report their frequency of other illicit substance use (not marijuana) over the past 6 months for several different substances (e.g., cocaine, stimulants, barbiturates, hallucinogens) on an 7-point scale from “*never used*” to “*used every day*”.

Percentage of alcohol-using friends.—At Wave 7, young adults were requested to indicate the number of persons they considered close friends. They were then requested to indicate how many of these friends drank alcohol regularly. A percentage score was calculated by dividing the number of regular alcohol-using friends by the total number of friends and multiplying by 100, with a possible range of 0% to 100%.

Percentage of drug-using friends.—At Wave 7, young adults were requested to indicate the number of persons they considered close friends. They were then requested to indicate how many of these friends used marijuana or other illicit drugs (e.g., hallucinogens, cocaine, opiates, uppers, downers). A percentage score was calculated by dividing the number of marijuana and other illicit drug-using friends by the total number of friends and multiplying by 100, with a possible range of 0% to 100%.

Physical health.—At Wave 7, a global rating of overall physical health was based on one item (“How would you rate your overall physical health?”) rated on a five-point scale from 1=poor to 5=excellent. This single item survey measure is used frequently in U.S. national surveys and tests of military personnel (Center for Disease Control, 2004; Krause and Jay, 1994).

Sleeping behaviors.—At Wave 7, a sleeping behaviors survey (Bliwise et al., 1992) was used to assess sleep difficulties such as feeling that you got enough sleep, difficulties going to sleep, periodic waking-up during the night, and the frequency of using prescription and over-the-counter medications to facilitate better sleep. Each of these 7 items referenced the last 30 days and were rated on a five-point scale ranging from 1 “Never” to 5 “Every day”; hence, the score range was 7-35. The summed scale score for these 7 items was used to measure *poor sleep*. There was also one question that asked about the number of hours and minutes of average sleep per day over the last 30 days. The response to this question was used to *measure hours of sleep*. An additional six items were used to assess *sleep problems* not measured in the sleeping behavior measure but of clinical significance (e.g., loud snoring, grinding your teeth, restless legs) over the last 30 days with a three-point response format of 1 “No”, 2 “Yes”, and 3 “Don’t know”. These six items were summed to form a composite score of *sleep problems* (versus sleep behaviors and average hours of sleep).

Interpersonal Conflict.—At Wave 7, the 9-item interpersonal conflict dimension of the Quality of Relationships Inventory (QRI; Pierce, 1994; Pierce et al., 1991) was used to assess young adults’ relationship-based perceptions of conflict with their primary romantic partner. Participants were instructed to respond to the items in reference to their current primary romantic partner; if participants were not in a current primary romantic relationship, they were instructed to respond to the items in reference to their most recent romantic relationship. Interpersonal conflict, which refers to the extent that the participant experiences angry or ambivalent feelings toward the referent person (e.g., “*How angry does this person*

make you feel?”), was assessed for each item with a 4-point Likert scale that ranged from 1=“not at all” to 4=“very much”. Coefficient alpha for the conflict scale was .92.

Work–family conflict.—At Wave 7, this construct was assessed with 12 items that measured the degree to which a respondent’s current job interfered with his or her home life and the degree to which a respondent’s home life interfered with his or her current job (Frone, 2000; 2003). Items were answered by the young adults on a 5-point scale (*never* “1” to *very often* “5”). Coefficient alpha was .85 for this measure.

High intrinsic job motivation.—At Wave 7, this 6-item scale reflected the degree to which the young adult wanted to work well in his or her job to achieve intrinsic satisfaction (adapted from Warr et al., 1979). A sample item was “I take pride in doing my job well”. Each item was answered on a 6-point scale (*strongly disagree* “1” to *strongly agree* “6”). Coefficient alpha was .73 for this scale.

Distributive justice.—At Wave 7, this 5-item scale reflected the degree to which the young adult perceived the work setting to be fair and equitable with regard to pay, level of responsibility, work schedule, performance evaluations, and work that is requested of employees (adapted from Niehoff and Moorman, 1993). A sample item was “My job performance evaluations are fair”. Each item was answered on a 6-point scale (*strongly disagree* “1” to *strongly agree* “6”). Coefficient alpha was .77 for this scale.

Statistical Analyses—The data analyses were completed in two stages. First, latent class growth mixture models (LCGMMs) with linear and quadratic slopes were specified to identify trajectories of alcohol use across four waves of measurement spanning adolescence to young adulthood (i.e., ages 17 to 33 years of age). I compared model fits of one-, two-, three-, and four-class LCGMMs, assessing their relative fit with conventional indices, including the Bayesian Information Criterion (BIC), entropy value, and the Lo-Mendell-Rubin adjusted likelihood ratio (adjusted LRT; Lo et al., 2001). I examined all three indexes but relied mostly on the LRT nested model fit statistics and conceptual parsimony because the BIC and entropy measures had limited discrimination across some of the alternative number of classes’ models. All LCGMMs were conducted using Mplus 8.1 software (Muthén and Muthén, 2009-2017). Missing values were estimated via full information maximum likelihood methods. Missing data were estimated for about 17% of the data (ranging from 0 to 21% across each of the variables).

Second, I analyzed a one-way MANOVA for the set of concurrent (Wave 7) young adulthood measures, with univariate ANOVA models if the overall MANOVA model statistic was significant (Stevens, 2012). The MANOVA and ANOVA models were used rather than structural equation models with the three-group variable as a categorical independent variable because the group classification for the three-groups was very high (i.e., classification probabilities for the three groups ranged from .91 to .96, thereby indicating minimal probable misclassification) and the ANOVA findings and post hoc pairwise contrast tests were easier to present to the readership. The post hoc pairwise test used was the Bonferroni multiple comparison correction test that is commonly used to reduce the chances of obtaining false-positive results (type I errors) when multiple pairwise

tests are performed on a single set of data (Shaffer, 1995). Bonferroni corrections are derived by dividing the critical P value (α) by the number of comparisons being made. For example, if 5 hypotheses are being tested, the new critical P value would be $\alpha/5$.

Results

LCGMM Findings:

The results for the LCGMM analyses are summarized in Table 1. For alcohol use, BIC values declined with greater numbers of classes. Entropy values and the LRT ratios, however, indicated that a three-class solution fit better than the four-class solution. Furthermore, the four-class solution yielded a very small subgroup ($n=26$; 2.6%) that was insufficiently powered to make group comparisons with regard to young adult correlates. Hence, the three-class model was selected to represent the trajectory groups. The resulting plots of the three-class solutions for alcohol use (using raw scores for number of drinks per day) are shown in Figure 1, and the corresponding parameter estimates for each class are shown in Table 2.

The majority of participants ($n = 646$; 64.3%) were assigned to the *Normative Use* group, which had a lower intercept in adolescence with use not changing significantly from adolescence through young adulthood. The second class comprised 29.9% of the sample ($n = 300$) and was assigned to the *Moderate Increase* group. Youth in this class had a moderate intercept in adolescence, a statistically significant increase in use between adolescence and emergent adulthood, and a statistically significant decrease in alcohol use from emergent adulthood (i.e., 23.8 yrs) to young adulthood (i.e., age 33.5 yrs.). The third class, comprising 5.8% of the sample ($n = 58$), was the *High Increase* group. This group reported the highest intercept in adolescence and continued high use throughout adolescence into emergent adulthood, and then a significant deceleration of use from emergent adulthood (i.e., ages 23-24 yrs.) to later young adulthood.

A review of the trajectory parameters (Table 2) indicated that, for the Normative group, only the intercept was statistically significant and neither the linear nor quadratic terms was statistically significant. By contrast, for the Moderate and High increase groups, all three terms (intercept, linear, and quadratic parameters) were statistically significant and in the direction of acceleration in emergent adulthood and deceleration from emergent to later young adulthood. Thus, in describing the shape of change for the trajectory groups across time, rates varied contingent on the trajectory group referred to, and a quadratic model characterized alcohol from adolescence to later young adulthood for two of the trajectory groups.

Later Young Adulthood Comparisons of Trajectory Groups:

The multivariate test from the MANOVA analyses of the 15 later young adult dependent variables and the trajectory group independent variable was statistically significant (*Pillai's Trace* $F=29.82$, $df=15$, 987, $p < .001$; findings were robust across other multivariate statistics including *Wilks' Lambda*, *Hotelling's Trace*, and *Roy's Largest Root*). Table 3 summarizes the overall sample descriptive statistics for the variables used in these analyses and Table 4

provides findings for mean level comparisons across groups, the statistically significant F -statistics for each of the 15 outcome variables, and pairwise Bonferroni posthoc tests across trajectory groups for each of the indicators of young adult functioning.

As shown in Table 4, the High and Moderate Increase groups differed significantly from the Normative Use group with regard to substance use and peer substance use. The High Increase group also differed from the Moderate Increase group with regard to more binge drinking and alcohol problems, a higher percentage of drug using friends, and lower ratings of physical health. There were also several trajectory group differences with regard to young adult factors related to the domains of health, interpersonal, and occupational functioning. Findings regarding health indicated that the High Increase group differed significantly from the Normative Use group in reporting more sleep problems, poorer sleep, fewer hours of sleep, and a lower rating of overall physical health. Findings regarding interpersonal functioning indicated that High and Moderate Increase groups differed significantly from the Normative Use group in reporting more conflict with their partners and greater work-family conflict. Findings regarding occupational functioning indicated that High and Moderate Increase groups differed significantly from the Normative Use group in reporting perceptions of a less fair and equitable workplace (i.e., lower on distributive justice). In addition, the High Increase group differed significantly from the Normative Use group in reporting lower intrinsic motivation to work and lower educational attainment (which relates to job opportunities, working conditions, and pay).

Hence, in later young adulthood, the High Increase group, relative to the Normative Use group, reported higher levels of alcohol and other substance use, poorer health, poorer interpersonal relations, and lower occupational functioning. The Moderate Increase group did not differ from the Normative Use group on as many variables as did the High Increase group, but did differ from the Normative Use group on a number of important factors related to substance use, health, and interpersonal and occupational functioning.

Discussion

The findings of this study indicated significant variation in intra-individual alcohol use trajectories from adolescence to young adulthood. Supportive of the study hypothesis regarding the number of trajectory groups, the three groups identified were consistent with the adolescent to emergent adult literature in indicating alcohol use patterns consonant with stable low use, moderate increasing use, and high increasing use (Jackson and Sher, 2005). Of importance, these findings extend the trajectory analysis literature by expanding the age window to later young adulthood (ages 33-35 yrs.) and thus enable an evaluation of maturing out of alcohol use for a later age range.

Similar to other findings in the literature (Lee et al., 2013; Verges et al., 2012; 2013), the current study indicated that the patterns of change toward maturing out were not uniform across alcohol users. Rather, the largest group of low-level users maintained a pattern of relative low use across time and did not mature out, in large part because they never reported consuming alcohol at higher levels. The Moderate Increase group did manifest a pattern of modest decline (maturing out), as did the High Increase group. Hence, a subset of this

adolescent-to-young adult sample did manifest a pattern of maturing out, but maturing out did not describe the largest subgroup of Normative Users (over 64%). Furthermore, while statistically significant, the magnitude of the effect for maturing out for Moderate and High Increase groups was modest and did not reflect a change toward substantially lower levels of use or abstinence, but rather slight moderation of alcohol use. For example, between W5:W6, the Moderate Increase group decreased their average number of drinks per day by 0.27 drinks, but still maintained an average number of drinks per day at 1.28 drinks. Similar findings for W5:W6 were indicated for the High Increase group in that average drinks per day was reduced by 0.95 drinks, but the average number of drinks per day at W6 was still almost 4.5 drinks per day.

The hypotheses about differences among the three trajectory groups and young adult functioning in the domains of substance use, health, and interpersonal and occupational functioning were principally supported. For example, the High Increase group reported the highest levels of substance use (e.g., binge drinking, alcohol problems), the lowest levels of functioning with regard to sleep (e.g., poor sleep, sleep problems) and ratings of physical health, the highest levels of partner conflict and work-family conflict, and the lowest levels of occupational functioning (e.g., lowest intrinsic work motivation). By contrast, the Normative Use group reported the highest levels of young adult functioning with regard to the four young adult domains assessed (i.e., better sleep, lower substance use, lower partner and work-family conflict, and better occupational functioning). The trajectory group findings were consistent with prior research indicating that higher levels of alcohol use were significantly associated with higher levels of current substance use (Andrews et al., 2002; Haller et al., 2010), poorer sleep (Vitiello, 2006; Wong et al., 2010), higher partner conflict (Wiersma and Fischer, 2014), higher work-family conflict (Frone, 2000; 2003), and lower occupational functioning (Frone, 2015; Weisner et al., 2005).

It is important to note that the Moderate Increase group often had intermediate scores on the measures of young adult functioning and significantly differed from the Normative Use group on several of these measures. However, the High Increase group differed significantly from the Moderate Increase group only on measures indicating greater alcohol involvement (i.e., more alcohol problems and greater binge drinking), a higher percentage of drug using friends, and poorer ratings of physical health. On many of the other indicators of young adult functioning, the High and Moderate Increase groups did not differ significantly, suggesting that both groups are at heightened risk for maladjustment across the life-course and merit attention for interventions during this phase of the lifespan. For the High Increase group, a particular emphasis needs to focus on the seriousness of problem drinking (i.e., alcohol problems and binge drinking), in addition to heavier alcohol use.

A number of limitations of the current findings merits mention. First, the sample for this study consisted principally of middle-class white students; generalizability of the findings to other racial/ethnic and socioeconomic groups awaits future inquiry. Second, the data relied on self-report methods and hence mono-method bias may have influenced the findings. Third, the intervals between measurement occasions may not have been optimal for assessing shorter-term changes in alcohol use.

Nevertheless, these findings suggested relatively stable patterns of alcohol use for each of the trajectory groups across the age span of adolescence through young adulthood. For the majority of the sample (64%), the long-term alcohol use pattern was one of low levels of use that was associated in young adulthood with lower substance use, better sleeping outcomes, lower partner and work-family conflict, and better occupational functioning. In contrast, the High Increase, and to a lesser extent the Moderate Increase, groups reported worse functioning for the four young adult domains. The High Increase group also differed significantly from the Moderate Increase group with regard to more alcohol problems and higher levels of binge drinking, a higher percentage of drug using friends, and lower self-ratings of physical health. With regard to maturing out, these findings paralleled prior research suggesting that maturing out applies to a subset of heavier and more frequent alcohol users (Verges et al., 2012; 2013). A quadratic function best characterized the shape of growth for the Moderate and High Increase trajectory groups, with linear and quadratic parameters statistically significant for both groups. The findings for these two groups suggested a significant increase in alcohol use from adolescence to emergent adulthood, and then a modest, but statistically significant, decrease in alcohol use from emergent adulthood to young adulthood. The upshot of these findings for maturing out is that, for Moderate and High Increase subgroups (approximately 36% of the sample), there is a modest decrease in alcohol use associated with age.

A more holistic, developmental perspective (Schulenberg and Maggs, 2002; Windle and Davies, 1999) may be helpful in understanding who matures out and why. This perspective could be valuable in viewing individuals beyond solely alcohol-specific behaviors (e.g., adolescent alcohol use predicting alcohol disorder in young adulthood) within the various developmentally, age normative contexts of functioning (e.g., occupational, interpersonal, and health functioning) that provide a broader perspective on functioning that could be valuable for identifying individuals and targets of intervention. A developmental perspective would also facilitate etiologic research in pursuing cumulative life history data (developmental and historical) and concurrent factors (e.g., marital and parental status) that account for variation in alcohol use trajectory patterns. It is also worth noting that at this time the maturing out concept appears to be more of a descriptive than explanatory concept. That is, many of the findings from the maturing out literature identify a subset of individuals (statistically a minority portion) who reduce their alcohol use; however, the underlying causal dynamics and mechanisms are not well elaborated and merit more refined research questions regarding the intra-individual course of alcohol use from adolescence to young adulthood.

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Figure 1.
Three-group latent class growth mixture model for alcohol use from adolescence to young adulthood.

Table 1*Results for Latent Class Growth Modeling (N = 1004)*

Alcohol use model	Model-fit indices				<i>p</i>	Number in each class			
	Log likelihood	BIC	Entropy	LMR LRT		1	2	3	4
1 class	−3462	6972	---	---	---	1004			
2 class	−2846	5760	.88	1189	.00	784	220		
3 class	−2620	5344	.87	436	.02	300	58	646	
4 class	−2548	5228	.84	139	.09	112	307	559	26

Note. BIC = Bayesian Information Criterion. LMR LRT = Lo-Mendell-Rubin likelihood ratio test.

Table 2*Class Parameter Estimates (N = 1004)*

Substance and class	Trajectory parameter		
	Intercept	Linear term	Quadratic term
Alcohol use			
Normative (n=646)	2.68 ^c	-.02	-.01
Moderate Increase (n=300)	3.06 ^c	.32 ^c	-.09 ^c
High Increase (n=58)	3.53 ^c	.74 ^c	-.19 ^b

^b
 $p < .01$.^c
 $p < .001$.

Table 3

Descriptive Statistics (Means and Standard Deviations) for Variables Used in the Current Study (N=1004)

Variables	Mean	(SD)
<i>Young Adulthood:</i>		
Binge drinking	1.05	(2.67)
Alcohol problems	1.28	(1.71)
Marijuana use	0.81	(3.34)
Other illicit drug use	0.22	(1.27)
% friends using alcohol	48.61	(33.89)
% friends using drugs	11.91	(21.06)
Sleep problems	1.36	(1.09)
Poor sleep	14.18	(3.41)
Hours of sleep	6.85	(0.93)
Physical health	3.54	(0.81)
Partner conflict	20.76	(5.66)
Work-family conflict	24.58	(5.38)
Work—Intrinsic Motivation	29.86	(5.09)
Work—Distributive Justice	19.72	(2.93)
Education level	16.14	(2.19)
<i>Adolescence-to-Young Adulthood:</i>		
LN ^I Alcohol use (17.0 yrs)	2.82	(0.60)
LN Alcohol use (23.8 yrs)	2.96	(0.57)
LN Alcohol use (28.9 yrs)	2.88	(0.53)
LN Alcohol use (33.5 yrs)	2.86	(0.53)

^ILN=Logarithm of (raw score +10).

Table 4

Observed Mean Level Comparisons and Standard Deviations of Young Adulthood (YA) Variables (Wave 7) across Latent Class Growth Groups

YA Factors	Normative (N)	Mod Incr (M)	High Incr (H)	F-statistic	Posthoc tests
Binge drinking	0.24(0.77)	1.59 (2.47)	7.26 (6.21)	311..82 ^c	H >N,M; M>N
Alcohol problems	0.61 (1.00)	2.17 (1.84)	4.04 (2.33)	244.73 ^c	H >N,M, M>N
Marijuana use	0.37 (2.25)	1.30 (4.01)	3.19 (6.70)	24.69 ^c	H,M >N
Other illicit drug use	0.11 (1.21)	0.34 (1.19)	0.76 (1.92)	9.09 ^c	H,M >N
% Friends use alcohol	38.66 (32.80)	65.33 (28.86)	72.91 (21.74)	94.01 ^c	H,M >N
% Friends use drugs	11.61 (22.97)	19.46 (29.19)	25.44 (25.09)	81.85 ^c	H >N,M; M>N
Sleep problems	1.29 (1.11)	1.43 (1.03)	1.73 (1.09)	5.56 ^b	H > N
Poor sleep	14.09 (3.57)	14.25 (3.01)	15.50 (3.29)	4.68 ^b	H > N,M
Hours of sleep	6.93 (0.99)	6.77 (0.78)	6.50 (0.89)	7.40 ^c	H,M < N
Physical health	3.56 (0.84)	3.56 (0.72)	3.24 (0.73)	3.24 ^b	H<N,M
Partner conflict	20.30 (5.63)	21.34 (5.73)	22.90 (4.99)	7.98 ^c	H,M > N
Work-family conflict	24.15 (5.48)	25.09 (5.12)	26.71 (4.75)	8.12 ^c	H,M > N
Work-Intrinsic motivation	30.20 (4.96)	29.51 (5.07)	27.98 (5.92)	6.18 ^b	H < N
Work-Distributive justice	19.97 (2.96)	19.41 (2.76)	18.44 (3.14)	9.64 ^c	H,M < N
Education level	16.26 (2.18)	16.04 (2.22)	15.29 (2.02)	5.62 ^b	H < N

Note. Posthoc tests were conducted via Bonferroni multiple comparison tests.

^b
p < .01

^c
p < .001