# Change in College Students' Perceived Parental Permissibility of Alcohol Use and Its Relation to College Drinking

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## Abstract

College students who perceive their parents to hold permissive views about their alcohol use engage in heavier drinking. However, few studies have assessed perceived parental permissibility of alcohol use (PPP) longitudinally across the later college years, and few have assessed variation in changes in PPP and whether or not these changes differentially predict drinking. This study assessed whether PPP changed across college and used two approaches to determine whether PPP predicted binge drinking frequency and peak drinking. Data on college students' daily lives and risk behaviors were collected from 687 students (51% female) in a large university in the Northeast United States over four years. Perceived parental permissibility of alcohol use increased from the last year of high school through the third year of college with males reporting significantly higher PPP by the third year of college. From 12th grade through the third year of college, between-person differences in mean PPP were positively associated with binge drinking frequency and peak drinking, and patterns of PPP change differentially predicted both drinking outcomes through fourth year. These findings suggest that PPP is a dynamic construct that may evidence important developmental changes across college and the transition to adulthood. More broadly, the results indicate that aspects of the parent-child relationship continue to change after high school and may be important as they are linked with college student risk behaviors.

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**Keywords**

perceived parental permissibility of alcohol use; college drinking; transition to adulthood

## 1. Introduction

Research suggests that parents continue to influence late adolescent alcohol use during the college years (Turrisi et al., 2000; Wood et al., 2004). For example, many parenting behaviors including parent-teen communication, parental modeling of alcohol use, and parental monitoring are associated with college drinking (Abar et al., 2009; Small et al., 2011; Turrisi & Ray, 2010). Perceived parental permissibility of alcohol use (PPP), that is, students' perceptions of whether and how much their parents think it is acceptable for them to drink, is associated with college students' drinking quantity, binge drinking likelihood, and negative alcohol consequences (Abar et al., 2009; Varvil-Weld et al., 2014; Walls et al., 2009). This study aims to extend previous research linking PPP and college drinking by assessing whether (and when) parents become more permissive about college student drinking and whether PPP is linked with drinking across multiple years of college.

### 1.1. The Transition to Adulthood

Over the last half-century, changing socioeconomic conditions have led to a new phase of development between the end of secondary school (~18 years of age) and the mid- to late-twenties, often referred to as the transition to adulthood. This period is characterized by historic increases in instability, individualization, identity exploration, and heterogeneity (Arnett, 2007; Côté & Bynner, 2008; Settersten & Ray, 2010). During these years, many risk behaviors, including substance use, typically peak (Johnston et al., 2015; Substance Abuse and Mental Health Services Administration [SAMHSA], 2003).

As the transition to adulthood continues to become longer and more complex, the role of parents during these years, especially the college years, may be increasing in importance. For example, college students often seek help and emotional support from parents, and overall, value their support and assistance (Chen & Kat, 2009; Kenny, 1987; Trice, 2002). Further, aspects of the parent-child relationship during college predict students' risk behaviors including alcohol use. For example, greater parent-student communication is associated with lower student drinking during college (Small et al., 2011; Turrisi et al., 2000).

### 1.2. Perceived Parental Permissibility of Alcohol Use and College Drinking

Studies of early to mid-adolescents have consistently linked PPP to earlier initiation of alcohol use and greater drinking (Hyatt & Collins, 2000; Tucker et al., 2008; van der Vorst et al., 2009). Prior work has also linked PPP in the last year of high school with greater drinking behaviors in college, including drinking quantity, binge drinking, and peak drinking (Fairlie et al., 2012; Varvil-Weld et al., 2014; Walls et al., 2009). Furthermore, cross-sectional analyses of second-year college students in the present sample concluded that those whose parents took a zero-tolerance approach to underage college drinking drank less than those whose parents were more accepting of alcohol use (Abar et al., 2012). Although a

number of studies have linked PPP with drinking prior to and during college, there are still two primary gaps in this literature.

First, as most studies have measured PPP only on a single occasion, there is a lack of longitudinal research documenting whether and how this construct changes *across* college. Further, if PPP does change during college, there is likely heterogeneity in patterns of PPP change, and these different patterns may, in turn, be differentially associated with levels of drinking. For example, some parents condone their children's drinking during late adolescence (Foley et al., 2004), while other parents approve of alcohol use only after their children meet the minimum legal drinking age (Yu, 1998). For both groups, parents' attitudes toward alcohol are linked with their children's drinking. Based on this prior research and research concerning late adolescent independence, autonomy, and substance use (Barber et al., 2005; Cheng et al., 2016; Greenberger, 1984; Steinberg & Silverberg, 1986), we speculated there may be several different patterns of PPP change among parents, including patterns of consistently low and consistently high PPP as well as a pattern of increasing PPP as students neared the minimum legal drinking age of 21 years old.

Second, few studies have examined whether PPP and college drinking are linked in the later college years, focusing primarily on PPP in the last year of high school as a predictor of early college drinking. Although some parent behaviors and characteristics, including PPP, parental modeling of alcohol use, and parental monitoring, predict alcohol use in high school and across the transition to college (Abar et al., 2009; Small et al., 2011; Turrisi & Ray, 2010), it is unclear whether parents continue to influence their children's drinking behaviors in the later college years as they near and pass the minimum legal drinking age and become more independent generally.

### 1.3. Present Study

The present study focused on changes in perceived parental permissibility of alcohol use (PPP) across college and tested whether this construct—both continuously across the full sample and contrasting longitudinal clusters representing different patterns of PPP change—predicted binge drinking frequency and peak drinking. We hypothesized that (1) college students' PPP would increase on average from the last year of high school through the third year of college; (2) mean levels of PPP would predict levels of binge drinking frequency and peak drinking across four years of college; and (3) membership in PPP clusters would be differentially associated with levels of the two drinking outcomes across college.

## 2. Materials and Methods

### 2.1. Participants

Data came from the University Life Study (ULS), a longitudinal study assessing the daily lives and risk behaviors of college students in a Northeast US state university (Howard et al., 2014). The ULS used a longitudinal measurement-burst design in which participants completed a longer, web-based survey followed by 14 consecutive daily web-based surveys in each of seven semesters. In the first wave, eligible participants were first-year, first-time, full-time students who were under 21 years of age, were US citizens or permanent residents,

and lived within 25 miles of the main campus. Participants were recruited using a stratified, random sampling procedure aiming to recruit similar numbers of females and males in each of the four largest US racial/ethnic groups.

Data collected in the first through seventh semesters were used in the present analyses. The mean age of participants ($N = 744$) in fall of first year was 18.45 years ($SD = 0.43$ years); 50.8 % were female. The sample was racially and ethnically diverse: 25.1% were Hispanic or Latino American; European American Non-Hispanic or Latino (NHL), 27.4%; Asian American NHL, 23.3%; African American NHL, 15.7%; and multiracial NHL, 8.5%. Due to the sampling strategy, the sample was more ethnically diverse than the student body.

## 2.2. Measures

### 2.2.1. Perceived Parental Permissibility of Alcohol Use (PPP)—In spring of second year, students indicated the amount of alcohol they perceived their parents would deem as an upper limit for them to consume (Varvil-Weld et al., 2014). Single items referred to three time periods: The current year, the first year of college, and the last year of high school, for example, "During your sophomore (second) year of college, how many drinks would your parents consider the maximum number for you to consume on any given occasion?" In spring of third year, this question was repeated regarding the current year. Possible responses were "*no amount would be ok*" (0), "*1 drink*" (1), "*2 drinks*" (2), "*3 drinks*" (3), "*4 drinks*" (4), "*5 drinks*" (5), "*6–12 drinks*" (6), and "*there was no upper limit*" (7).

### 2.2.2. Alcohol Use—Alcohol use was assessed annually during fall of students' first four years of college. One drink was defined as one 12-ounce can or bottle of beer, one 5-ounce glass of wine, or one drink containing one shot of liquor (International Center for Alcohol Policies, 1998). *30-day binge drinking frequency* was measured by asking "During the last 30 days (one month), how often did you have 4/5 [*females/males*] or more drinks containing any kind of alcohol within a two-hour period?" (NIAAA, 2004). Possible responses were "*I never had 4/5 or more drinks within a two-hour period in the last 30 days*" (0), "*Once*" (1), "*2 to 3 times*" (2), "*Once a week*" (3), "*Two times a week*" (4), "*3 to 4 times a week*" (5), "*5 to 6 times a week*" (6), and "*Everyday*" (7). *30-day peak drinking* was measured by asking "During the last 30 days (one month), what is the maximum number of drinks containing alcohol that you drank within a 24-hour period?" (NIAAA, 2004), with a maximum set at 25 drinks.

## 2.3. Statistical Analyses

Generalized linear mixed models (GLMMs), estimated using Poisson distributions, were used to assess whether PPP changed across college and whether mean PPP levels predicted each of the two drinking outcomes across college (Raudenbush & Bryk, 2002). K-means cluster analysis was conducted on the four PPP assessments to identify patterns of PPP change across college. The k-means procedure uses simple Euclidean distances to construct relatively homogenous groups for a given number of clusters by maximizing the distance between cluster centers and minimizing the distance between data points within a cluster and the center of that cluster (Everitt & Hothorn, 2014). The four-cluster solution was selected

because this solution was suggested by the most criteria across $k$=3 through $k$=8 clusters using the NbClust function in R 3.3.3 (Everitt & Hothorn, 2014; Kabacoff, 2015), and because these clusters were consistent with developmental theory concerning changes in autonomy, parent-child relationships, and late adolescent substance use (Barber et al., 2005; Cheng et al., 2016; Steinberg & Silverberg, 1986). Lastly, two GLMMs were estimated using Poisson distributions to predict the two drinking outcomes using PPP cluster membership as a predictor. Intercepts in all GLMMs were anchored at the last time point to identify cumulative differences that emerged across college. Violations of the equidispersion assumption of Poisson statistical models were accounted for using level-1 random effects capturing over- and underdispersion (Coxe et al., 2009).

## 3. Results

### 3.1. Descriptives

On all four occasions from high school through third year of college, the modal response for the number of drinks students believed their parents would approve of them drinking on a given occasion was zero, with an overall mean between two and three drinks (see Table 1). Turning to alcohol use, averaged across college, the average student engaged in binge drinking between once and two to three times and consumed between five and six drinks on his or her heaviest drinking occasion in the past 30 days (see Table 2).

### 3.2. Does Perceived Parental Permissibility of Alcohol Use (PPP) Change across College?

The average female reported that her parents approved of her consuming slightly less than one drink on a given night in her last year of high school and slightly more than two drinks during her third year of college, $\gamma_{00}$ (Table 3). The average male reported that his parents approved of him consuming slightly more than one drink on a given night during his last year of high school and slightly less than three drinks during his third year of college, $\gamma_{01}$. This change corresponded to an average increase in PPP of 31% each year for females, $\gamma_{10}$. The rate of change in PPP for males did not differ from that of females, $\gamma_{11}$ (Figure 1).

### 3.3. Is PPP Associated with Drinking Behaviors across College?

The average female reported slightly less than one binge drinking occasion in the past 30 days in first year and slightly more than one binge drinking occasion in the past 30 days in fourth year, $\gamma_{00}$, although the number of binge drinking occasions in fourth year was not significantly different than one (Table 4). This change corresponded to an average annual increase of 8% in females' binge drinking frequency, $\gamma_{10}$. Males did not differ from females in binge drinking frequency in fourth year, $\gamma_{01}$, or in their rate of change across college, $\gamma_{11}$. Each additional unit in mean permissibility was associated with a 29% greater number of past 30-day binge drinking occasions, $\gamma_{02}$, which corresponded to a difference of between zero and one binge drinking occasion in a 30-day period.

The average female consumed slightly less than three drinks on her heaviest drinking occasion in the past 30 days in her first year and slightly more than four drinks in fourth year, $\gamma_{00}$. The average male consumed more drinks on his heaviest drinking occasion in fourth year, $\gamma_{01}$, with a predicted average of between five and six drinks. This change

corresponded to an average annual increase of 12% in females' peak drinking, $\gamma_{10}$. The rate of increase in males' peak drinking did not differ from that of females, $\gamma_{11}$. Each additional unit in mean PPP was associated with a 24% greater number of drinks consumed on the heaviest drinking occasion in the past 30 days, $\gamma_{02}$.

### 3.4. Is PPP Cluster Membership Associated with Drinking Behaviors?

Using k-means cluster analysis, students with responses for all four PPP indicators (high school and 1st, 2nd, and 3rd year of college) were sorted into one of four clusters representing different patterns of PPP change. Ninety of the 679 students in the analytic sample for the aggregate GLMMs were not included due to incomplete data; subsequent analyses focus on the 589 cases assigned to one of the four clusters. Students in the *Low* cluster ($n = 213$) had PPP scores that were consistently low across the four occasions (Figure 2). Students in the *Age 21* cluster ($n = 190$) reported PPP scores that started low but rose sharply in the third year of college, corresponding to when students neared the minimum legal drinking age of 21 years, $t(599) = 22.59$, $p < .001$. Students in the *College* cluster ($n = 111$) had somewhat low PPP scores during the last year of high school that rose dramatically upon matriculation to college. Lastly, students in the *High* cluster ($n = 75$) reported high PPP scores during all four time periods.

Table 5 presents GLMMs testing whether cluster membership was associated with the drinking outcomes. The *Low* cluster was the reference group due to its largest size and overlap with the modal pattern of zero drinks. Similar to the aggregate model, during fourth year, there were no gender differences in binge drinking frequency, but males consumed a greater number of drinks on their heaviest drinking occasions than did females, $\gamma_{01}$. Further, binge drinking frequency and peak drinking increased across college, $\gamma_{10}$, and these rates of change did not differ by gender, $\gamma_{11}$.

Results contrasting the four clusters showed that, during fourth year, students in the *Age 21*, $\gamma_{02}$, *College*, $\gamma_{03}$, and *High*, $\gamma_{04}$, clusters reported more binge drinking occasions in the prior 30 days compared to students in the *Low* cluster. However, there were no differences between clusters in their rate of change in binge drinking frequency over time, $\gamma_{12}$, $\gamma_{13}$, and $\gamma_{14}$. Predicting peak drinking, relative to the *Low* cluster, the number of drinks consumed on students' heaviest drinking occasion in the past 30 days in fourth year was greater for students classified in each of the other three clusters, $\gamma_{02}$, $\gamma_{03}$, and $\gamma_{04}$. The number of drinks students consumed on their heaviest drinking occasions increased at a slower rate for students in the *College*, $\gamma_{13}$, and *High*, $\gamma_{14}$, clusters than for those in the *Low* cluster.

## 4. Discussion

As students moved from high school through college, they believed that their parents became more permissive with respect to their drinking alcohol. These changes in PPP were not universal, however: Four distinct patterns of stability and change were identified across college. Moreover, more permissive patterns—whether consistently permissive or showing increasing permissibility across time—were associated with more frequent binge drinking and a greater number of drinks consumed on peak occasions. Thus, all three hypotheses received some support.

The primary contribution of this study is the novel conceptualization of PPP as a dynamic construct that changes along distinct, non-linear pathways during the college years. The conditional growth model of PPP (Figure 1), which takes a variable-centered approach, characterizes PPP as increasing incrementally across the college years in an approximately monotonic fashion. However, the more nuanced, pattern-centered approach depicted in Figure 2 suggests that PPP change across the college years may be more accurately characterized by divergent subgroups with various patterns of relative stability (e.g., low across time) and nonlinear change (e.g., increasing sharply at college matriculation or age 21). The cluster models (Table 5) demonstrate the predictive value of these distinctions by showing that these subgroups are differentially associated with binge drinking and peak drinking.

Substantively, the PPP clusters may represent different stances or dispositions of parents in regard to their children's alcohol use. For example, PPP scores of zero in the last year of high school, indicating parents' being intolerant of their children's alcohol use, likely have different meanings in different clusters. A PPP score of zero for students in the *Low* cluster may indicate parents' disapproval of alcohol use altogether, perhaps for moral or religious reasons, whereas the same score in the *Age 21* cluster may indicate parents' disapproval of underage alcohol use (Yu, 1998), which would represent a legal reason. It is important to note that these interpretations are speculative, and underlying reasons for students' PPP and differences between the non-*Low* PPP clusters were not assessed. Still, this more nuanced view that uses a pattern-centered approach to conceptualize PPP among college students as a dynamic, non-linear construct characterized by divergent subgroups is consistent with research reporting similar patterns of change and heterogeneity in adolescent and emerging adult substance use (Chassin et al., 1991; Schulenberg et al., 1996).

This new way of conceptualizing PPP has two key implications for developmental and prevention science. First, viewing permissibility as dynamic, non-linear, and divergent across families suggests that studies that only assess PPP on a single occasion may provide an incomplete view of this construct and its relation to drinking. For example, Figure 2 demonstrates that students in three clusters – *Low*, *Age 21*, and *College* – reported very similar parents' attitudes towards drinking in the last year of high school. However, by the third year of college, parents in these clusters differed considerably in their attitudes towards student drinking. Second, it suggests a need for effective parent-based interventions throughout college. For example, students in the *Age 21* cluster reported that their parents became much more tolerant of alcohol use as their cohort approached the minimum legal drinking age. Since this cluster reported more frequent binge drinking and greater peak drinking than did the *Low* cluster, parent-based interventions aimed at reducing binge drinking that are implemented later in college may be effective. Just as delaying initiation of any drinking in early adolescence is viewed as a goal by many prevention efforts (DeWit et al., 2000; Kosterman, 2000), delaying or preventing increases to binge drinking, as well as reducing its frequency and intensity, is likely to reduce harm among college students.

The results should be considered in light of several limitations. First, PPP was assessed with a single item and retrospectively regarding high school and first year of college. Although not ideal, PPP is commonly assessed retrospectively in the college drinking literature and

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other studies have used the same item (Abar et al., 2009; Varvil-Weld et al., 2014). Second, it is possible that a ceiling effect constrained change in the *College* and *High* cluster. However, the maximum score of 7 represented no amount being too much to drink, which does represent a very permissive view. Third, students' perceptions of parents' attitudes, not those reported by parents themselves, were assessed. Evidence suggests that students who drink frequently overestimate injunctive norms, or others' acceptance of drinking behaviors (Neighbors et al., 2011). However, evidence also suggests adolescents' reports of parenting practices are more predictive of alcohol use and overlap marginally with parent reports (Cottrell et al., 2003; Goldin, 1969; Latendresse et al., 2009). Finally, the possibility of reverse causality remains. Parents may become more permissive of drinking after learning their children already drink regularly, or perhaps heavier-drinking students perceive or report their parents as being more permissive to reduce cognitive dissonance.

## 5. Conclusions

The findings of the current study extend the literature linking PPP and college drinking by showing that PPP increased across college, patterns of PPP change were non-linear and differed between families, and membership in PPP clusters was differentially associated with drinking behaviors. Our findings suggest a new, pattern-centered way of conceptualizing PPP and suggest the need to continue implementing parent-based interventions beyond the transition to and the first year of college. Future work assessing additional characteristics of the parent-child relationship, underlying reasons for different approaches to permissibility, and more nuanced aspects of parents' attitudes and messages about their children's alcohol use would provide important insights into why, how, and under what conditions parents influence children in adolescence and beyond. Future work replicating the clusters and their links with drinking behaviors would help establish robustness and relative (dis)advantages of particular clusters. Lastly, future work assessing the link between PPP and negative consequences of alcohol use would help extend the PPP literature by determining whether PPP is associated with broader developmental and health-related outcomes and perhaps uncovering mechanisms between aspects of parenting and the development of alcohol and/or substance use disorders.

## Acknowledgments

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## Highlights

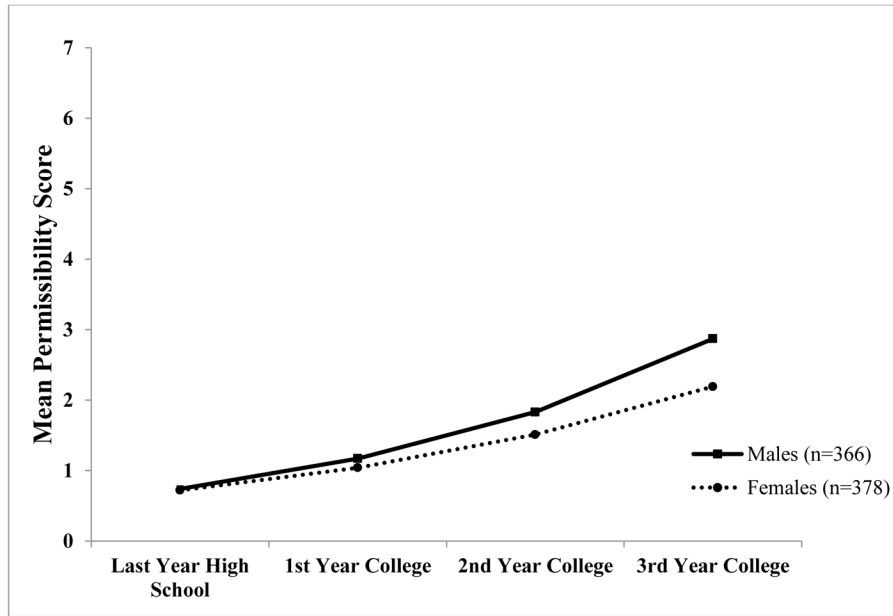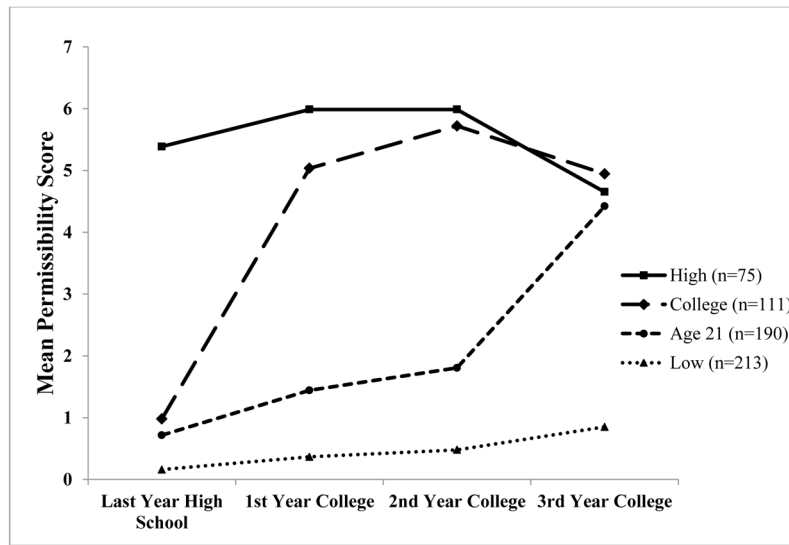- Perceived parental permissibility of alcohol use increased from the last year of high school through the third year of college.

- Between-person differences in mean permissibility were positively associated with binge drinking frequency and peak drinking across the college years.

- Four patterns of stability and change in perceived parental permissibility of alcohol use were identified across college.

- Patterns of permissibility change differentially predicted binge drinking frequency and peak drinking through the fourth year of college.

**Figure 1.**
Predicted change in perceived parental permissibility of alcohol use from the last year of high school through the third year of college by gender.

**Figure 2.**
Patterns of change in perceived parental permissibility of alcohol use in each of the four permissibility clusters.

**Table 1**

Means and Standard Deviations of Perceived Parental Permissibility of Alcohol Use across Four Occasions: Full Sample and by Gender

|  | Last year of high school ($n = 656$) | First year of college ($n = 652$) | Second year of college ($n = 655$) | Third year of college ($n = 617$) |
|---|---|---|---|---|
| Full sample | 1.20 (1.95) | 2.33 (2.47) | 2.63 (2.54) | 3.25 (2.33) |
| Females | 1.09 (1.78) | 2.15 (2.37) | 2.46 (2.42) | 2.87 (2.17) |
| Males | 1.31 (2.11) | 2.53 (2.56) | 2.81 (2.66) | 3.69 (2.43) |

**Table 2**

Means and Standard Deviations of 30-Day Binge Drinking Frequency and 30-Day Peak Drinking across the First Four Years of College: Full Sample and by Gender

| 30-day binge drinking frequency | First year of college ($n$ = 738) | Second year of college ($n$ = 645) | Third year of college ($n$ = 614) | Fourth year of college ($n$ = 607) |
|---|---|---|---|---|
| Full sample | 1.35 (1.74) | 1.60 (1.75) | 1.54 (1.65) | 1.68 (1.72) |
| Females | 1.17 (1.67) | 1.48 (1.66) | 1.52 (1.62) | 1.53 (1.63) |
| Males | 1.54 (1.79) | 1.74 (1.84) | 1.56 (1.68) | 1.86 (1.80) |
| 30-day peak drinking | First year of college ($n$ = 729) | Second year of college ($n$ = 636) | Third year of college ($n$ = 614) | Fourth year of college ($n$ = 594) |
| Full sample | 4.95 (5.32) | 5.71 (5.66) | 5.99 (5.69) | 6.48 (5.49) |
| Females | 3.58 (3.87) | 4.63 (4.22) | 4.91 (4.36) | 5.23 (4.23) |
| Males | 6.38 (6.18) | 6.90 (6.72) | 7.24 (6.72) | 7.93 (6.37) |

**Table 3**

Conditional Growth Model Estimating Change in Perceived Parental Permissibility of Alcohol Use across College and by Gender

|  | Incidence rate ratio [95% CI] |
| --- | --- |
| Intercept, $\gamma_{00}$ | 2.19 [1.94, 2.47]*** |
| Male Gender, $\gamma_{01}$ | 1.31 [1.10, 1.55]** |
| Time, $\gamma_{10}$ | 1.31 [1.26, 1.35]*** |
| Gender × Time, $\gamma_{11}$ | 1.04 [.99, 1.09] |

*Note.* $N = 744$, CI = confidence interval.

*
$p < 0.05$,

**
$p < 0.01$,

***
$p < 0.001$.

$\log(\text{Permissibility}_{ij}) = \gamma_{00} + \gamma_{01}\text{Male Gender}_i + \gamma_{10}\text{Time}_{ij} + \gamma_{11}\text{Male Gender}_i \times \text{Time}_{ij} + u_{0i} + \varepsilon_{ij}$

**Table 4**

Fixed Effects of Generalized Linear Mixed Models Predicting Drinking Behavior by Time, Perceived Parental Permissibility of Alcohol Use, and Gender: Aggregate Models

| | Binge drinking Incidence rate ratio [CI] | Peak drinking Incidence rate ratio [CI] |
|---|---|---|
| Average drinking, $\pi_0$ | | |
| Intercept, $\gamma_{00}$ | 1.07 [.94, 1.22] | 4.28 [3.86, 4.76] *** |
| Male gender, $\gamma_{01}$ | 1.12 [.93, 1.35] | 1.28 [1.10, 1.48] ** |
| Mean permissibility, $\gamma_{02}$ | 1.29 [1.23, 1.34] *** | 1.24 [1.20, 1.28] *** |
| Average change over time, $\pi_1$ | | |
| Intercept, $\gamma_{10}$ | 1.08 [1.05, 1.12] *** | 1.12 [1.08, 1.15] *** |
| Male gender, $\gamma_{11}$ | .98 [.93, 1.03] | .96 [.92, 1.00] |

*Note.* $N = 679$, CI = 95% confidence interval.

*
$p < 0.05$,

**
$p < 0.01$,

***
$p < 0.001$.

$\log(\text{Outcome}_{ij}) = \gamma_{00} + \gamma_{01}\text{Male Gender}_i + \gamma_{02}\text{Mean Permissibility}_i + \gamma_{10}\text{Time}_{ij} + \gamma_{11}\text{Male Gender}_i \times \text{Time}_{ij} + u_{0i} + \varepsilon_{ij}$

**Table 5**

Fixed Effects of Generalized Linear Mixed Models Predicting Drinking Behavior by Time, Perceived Parental Permissibility of Alcohol Use, and Gender: Permissibility Cluster Models

|  | Binge drinking Incidence rate ratio [CI] | Peak drinking Incidence rate ratio [CI] |
|---|---|---|
| Average drinking, $\pi_0$ | | |
| Intercept, $\gamma_{00}$ | .57 [.47, .70]*** | 2.52 [2.17, 2.94]*** |
| Male gender, $\gamma_{01}$ | 1.18 [.97, 1.42] | 1.33 [1.14, 1.55]*** |
| Permissibility cluster | | |
| Age 21[a], $\gamma_{02}$ | 1.99 [1.56, 2.54]*** | 1.97 [1.62, 2.38]*** |
| College[a], $\gamma_{03}$ | 3.32 [2.53, 4.35]*** | 2.72 [2.19, 3.37]*** |
| High[a], $\gamma_{04}$ | 3.87 [2.86, 5.23]*** | 2.96 [2.32, 3.77]*** |
| Average change over time, $\pi_1$ | | |
| Intercept, $\gamma_{10}$ | 1.15 [1.08, 1.22]*** | 1.18 [1.12, 1.24]*** |
| Gender, $\gamma_{11}$ | .98 [.93, 1.03] | .97 [.93, 1.01] |
| Permissibility cluster | | |
| Age 21[a], $\gamma_{12}$ | .94 [.87, 1.02] | .96 [.90, 1.02] |
| College[a], $\gamma_{13}$ | .94 [.87, 1.02] | .92 [.87, .98]* |
| High[a], $\gamma_{14}$ | .93 [.86, 1.01] | .92 [.86, .96]* |

*Note.* $N = 589$, CI = 95% confidence interval.

[a] In comparison to the *Low* permissibility cluster (reference).

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$.

$\log(\text{Outcome}_{ij}) = \gamma_{00} + \gamma_{01}\text{Male Gender}_i + \gamma_{02}\text{Age 21}_i + \gamma_{03}\text{College}_i + \gamma_{04}\text{High}_i + \gamma_{10}\text{Time}_{ij} + \gamma_{11}\text{Male Gender}_i \times \text{Time}_{ij} + \gamma_{12}\text{Age 21}_i \times \text{Time}_{ij} + \gamma_{13}\text{College}_i \times \text{Time}_{ij} + \gamma_{14}\text{High}_i \times \text{Time}_{ij} + u_{0i} + \varepsilon_{ij}$