POST-HIGH SCHOOL EDUCATION TRAJECTORIES, ADULT ROLE TRANSITIONS, AND MATURING OUT OF HEAVY ALCOHOL USE

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Studies of drinking trajectories during the late teens and the twenties have focused almost exclusively on young adults who attend college. It is unclear if young adults outside of this educational pathway report different trajectories of alcohol use than those who attend college. The purpose of this study was to compare developmental trajectories of alcohol use and problems in a nationally representative sample (N = 8984) of individuals who did and did not attend college. Adult role transitions and adolescent psychological functioning were examined as potential predictors that might explain differences in alcohol use trajectories between the groups. Although non-college participants reported higher levels of binge drinking and alcohol problems at age 18 than college participants, both groups unexpectedly reported similar increases in alcohol use and problems during emerging adulthood, as well as similar decreases in alcohol use during the mid-twenties and early thirties. Even though non-college participants reported transitioning to adult roles earlier than the college participants, few of the associations between the adult role transitions and the alcohol use and problems trajectories differed between the groups. Finally, though the non-college group had poorer psychological adjustment in adolescence than the college group, worse adjustment was similarly associated with later adult role transitions and, surprisingly, flatter alcohol use trajectories in both groups. These results indicate that increased participation in heavy drinking, as well as later desistance, is relatively universal during this developmental period and not specific to young adults who attend college.

In addition, the associations between adult role transitions, adolescent psychological functioning, and the trajectories of alcohol use and problems found in both groups suggest that drinking patterns during young adulthood are influenced by similar factors regardless of college attendance.

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1.0 INTRODUCTION

Developmental theorists have proposed that there is a distinct developmental period between adolescence and the late twenties. Known as "emerging adulthood," it encompasses the ages of 18 to 25 (Arnett, 1992; 2000). During this age range, rates of heavy alcohol use (i.e. drinking five or more drinks for males and four or more drinks for females on the same occasion on five or more days in the past 30 days) and binge drinking (i.e. drinking five or more drinks for males and four or more drinks for females on the same occasion on at least one day in the past 30 days) reach their peak (NSDUH Report, 2003; 2006). Emerging adults also report higher rates of alcohol use disorders compared to other developmental periods (Grant et al., 1994). Although alcohol use is common during other developmental stages, emerging adults report more problematic drinking behaviors than other developmental groups. These high rates of alcohol use not only illustrate frequent participation in potentially dangerous drinking behaviors but also indicate that drinking, and drinking heavily, is normative, or highly common, during emerging adulthood (Arnett, 2000).

Participation in risk behaviors, including alcohol use, is not unique to emerging adulthood. Drinking among adolescents and young adults, the latter defined herein as individuals in their mid-twenties to early thirties, is also common, but adolescents and young adults are more likely than emerging adults to have limits and boundaries placed on their behavior by parents or guardians or societal expectations and responsibilities, depending on the

developmental stage (Arnett, 1994; 2001; Nash, McQueen, & Bray, 2005; Steinberg et al., 1994, Wood et al., 2004). As a result, drinking opportunities can be more limited outside of the emerging adult period.

1.1 "MATURING OUT" OF HEAVY ALCOHOL USE

During the transition to the late twenties, alcohol use tends to decrease, even among emerging adults who reported problematic levels of drinking (Donovan et al, 1983; Jackson et al., 2001; Maggs & Schulenberg, 2005; SAMHSA, 2011; Sher & Gotham, 1999; Sher et al., 2005). This decrease in alcohol use is often referred to as "maturing out" of heavy alcohol use (Dawson et al., 2006; Littlefield et al., 2009; Windle, 2003). A number of studies have examined characteristics of the transition to the late twenties to understand why this decrease in heavy alcohol use takes place, such as transitions to adult roles, changes in adult attitudes, development of adult identities, and conforming to societal expectations (Arnett, 2000; 2001).

Decreases in heavy alcohol use during the late twenties seem to coincide with a number of other transitions and changes that occur during young adulthood. In particular, getting married and having children, common adult role transitions among individuals in their late twenties, are associated with decreased alcohol use and alcohol problems during young adulthood compared to emerging adulthood in samples of college students (Dawson et al., 2006; Littlefield et al., 2009). Impulsivity, a personality trait known to be associated with alcohol use, is also lower in the late twenties compared to the early twenties, which is, in turn, associated with decreases in alcohol use between these developmental periods (Littlefield et al., 2009). In addition to the adoption of adult roles and decreases in impulsivity, young adult social

environments are often less favorable to participation in heavy alcohol use than they were during college, indicating that heavy alcohol use is no longer considered appropriate during the late twenties. Finally, young adults, compared to emerging adults, are more likely to report that they have attained adulthood and should be meeting the social conventions that define being an adult, such as being employed full-time, having committed romantic relationships, and avoiding drunkenness (Arnett, 2001). Taken together, these studies indicate that, because young adulthood is not as conducive to participation in heavy alcohol use as emerging adulthood, a decrease in alcohol use occurs during this developmental period. However, the generalizability of the findings for all of these studies is limited because of an almost exclusive focus on college students.

Only 28.2% of adults over the age of 25 in the United States have earned at least a bachelor's degree (U.S. Department of Commerce, 2013). This means that the majority of adults in the United States are not college educated. A subpopulation of individuals in their late teens and early twenties report attending at least some college without attaining a degree. As many as 66.2% of 2012 high school graduates report enrolling at a two year or four year college or university after high school graduation, but only a little over half of those who enroll in college, approximately 54%, will graduate with a degree within six years (Shapiro et al., 2013; U.S. Department of Labor, 2013a). Despite failure to graduate, all enrollees will still be exposed to drinking behaviors that are prevalent on college campuses. Because aspects of the college environment are more conducive to alcohol use, particularly heavy alcohol use (Carter et al., 2010), than non-college environments, individuals in their late teens and early twenties who do not attend college might be expected to report less alcohol use than their peers who attend

college. These differences in alcohol use could also have implications for alcohol use trajectories beyond the college years.

There is some evidence that college students, compared to peers who do not attend college, do indeed report higher rates of heavy drinking, binge drinking, and alcohol dependence and abuse (NSDUH Report, 2003). However, higher rates of alcohol use and disorders among college students do not necessarily translate to continued heavy drinking later, as is illustrated by patterns of alcohol use in this population (Braithwaite et al., 2010; Brennan & Shaver, 1995; Chilcoat & Breslau, 1996; Dawson et al., 2006; Gotham et al., 1997; Gotham et al., 2003; Leonard & Mudar, 2000; Littlefield et al., 2009). For example, Muthen and Muthen (2000) found that, even after reporting high rates of heavy alcohol use during the college years, those who attend college report relatively low levels of heavy alcohol use in their late twenties and early thirties. In contrast, there is some evidence that continued heavy alcohol use into young adulthood, and its associated problems, are actually more likely to be reported by those who do not attend college than by their peers who attended college (Merline et al., 2004). For example, Merline and colleagues (2004) found that, at 35 years old, participants were less likely to drink heavily if they had completed a college degree than if they had not, and participants were also less likely to drink heavily if they had taken college classes compared to participants who had not taken college classes. These findings suggest that even some college attendance is associated with lower risk for heavy alcohol use in the late twenties compared to peers who do not attend college at all. Thus, it is likely that longitudinal research will show that there are differences in trajectories of heavy alcohol use and alcohol problems during emerging adulthood and the late twenties between individuals who do and do not attend college. Specifically, those who attend college will report a greater increase in alcohol use and problems during the college years but a

greater decrease in alcohol use and problems during young adulthood compared to those who do not attend college.

1.2 TIMING OF ADULT ROLE TRANSITIONS AND MATURING OUT

The literature also has yet to address whether emerging adults who do and do not attend college transition to adult roles at different ages. The timing of these transitions may affect both the increase in alcohol use observed during emerging adulthood and subsequent maturing out during the late twenties. The adoption of adult roles, such as entry into full-time employment, marriage, or becoming a parent, is consistently associated with decreases in heavy alcohol use among young adults who attend college (Arnett, 2000; 2001; Jackson et al., 2001; Sher et al., 2005). Adoption of these adult roles is assumed to be associated with desistance in heavy alcohol use, in part, because of their incompatibility with continued heavy drinking. Although national trends indicate that young adults are delaying entry into adult roles, particularly marriage and parenthood, it is unclear if these delays occur for all individuals in their late twenties or are limited to those who attend college during emerging adulthood.

One important adult role transition that occurs for many transitioning to young adulthood is entry into full-time employment. Many adolescents participate in part-time work, which is associated with greater participation in substance use due to the presence of stresses in addition to school or the presence of third variables, such as disengagement from school or intensity of work schedule (Bachman & Schulenberg, 1993; Monahan et al., 2013). Compared to part-time work, full-time employment is more likely to occur after an adolescent or emerging adult has left school and requires greater job related responsibilities (Schulenberg & Maggs, 2002). In

general, the literature indicates that transitioning from high school to full-time employment is associated with decreases in alcohol use (Bachman et al., 1997; Jackson et al., 2001; Schulenberg & Maggs, 2002; Sher et al., 2005; Wood et al., 2000), though the decrease in alcohol use is more pronounced when young adults transition from college to work rather than from high school to work (Schulenberg et al., 2000). Compared to peers attending college, emerging adults who enter the workforce immediately after high school may report lower levels of heavy alcohol use during emerging adulthood due to limited opportunities to participate in heavy alcohol use. For example, participation in heavy alcohol use for emerging adults who are working full-time may conflict with job related responsibilities. It is unclear how transitioning to full-time employment after high school will affect alcohol use during the late twenties. Transitioning to full-time employment after high school rather than attending college seems to be associated with lower levels of alcohol use during emerging adulthood. As such, an earlier transition to full-time employment may also be associated with lower levels of alcohol use during the late twenties due to lower levels of alcohol use during emerging adulthood.

Marriage and cohabitation with a romantic partner are also associated with decreased alcohol use among young adults who attended college (Bachman et al., 1997; Fleming et al., 2010; Gotham et al., 1997; 2003; Littlefield et al., 2009). In a sample of participants recruited as college freshmen, Gotham and colleagues (2003) found that being married in the late twenties was associated with lower levels of alcohol use disorder diagnoses during young adulthood. Fleming and colleagues (2010) found a similar protective effect for young adults who reported cohabiting with a romantic partner. Married and cohabiting young adults may report lower levels of alcohol use, in part, because of the different social and recreational activities of couples compared to single peers (O'Malley, 2004/2005). Emerging adults attending college report

being disinterested in and unprepared for marriage or cohabitation until the late twenties, and they delay the adoption of these adult roles until after transitioning to adulthood (Mather & Lavery, 2010; Scott et al., 2009). This choice to delay marriage or cohabitation is reflected in national trends showing an increase in the age of first marriage in the United States in recent years (Scott et al., 2009), with men marrying for the first time around age 28 on average and women marrying for the first time around age 26 (Draut et al., 2011).

For young adults not in college, there is some evidence that marriage occurs earlier, during the early and mid-twenties, than for young adults who attend college (England & Bearak, 2012). These findings indicate that young adults who did not attend college may not feel the same need to delay marriage or cohabitation as peers who are still in school during their early twenties. In contrast to later marriage, marriage during the late teens or early twenties may not be associated with lower levels of alcohol use in the early twenties or desistance in alcohol use during the late twenties. Marriage during adolescence is associated with increased risk for more frequent and more severe alcohol use (Krohn et al., 1997; Martino et al., 2004; Sher & Gotham, 1999). This increased risk for substance use has been thought to be due, in part, to adoption of adult roles before being prepared for the associated responsibilities and the commensurate stress and negative affect associated with immature role transitions. Emerging adults who marry during the early twenties are at risk for a number of negative outcomes, including lower SES attainment and higher rates of divorce compared to peers who marry later (Dahl, 2010; Glenn & Supancic, 1984). As in adolescence, the negative outcomes associated with marriage during the early twenties may be due to adoption of an adult role, in this case marriage, before being prepared for that role. If emerging adults who marry or cohabitate young are unprepared for this level of commitment, their rates of alcohol use during the late twenties may mimic those of

married or cohabiting adolescents rather than those of peers who married or cohabited later. Specifically, rates of alcohol use may be higher over time for those who marry or cohabitate during emerging adulthood rather than lower.

Parenthood is another key adult role associated with maturing out during the late twenties among those who attended college (Bachman et al., 1997). Similar to entry into full-time employment and marriage, parenthood is associated with responsibilities and constraints that limit a young adult's opportunities to participate in heavy alcohol use. In addition, because young adult pregnancies are more likely to be planned than pregnancies during adolescence or emerging adulthood (Bachman et al., 1997), parents-to-be may decrease substance use before and during pregnancy to avoid health complications related to substance use. As with marriage, statistics showing later ages at the age of first child among individuals in the United States indicate that many young adults are actively delaying parenthood (Mathews & Hamilton, 2009), with women reporting becoming mothers for the first time around age 25 on average. Emerging adults who are not enrolled in college may not delay parenthood in the same way as their college attending peers. Just as transitioning to marriage before an individual is prepared for the responsibilities of that adult role is associated with increased alcohol use, adolescents who become parents are at increased risk for alcohol use (Krohn et al., 1997; Martino et al., 2004; Sher & Gotham, 1999). Also similar to marriage, individuals who transition to parenthood during the early twenties are at risk for many negative outcomes, including financial strain and high levels of internalizing symptoms (Bramlett & Mosher, 2002; Falci et al., 2010). If these negative outcomes are due to being unprepared for the responsibilities of parenthood, alcohol use patterns among those in their late twenties who become parents during their early twenties may again look more like those of teen parents than those of peers who waited until the late twenties

to become parents. Thus, emerging adults may also be at risk for higher levels of alcohol use over time if they transition to parenthood before being prepared for that adult role.

1.3 INDIVIDUAL CHARACTERISTICS, COLLEGE ATTENDANCE, TIMING OF ADULT ROLES, AND MATURING OUT

Although the literature on the etiology of adolescent and young adult alcohol use has tended to focus on the predictive utility of individual personality variables, there is also recognition that many high-risk traits, such as negative affect and impulsivity, correlate strongly with one another (Clark et al., 2011). Some studies have aggregated these correlated aspects of temperament and personality to effectively yield prediction of substance use. Clark and colleagues (2011) found that aspects of attention, conduct, and mood problems were predictive of both participation in substance use and development of substance use disorders (Clark et al., 2011). Others found that overlap in psychopathologies, rather than the individual psychological disorders, suggests a core liability for substance use and substance use disorders (Clark et al., 2008, Tarter et al., 1999). For example, poor adolescent psychological functioning, defined as a combination of internalizing and externalizing symptoms, was associated with higher levels of substance use, including alcohol use, during adolescence compared to peers with better psychological functioning (Brody & Ge, 2001; Nation & Heflinger, 2006).

Thus, a composited measure of adolescent psychological functioning, which is also supported by psychometric work in youth (Achenbach & Edelbrock, 1987), fits well with lifespan models of alcohol use that describe how related broad characteristics, that tap genetic, environmental, and psychological vulnerabilities, predict substance use (Sher, 1991). Sher

(1991) particularly emphasizes the role of temperament and personality, as a broad set of characteristics including impulsivity, conventionality, and self-regulation, in the development of alcohol use and alcohol use disorders (Bates, 1993; Hawkins et al., 1992). Because it has shown utility in predicting alcohol use and disorders across the lifespan, a construct that aggregates across correlated vulnerabilities such as these may be useful for understanding alcohol use trajectories through early adulthood. Moreover, an index of adolescent psychological functioning that aggregates across correlated vulnerabilities may be useful in initial research designed to test hypotheses about alcohol use trajectories in relation to college attendance and the timing of adult role transitions.

Poor adolescent psychological functioning, measured broadly, has been associated with impairments during emerging adulthood and the late twenties (including alcohol use). Young adults with poorer adolescent psychological functioning report lower levels of educational and vocational achievements during emerging adulthood and the late twenties than peers with better adolescent psychological functioning (Juvonen et al., 2000; Lewinsohn et al., 2003; Ting, 1997). Young adults with poorer adolescent psychological functioning also report higher levels of alcohol use than peers with better psychological functioning during adolescence (Mortensen et al., 2001). As such, it is likely that individuals with histories of poor psychological functioning will report more heavy drinking through adulthood compared to peers with better psychological functioning histories. In addition, evidence of continued impairments among young adults with histories of poor psychological functioning in adolescence suggests that the timing of adult role transitions may differ from the timing of these transitions among those with better adolescent psychological functioning. Specifically, young adults with histories of poor psychological functioning may report transitioning to adult roles early, as is supported by research indicating

that adolescent parents have poorer psychological functioning than peers who do not become parents (Coley & Chase-Lansdale, 1998).

It is common for emerging adults to not attend college, thus differences in college attendance alone are unlikely to explain differences in young adult alcohol use between those who do and do not attend college. Differences in adolescent psychological functioning between emerging adults who do and do not attend college, in conjunction with other impairments in adult behavior among those with poorer psychological functioning, may explain the difference in adult alcohol use between those who do and do not attend college. Although emerging adults with poorer adolescent psychological functioning who do not attend college may have worse outcomes than their peers with better psychological functioning, emerging adults with poorer adolescent psychological functioning who attend college may have similar outcomes to their peers with better psychological functioning. Emerging adults who are able to attend college despite a history of poor psychological functioning may have resources available to them, including financial resources and social support, that allow them to be resilient over time (Evans, 2004; Masten et al., 1999). As a result, it is likely that adolescent psychological functioning will predict the timing of adult role transitions and alcohol use and problems during emerging adulthood and young adulthood more strongly among those who do not attend college than among those who do attend college.

Gender, racial/ethnic identity, socioeconomic status, and whether participants live at home during emerging adulthood may also affect college attendance, alcohol use, and the timing of adult role transitions that affect heavy alcohol use. Women report lower levels of alcohol use and alcohol use problems than men across the lifespan (Stoltenberg et al., 2008; Wilsnack et al., 2000), enter committed relationships and become parents at slightly younger ages than men

(Goodwin et al., 2010), and are attending college in greater numbers than their male counterparts (Goldin et al., 2006; Jacob, 2002). In addition, racial/ethnic identity and socioeconomic status have been shown to affect collage attendance and the age at which young adults transition to full-time employment, committed romantic relationships, and parenthood (Arnett, 2003; Bynner, 2005; Galambos & Martinez, 2007; Heinz, 2009; Perna, 2000; Perna & Titus, 2005). Leaving home is associated with increased alcohol use among emerging adults who do and do not attend college, though the association between leaving home and alcohol use is more pronounced for college students (White et al., 2006). Thus, research examining maturing out needs to control for these characteristics in statistical analyses.

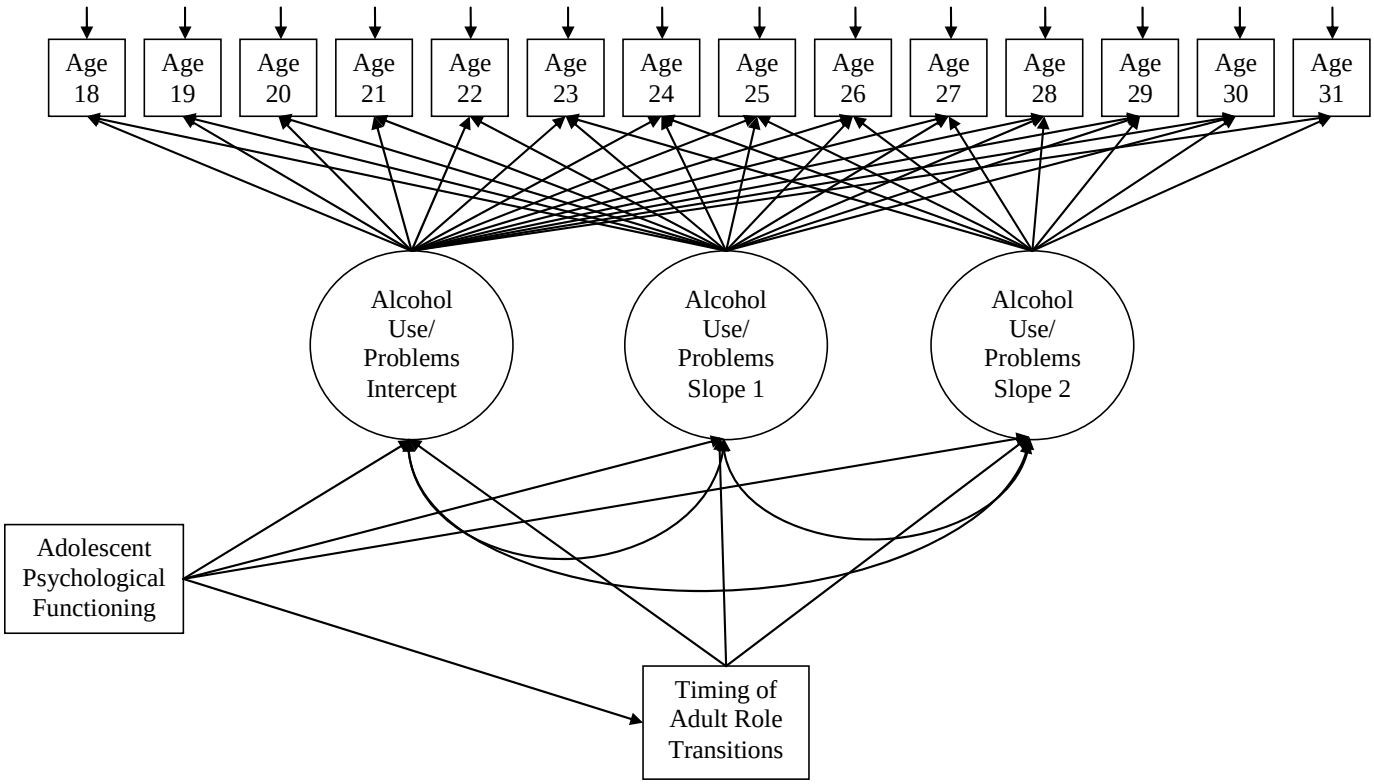
1.4 HYPOTHESES AND PREDICTIONS

The purpose of this study was to test mechanistic models of alcohol trajectories during young adulthood for a population that has received little research attention yet is highly prevalent in the United States: college aged adults who do not attend college (Figure 1). The study involved analysis of data from the National Longitudinal Survey of Youth 1997 (NLSY97) which consists of individuals who were born between 1980 and 1984 and have been assessed annually since 1997. The specific aims and hypotheses were as follows.

1. To examine whether trajectories of alcohol use through emerging adulthood and into young adulthood differed between emerging adults who did or did not pursue postsecondary education.

    a. Emerging adults who pursued postsecondary education would report a greater increase in alcohol use and alcohol problems compared to emerging adults who did not attend college.

Figure 1. Conceptual model of the influence of the timing of adult role transitions and adolescent psychological functioning on maturing out of heavy alcohol use, modeled using piecewise growth models of alcohol use and problems



b. Those who did not attend college would have less of a decrease in alcohol use and alcohol problems during young adulthood compared those who pursued postsecondary education.

2. Test whether the timing of adult role transitions, specifically entering full-time employment, becoming married or cohabiting with a romantic partner, and becoming a parent, differed between those who attended college and those who did not attend college and how the timing of these adult role transitions related to alcohol use.

a. Emerging adults who did not attend college would transition into adult roles earlier than emerging adults who pursued postsecondary education.

b. Later transitions to adult roles would be associated with greater decreases in alcohol use and alcohol problems during young adulthood than earlier transitions to adult roles.

3. Assess how adolescent psychological functioning affected the timing of adult role transitions and maturing out and differences in the strength of these associations based on college attendance.

a. Young adults with poorer adolescent psychological functioning would demonstrate less maturing out than young adults with better adolescent psychological functioning.

b. Young adults with poorer adolescent psychological functioning would transition to adult roles earlier than young adults with better adolescent psychological functioning. The earlier transitions to adult roles among young adults with poorer adolescent psychological functioning would be associated with less maturing out during young adulthood.

c. College attendance would moderate these hypothesized associations (3a and b) such that they would be stronger among young adults who did not attend college than among those who did attend college.

2.0 METHOD

2.1 SAMPLE

The sample was comprised of individuals from the National Longitudinal Survey of Youth 1997 (NLSY97). The NLSY97 is a longitudinal project sponsored by the U.S. Bureau of Labor Statistics. Participants in the NLSY97 were born between 1980 and 1984, and they were first interviewed in 1997 when they were between the ages of 12 and 18 years old. The sample was designed to be representative of individuals living in the United States, though a supplemental sample was added during the initial survey to oversample Hispanic/Latino and African-American adolescents. Participants were interviewed annually until Wave 15, which took place in 2011-2012 when participants were between 28 and 32, and they will be interviewed biennially in future waves beginning in 2013. The initial sample consisted of 8,984 individuals, and approximately 83% of the original sample, N = 7,423, participated in the Wave 15 interview. The initial survey sample was 51% male. Fifty-two percent of the participants identified as non-African-American/non-Hispanic, followed by African-American/non-Hispanic (26%), Hispanic/Latino (21%), and Mixed (1%) (U.S. Department of Labor, 2005; 2013b).

2.2 PROCEDURE

NLSY97 participants were recruited via screening interviews. First, primary sampling units (PSU) representing either a metropolitan area or one or more non-metropolitan counties with at least 2,000 housing units were selected using the National Opinion Research Center's (NORC) 1990 national sample. A total of 147 non-overlapping PSUs were selected. PSUs were then divided into sample segments. After selecting sample segments to represent one or more adjoining blocks with at least 75 housing units, a subset of households were chosen from the sample segments. A supplemental sample was recruited using the same procedures but focused on oversampling African-American and Latino participants. Screening interviews were then conducted among the selected households, and 9,907 individuals were identified as eligible to participate in the NLSY97. Approximately 91% of individuals eligible to participate in the NLSY97, a total of 8,984 individuals, participated in the Wave 1 interview. The sampling procedure has been found to have operated as planned, with no major imbalance in the recruitment of youth within the eligible age range (Moore et al., 2000). The NLSY97 has been found to be reasonably balanced demographically when compared to a Current Population Survey conducted around the same time as the NLSY97 recruitment (Moore et al., 2000).

For all of the waves, in person interviews were administered by an interviewer in the home (83.8%- 96.8% of interviews across waves) with a laptop computer. Questionnaires were answered using a computer-assisted personal interview (CAPI) instrument (Bradburn et al., 1991). Interviewers entered the participants' answers via the CAPI, except during sensitive portions of the interview (e.g., substance use), when participants directly answered the questions on the laptop. When in person interviews were not possible, interviews were conducted by phone (3.2%- 16.2% of interviews across waves) and the interviewer entered answers to all of

the questionnaires. In round 1, 88.4% of the participants, *N* = 7, 942, had one parent complete a set of questionnaires. Both English and Spanish versions of all survey instruments were available, and the Spanish versions of the questionnaires were administered by bilingual Spanish-speaking interviewers. Participants received financial compensation for each wave in which they participated, and parents who participated in Wave 1 were also compensated for their time.

2.3 MEASURES

2.3.1 Binge drinking

Binge drinking was assessed using participants' self-reported number of days drinking 5 or more drinks during the same drinking occasion (i.e., binge drinking) during the previous 30 days. These reports were collected annually. Participants responded using a number between 0 and 30 days.

2.3.2 Alcohol problems

Alcohol problems were assessed using participants' self-reported number of days drinking before or during school or work, and the frequency of driving when drinking in the past 30 days. Frequency of drinking before/during school or work was assessed annually, and the frequency of driving when drinking was assessed at 6 out of the 15 waves. Participants responded to the frequency of drinking before/during school question using a number between 0 and 30 days. The

response categories for frequency of driving when drinking were 0, 1, 2-3, 4-5, 6 or more, and did not drive in the past 30 days. Although these items provide a constricted assessment of alcohol problems, they represent two criteria for a substance use disorder diagnosis, specifically substance use in situations in which it is physically hazardous and substance use resulting in a failure to fulfill major role obligations (APA, 2013). Though alcohol problems and criteria for alcohol use disorders are not limited to these criteria, these items provided insight into how participants' alcohol use may be directly impairing daily life functioning rather than legal issues or physical symptoms of withdrawal or tolerance. In addition, examination of alcohol use disorder criteria using item response theory has found that these specific criteria, when examined individually, help identify individuals at similar levels of disorder severity as other disorder criteria (Saha et al., 2006).

2.3.3 College attendance

College attendance was assessed using participants' annual report of their enrollment status in each month of the preceding year. Response options were: attending full time towards a two year degree, four year degree, master's degree, doctoral degree, professional degree, joint BA/MA degree, or degree unknown; part time towards a two year degree, four year degree, master's degree, doctoral degree, professional degree, joint BA/MA degree, or degree unknown; and unknown full time/part time towards a two year degree, four year degree, master's degree, doctoral degree, professional degree, joint BA/MA degree, or degree unknown. For the purposes of this study, participants were coded as attending college if they were enrolled either full time or part time and working toward a two or four year degree or joint BA/MA degree between the ages of 18 and 24. All other participants were coded as not attending college. College attendance

rather than degree attainment was assessed because the literature indicates that reporting any college attendance is associated with less alcohol use during young adulthood compared to no college attendance (Merline et al., 2004).

2.3.4 Employment

Employment was assessed using participants' annual report of hours worked at all jobs, including self-employed jobs, during the preceding year. The response categories were 0, 1-499, 500-999, 1000-1499, 1500-1999, 2000-2499, 2500-2999, 3000-3499, 3500-3999, 4000-4499, 45000-4999, and 5000 or more hours. Participants were labeled as having transitioned to full-time employment when they reported working at least 2000 hours. Hours worked was assessed rather than type of employment because the literature indicates that it is the transition to full-time employment that influences alcohol use rather than the type of employment (Bachman et al., 1997; Schulenberg et al., 2000; Wood et al., 2000).

2.3.5 Marriage/Cohabitation

Marital and cohabitation status were assessed using participants' self-reported marital and cohabitation status assessed at each annual interview. The response categories were never married cohabiting, never married not cohabiting, married spouse present, married spouse absent, separated cohabiting, separated not cohabiting, divorced cohabiting, divorced not cohabiting, widowed cohabiting, and widowed not cohabiting. Participants were labeled as being married or cohabiting if they reported being never married cohabiting or married spouse present.

2.3.6 Parenthood

Parent status was assessed using participants' self-reported number of biological and adopted children residing with the parent. Participants' number of children was assessed annually, and the response options ranged from 0 to 10 or more. A child's status as a biological child or adopted child was assessed at 10 waves. Participants were identified as achieving parenthood only when the child was living with them because research indicates that the negative association between parenthood and substance use is primarily present when a child resides with the parent (Bachman et al., 1997).

2.3.7 Adolescent psychological functioning

Adolescent psychological functioning was assessed using parent report on six items from the Child Behavior Checklist (CBCL) included in the parent questionnaires administered at Wave 1. The six items were selected for use in the NLSY97 based on their demonstrated discrimination between demographically similar children who were referred or not referred for mental health services in other nationally representative surveys (Ehrle & Moore, 1997). Of the six items, parents answered two questions for both boys and girls (1. lies or cheats and 2. unhappy, sad, or depressed), two questions only for girls (1. school work is poor and 2. has trouble sleeping), and two questions only for boys (1. can't concentrate or pay attention for long and 2. doesn't get along with other kids), for a total of four questions per participant. Response options were 0 (Not true), 1 (Sometimes true), and 2 (Often true). The responses to the items were summed to create a total psychological functioning score, with possible scores ranging from 0 to 8. The measure has been used in a diverse group of studies, including samples of children in special risk

groups and more general community samples (CPRC, 2005; Kortenkamp & Ehrle, 2002; Vandivere et al., 2004). The Cronbach's alpha for the parent report on the measure for the current sample was .57 for girls and .65 for boys. As different items were used to assess adolescent psychological functioning in boys and girls, the interaction between gender and psychological functioning score was examined to determine if psychological functioning was associated differently with alcohol trajectories due to gender.

2.3.8 Covariates

2.3.8.1 *Alcohol use history*

Participants' self-reported age of their first drink and frequency of monthly alcohol use at age 17. These variables were included in the analyses due to the correlation between problematic drinking in adulthood and adolescent alcohol use. Age of first drink was assessed at Wave 1 and at four subsequent waves, and response options for age of first drink ranged from 0 to 18 or older. Participants' earliest report of age of first drink was used in the analyses to prevent the effect of "telescoping," or the inflation of age of first drink over time (Golub et al., 2000). The response range for frequency of alcohol use was 0 to 30 days. Frequency of alcohol use was collected at each wave, and only frequency of alcohol use data collected at age 17 was used as a measure of adolescent alcohol use. Adolescent alcohol use and age of first drink were z-scored, and then averaged, to create a composite alcohol use history variable.

2.3.8.2 *Demographics*

Demographic variables included participant gender, race/ethnicity (i.e., Black, Hispanic, Mixed Race, or Non-Black/Non-Hispanic), highest level of education, living at home during emerging

adulthood, and socioeconomic status, measured using parent education and family income, as reported by participants at Wave 1.

2.4 ANALYTIC OVERVIEW

Data analyses were carried out in a structural equation modeling framework using the Mplus 7.1 (Muthen & Muthen, 2012) software program. Latent variable growth models were estimated for the alcohol use and problems variables to assess trajectories of alcohol use and problems between ages 18 and 31. Then, using a multiple group modeling framework, the latent variable growth model trajectories were compared between participants who did or did not attend college. Comparing trajectories between groups was utilized rather than testing a time varying covariate of college attendance with drinking. The former allowed examination of differences in drinking patterns over time due to college attendance rather than the impact of college attendance on drinking at specific ages. The timing of adult role transitions and adolescent psychological functioning were added as predictors of the intercept and slopes in the growth models and the effects were compared between college attendance groups using a chi-square difference test. Models were estimated separately for (1) frequency of binge drinking (drinking 5 or more drinks during the past 30 days), (2) frequency of drinking before or during school/work (drinking before or during work during the past 30 days), and (3) frequency of drinking and driving (driving after drinking in the past 30 days). Alcohol use variables in general tend to have a non-normal distribution. To take into account the probable non-normality of the alcohol use variables in the proposed study, robust estimation methods, such as MLR, was utilized and results were checked with a bootstrapping method (Loehlin, 2004). Data were structured by age rather than by wave

to assess developmental changes in alcohol use (Bollen & Curran, 2006). Model fit was assessed using the chi-square value, Root Mean Square Error of Approximation (RMSEA), and Comparative Fit Index (CFI). Models were considered to have good fit if the chi-square value was nonsignificant, the RMSEA was equal to or lesser than .05, and the CFI was equal to or greater than .95 (Loehlin, 2004).

Power in growth curve analysis is determined based on the number of individuals and the total number of repeated observations for those individuals (Muthen & Curran, 1997). Given the relatively high retention of subjects in the NLSY97 and sample size of participants enrolled in college during the "traditional" attendance years (Table 1), the power curves presented in Muthen and Curran (1997) indicate that power to detect small to medium effects in the analyses exceeded .99. Because the analyses had more than sufficient power to detect effects, the magnitude of the effects was considered in the interpretation of the findings.

Table 1. Number of participants enrolled in college at each age of interest

Age	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Enrolled in College	2268	3672	3760	3497	3174	2332	1609	1265	1104	950	692	464	294	127
Not Enrolled in College	6715	5264	5170	5445	5732	6508	7167	7489	7657	7860	8176	6671	5076	3435
Total in Sample	8983	8936	8930	8942	8906	8840	8776	8754	8761	8810	8868	7135	5370	3562
4 Year College														
Full Time	1463	2240	2276	2208	2095	1419	773	514	403	326	230	164	86	44
Part Time	93	185	244	250	295	296	277	246	205	173	139	93	64	24
Total in 4 Year College	1556	2425	2520	2458	2390	1715	1050	760	608	499	369	257	150	68
2 Year College														
Full Time	528	883	814	612	416	318	280	244	246	242	176	107	78	32
Part Time	184	364	426	427	368	299	279	261	250	209	147	100	66	27
Total in 2 Year College	712	1247	1240	1039	784	617	559	505	496	451	323	207	144	59

2.4.1 Examining differences between alcohol use and problems based on college attendance (Hypothesis 1)

A number of differences between those who attend college and those who do not have been identified in the literature, including differences in high school achievement and financial resources (Bynner, 2005; Galambos & Martinez, 2007; Heinz, 2009). This means that creating college attendance groups based solely on college attendance status would ignore potential confounds between the groups. As such, an attempt was made to create college attendance subgroups who would be similar in these confounding variables by using propensity score analysis. Propensity score analysis is used to create groups matched in observed or quasi-experimental data using observed covariates (Luellen et al., 2005). As a result, we can more confidently, though not definitively, draw causal inferences about differences between groups in observational data.

Participants were considered to be attending college if they were enrolled for at least 75% of the year, or nine months out of the year. Any participants attending college for at least 75% of the year for one year during the "traditional" college years (i.e. ages 18-24) were labeled as the "college group," while participants who did not attend college at all during the traditional college years were labeled as the "non-college group." The observed covariates that were used to calculate the participants' propensity scores, or predicted probability of belonging to a group based on observed variables, were high school achievement, employment during adolescence, marital/cohabitation status during adolescence, adolescent parenthood, alcohol use history, and the six demographic variables described earlier. Nearest neighbor matching was used to match participants in the college and non-college groups. This method selects the non-college

participants whose propensity score is closest to the propensity score of a participant in the college group (Stuart, 2010).

An alternative analytic plan was devised in the event that the attempt to create matching groups failed: analysis of all participants with inclusion of the propensity score as a covariate. This strategy would maintain adequate power by allowing the inclusion of the full sample with covariate data while still taking college group differences in the potential confounds into account via the propensity score. Results would be interpreted as effects above and beyond the probability of belonging to a group based on background characteristics (aka the propensity score). Propensity score as a covariate was chosen over latent class analysis, which would also take similarities and differences in potential confounds into account, because the subdivision of the sample could have resulted in power issues. The confounding variables could also have been included as a latent variable of the covariates. Although this method would include the entire sample, thus maintaining adequate power, utilizing a latent variable of covariates would only allow interpretation of effects above and beyond the presence of the covariates without fully addressing differences in the covariates between the two groups.

Once groups were established, growth models were assessed to examine trajectories of alcohol use during emerging adulthood and young adulthood. Binge drinking and drinking before/during school/work were modeled using piecewise growth models. These models specify a point at which patterns of behavior are expected to change by specifying two slope terms (Muthen & Muthen, 2012). In these analyses, the first slope term modeled alcohol use or problems from 18 to 22, which captures the increase in alcohol use and problems during emerging adulthood. The second slope term modeled alcohol use or problems from 22 to 31, which captures the expected period for maturing out of heavy alcohol use during the transition to

young adulthood. Due to insufficient data during emerging adulthood, drinking and driving was modeled using a freely estimated growth curve model from 24 to 31. To ensure that piecewise or freely estimated growth curve models best fit the data, these models were compared to other functional forms of the growth models, such as linear and quadratic growth curve models. The alcohol use trajectories were first assessed in the overall sample and then examined in a multigroup framework to assess differences in the alcohol use trajectories between the college/non-college groups. Differences in the intercept and slope terms between groups were tested using chi-square difference tests. Chi-square difference tests assess the change in model fit between models in which paths are freely estimated between groups and models in which paths are fixed to be the same between groups (Loehlin, 2004). Due to the use of a robust estimation method (MLR) in the growth curve models, the Satorra-Bentler scaled chi-square was used for the chi-square difference tests in the current study (Satorra, 2000). A significant chi-square difference test indicates that fixing a path to be the same between groups worsens the overall fit of the model, thus reflecting a significant difference between the groups for that path. Parameters in the initial models were freely estimated and then constrained one at a time to test for potential group differences. The parameters were freely estimated in all models not testing group differences in a specific parameter, regardless of whether the difference was significant or not, so that each chi-square difference test compared the equated parameter with the base model in which all parameters were freely estimated (Bou & Satorra, 2010, Muthen & Muthen, 2012).

In addition to comparing the growth curve models between the college/non-college groups, additional analyses compared the growth curve models between participants who attended college but never earned a degree and participants who earned at least an associate's degree. These additional analyses were conducted to test whether the results pertaining to the

full college group (defined as any college attendance) were affected by exclusion of participants who failed to graduate.

2.4.2 Testing the influence of the timing of adult role transitions (Hypothesis 2)

To assess differences in the timing of adult role transitions between participants who do and do not attend college, cox regression survival analyses for marriage/cohabitation, parenthood, and full-time employment were conducted. Survival analyses are used to assess the time to a specified event (Muthen & Muthen, 2012). Separate survival analyses were conducted for each adult role. College attendance group was tested as a predictor in the survival analyses to assess group differences.

The resulting survival functions were added as predictors in the growth models. The survival function, or rate of change in status, for each participant was saved as a new independent variable for each adult role transition. Using the survival function as a predictor helped to determine how differences in the timing of transitions to adult roles affected alcohol use. For example, a negative association between the survival function for full-time employment and the alcohol use slope from 22 to 31 indicates that a later transition to full-time employment is associated with a greater decrease in alcohol use during young adulthood. The survival function was used instead of a time varying covariate because it illustrates how earlier or later transitions to adult roles affect alcohol use and problems *over time*. A time varying covariate would test how transitioning to an adult role at a specific age affects alcohol use and problems at that age but would not allow for interpretation of the effect of adult role transition timing on changes in alcohol use over time. Separate models were assessed for each role transition, and differences between the college attendance groups were tested in a multigroup framework using

chi-square difference tests. Due to potential intercorrelations between the timing of adult role transitions, a model including all of the role transitions was also tested.

2.4.3 Testing the influence of adolescent psychological functioning (Hypothesis 3)

Differences in adolescent psychological functioning based on college attendance group were tested using a t-test. A manifest variable for adolescent psychological functioning was then added to the growth models as a predictor of alcohol use, problems, and the timing of role transitions, separately for each role transition. College attendance group differences in the associations between adolescent psychological functioning and the timing of role transitions, as well as college attendance group differences in the direct and indirect associations between adolescent psychological functioning and alcohol use and problems, were assessed using chi-square difference tests in a multigroup framework. For example, hypothesis 3c would be supported, in part, if having poorer psychological functioning was associated with transitioning to parenthood earlier and, in turn, this early transition to parenthood was associated with a flatter slope in alcohol use and problems, rather than a decreasing slope, between ages 22 and 31 for participants in the non-college group. To determine if potential gender differences present in the psychological functioning variable were due to the different items assessed for boys and girls, secondary analyses testing the interaction between gender and the shared psychological functioning items, and between gender and the non-shared functioning items, were also conducted.

3.0 RESULTS

3.1 DESCRIPTIVE ANALYSES

Initial descriptive analyses of the prevalence of college attendance, employment, and overlap in college attendance and employment were conducted to determine the feasibility of the proposed analyses. The numbers of participants in two or four year college (Table 1), employed (Table 2), and both in college and employed (Table 3) at each age of interest are provided.

Table 2. Number of participants employed at each age of interest

Age	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Employed	7018	7180	7129	7031	7001	6990	6963	6866	6653	6458	5187	3837	2463	1208
Not Employed	1718	1492	1545	1609	1656	1649	1696	1810	1995	2208	3569	3249	2874	2339
Total In Sample	8736	8672	8674	8640	8657	8639	8659	8676	8648	8666	8756	7086	5337	3547
Employment														
Full-Time	592	1240	1796	2135	2430	2994	3447	3595	3536	3160	2431	1757	986	267
Part-Time	6426	5940	5333	4896	4571	3996	3516	3271	3117	3298	2756	2080	1477	941

Table 3. Number of participants enrolled in college and employed at each age of interest

Age		18	19	20	21	22	23	24	25	26	27	28	29	30	31
4 Year College	Employment														
Full Time	Full-Time	31	107	161	199	241	252	180	123	103	67	61	36	19	7
	Part-Time	1210	1828	1797	1713	1574	969	492	312	223	181	117	91	45	28
Part Time	Full-Time	8	37	54	51	73	110	114	102	83	71	50	36	19	1
	Part-Time	73	120	150	158	183	147	122	104	75	63	62	35	32	17
Total		1322	2092	2162	2121	2071	1478	908	641	484	382	290	198	115	53
2 Year College															
Full Time	Full-Time	33	95	138	133	116	90	62	49	45	44	36	17	10	3
	Part-Time	429	676	573	393	240	180	171	144	139	141	91	62	44	22
Part Time	Full-Time	14	58	54	135	112	103	116	95	104	71	48	33	18	1
	Part-Time	152	275	150	243	209	149	129	116	111	98	67	46	34	22
Total		628	1104	915	904	677	522	478	404	399	354	242	158	106	48

The analyses indicate that, consistent with prior publications (Shapiro et al., 2013; U.S. Department of Commerce, 2013; U.S. Department of Labor, 2013a), a greater proportion of the sample reported being employed, either full-time or part-time, than being enrolled part time or full time in postsecondary education. As expected from national norms, peak college enrollment for the sample was in the late teens and early twenties and ranged from 41% (age 19) to 36% (age 22). Percentages were slightly lower at age 18 (25%) and after age 22 (e.g., 26% at age 23 and decreasing thereafter). College enrollment and employment were not mutually exclusive. Of students in college (two or four year), the proportion of students who were also employed ranged from 36% (age 19) to 31% (age 22). Most working students were employed part-time. A small proportion of the sample, on average 10%, reported working full-time while enrolled in college full time during the traditional college years. The proportion of participants who were working but not enrolled in college during the traditional college years ranged from 45% (age 19) to 48% (age 22). Of these participants, the proportion employed full-time ranged from 24% (age 19) to 44% (age 22), and the proportion employed part-time ranged from 76% (age 19) to 56% (age 22). The prevalence rates indicated that there were a sufficient number of participants in each of the college and non-college groups to utilize multigroup latent variable growth curve modeling to test the hypotheses. Importantly, the results also indicated that, by and large, the college and non-college groups have distinct employment profiles.

Initial descriptives were also examined for the alcohol use variables (Table 4). The analyses indicated that a maturing out pattern appears to be present in the means for frequency of binge drinking, frequency of drinking before or after school or work, and frequency of drinking and driving. All of the alcohol use variables had relatively large standard deviations, indicating substantial variability in alcohol use and problems at each age. This variability is illustrated in

Table 4. Descriptives for alcohol variables

Age		18	19	20	21	22	23	24	25	26	27	28	29	30	31
Binge Drinking	N	8121	7916	7736	7554	7468	7350	7221	7275	7282	7288	5864	4367	2832	1298
	Mean	1.30	1.54	1.66	1.99	1.78	1.74	1.62	1.59	1.49	1.42	1.42	1.35	1.24	1.33
	Min.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Max.	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	Std. Dev.	3.39	3.70	3.96	4.21	3.84	3.90	3.66	3.66	3.56	3.39	3.48	3.44	3.35	3.46
Drinking Before/During School/Work	N	8141	7931	7758	7593	7536	7429	7311	7372	7377	7377	5917	4415	2870	1309
	Mean	.29	.37	.37	.42	.34	.36	.29	.30	.30	.33	.35	.35	.30	.46
	Min.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Max.	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	Std. Dev.	1.66	2.09	2.13	2.18	2.00	2.06	1.80	1.79	1.86	1.91	1.99	2.06	1.84	2.26
	Percent Endorsing Behavior	7.60	8.00	8.20	9.10	7.50	7.20	7.00	7.80	6.50	6.80	6.80	6.90	6.70	9.20
Drinking and Driving	N	1636	1631	1617	1589	1413	1505	3028	4587	6075	7459	5976	4461	2898	1335
	Mean	.07	.10	.14	.25	.23	.20	.11	.13	.14	.15	.13	.18	.15	.14
	Min.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Max.	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Std. Dev.	.39	.46	.56	.75	.71	.63	.49	.52	.55	.57	.53	.62	.59	.54
	Percent Endorsing Behavior	4.10	5.70	7.40	12.60	11.80	11.70	5.30	7.30	7.20	7.70	6.50	9.20	7.80	7.30

Notes: The response scale for binge drinking and drinking before/during school/work was 0 to 30 days. The response scale for drinking and driving was 0 (0 days/Did not drive in the past 30 days), 1 (1 day), 2 (2-3 days), 3 (4-5 days), and 4 (6 or more days).

the distribution of scores by age in Figures 2-10. The alcohol problem variables were, as expected, extremely right skewed, with only about 10% or less of the sample endorsing these behaviors across most of the ages. Due to the highly skewed nature of these data, and the limited measurement of drinking and driving throughout the study (only at six of the 15 waves), findings pertaining to the binge drinking results are emphasized below, and only differences in the alcohol problems results compared to the binge drinking results are reported.

Figure 2. Bar graph illustrating the distribution of binge drinking scores at age 18 among the college and non-college groups

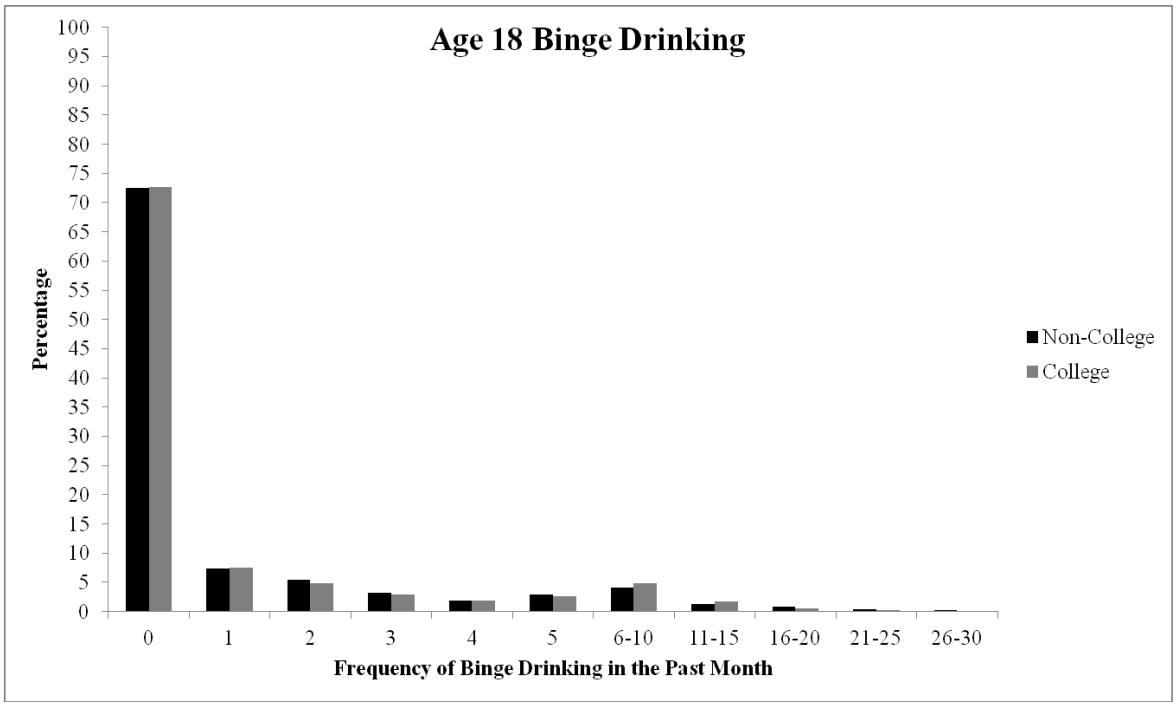


Figure 3. Bar graph illustrating the distribution of binge drinking scores at age 21 among the college and non-college groups

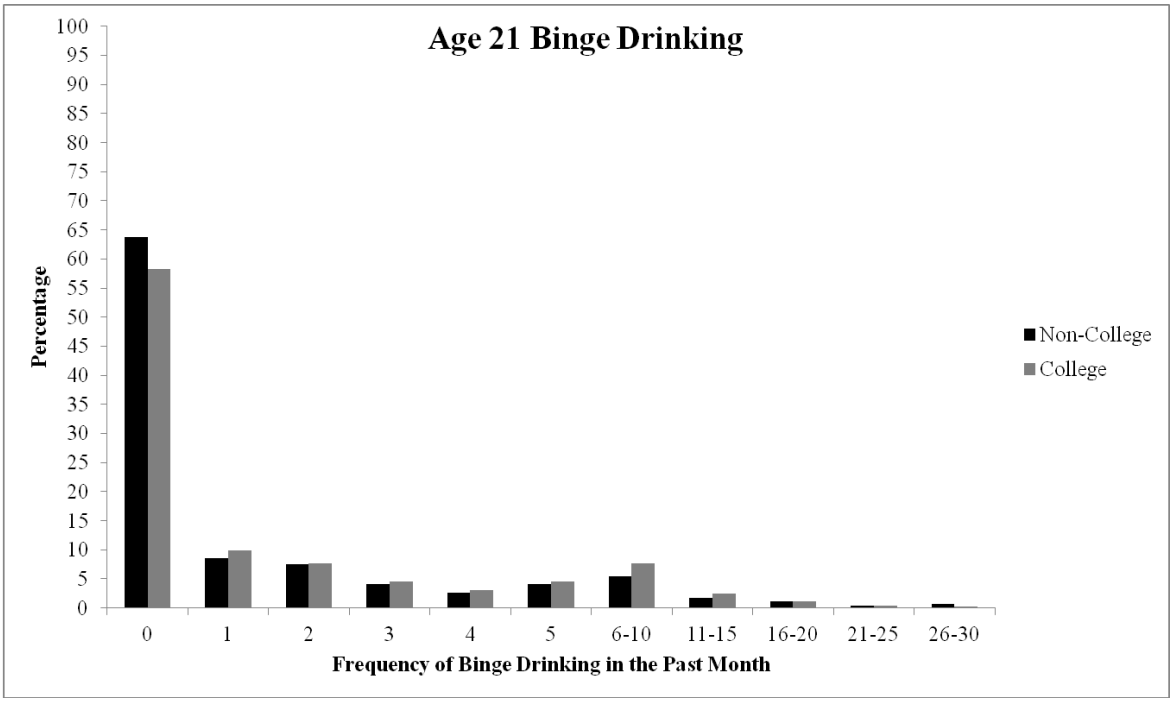


Figure 4. Bar graph illustrating the distribution of binge drinking scores at age 28 among the college and non-college groups

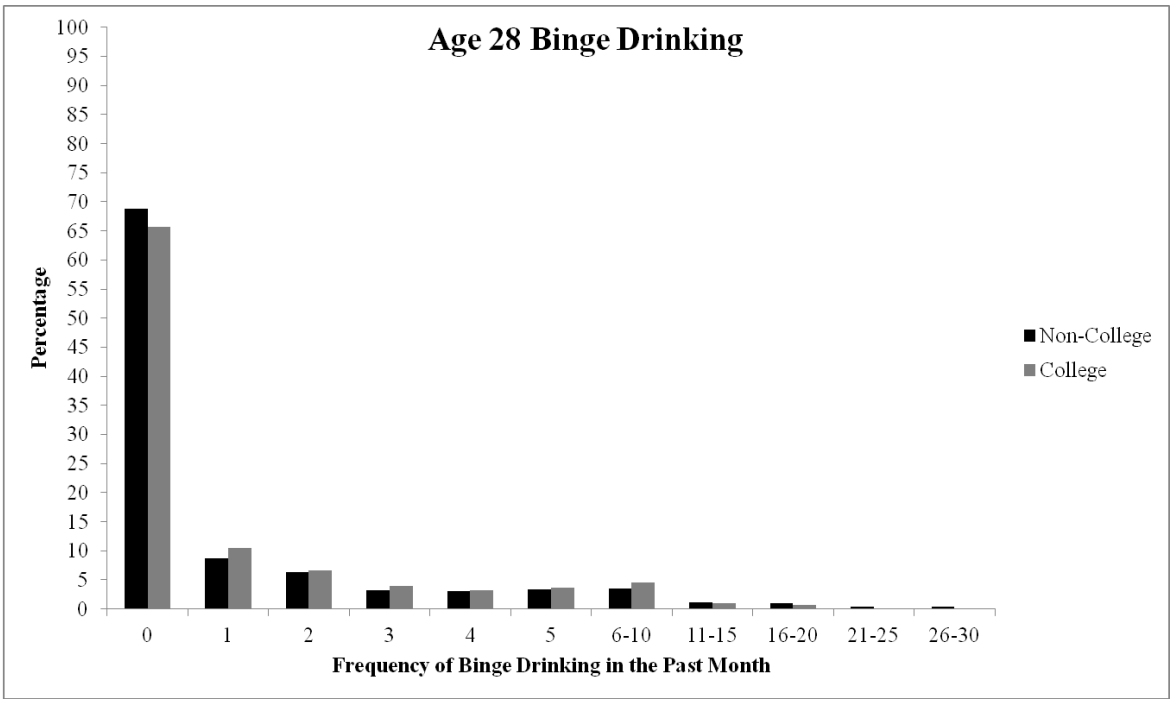


Figure 5. Bar graph illustrating the distribution of drinking before/during school/work scores at age 18 among the college and non-college groups

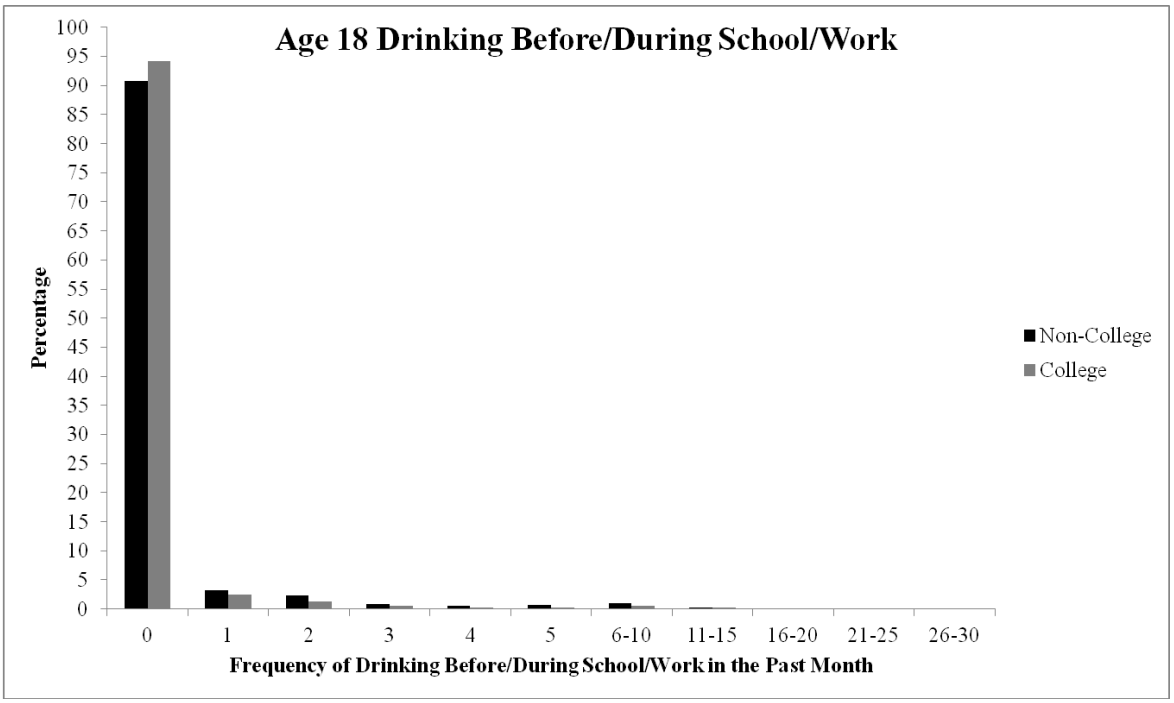


Figure 6. Bar graph illustrating the distribution of drinking before/during school/work scores at age 21 among the college and non-college groups

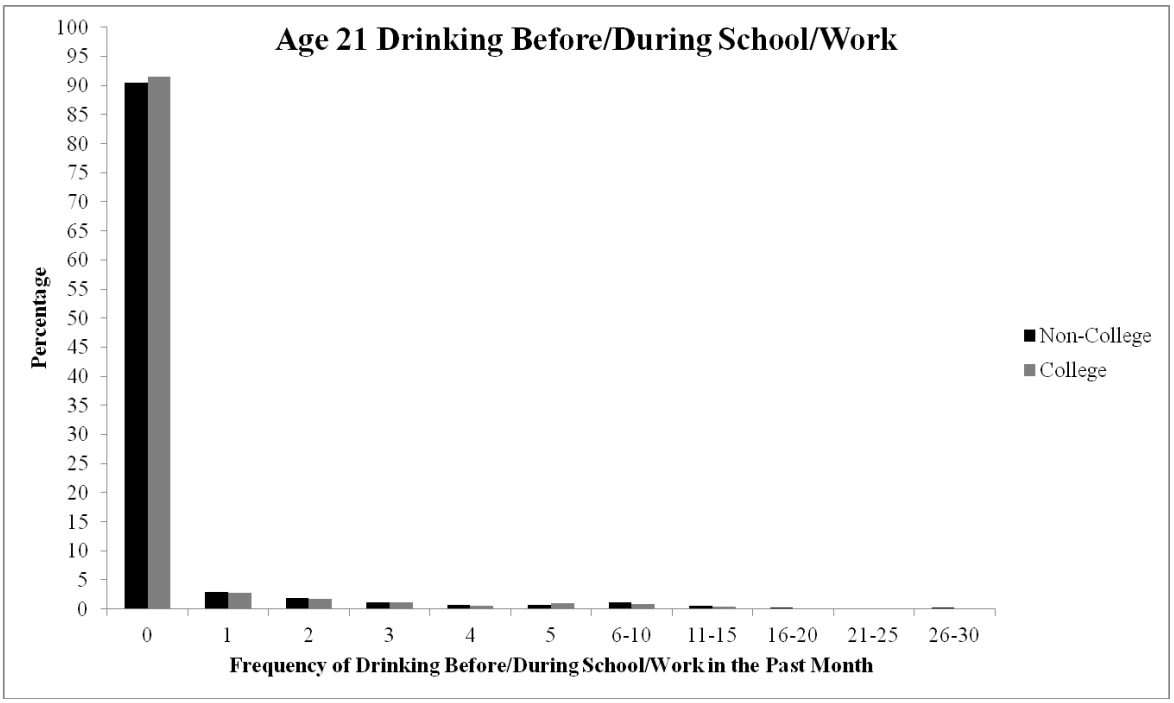


Figure 7. Bar graph illustrating the distribution of drinking before/during school/work scores at age 28 among the college and non-college groups

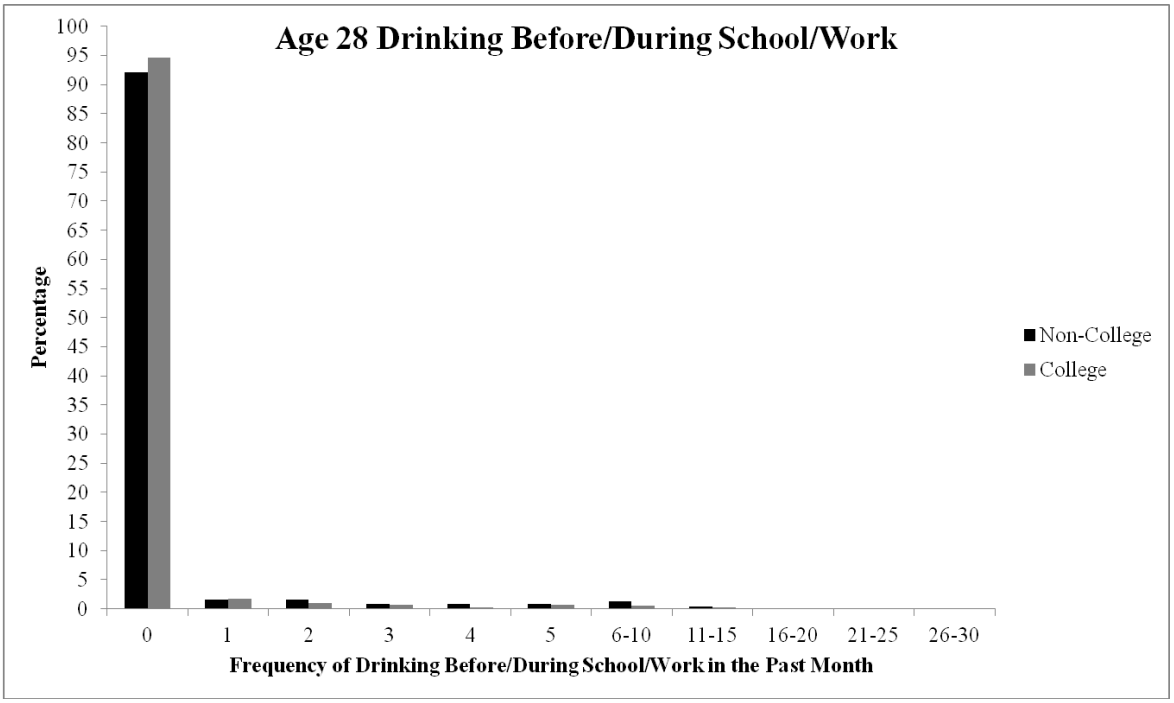


Figure 8. Bar graph illustrating the distribution of drinking and driving scores at age 18 among the college and non-college groups

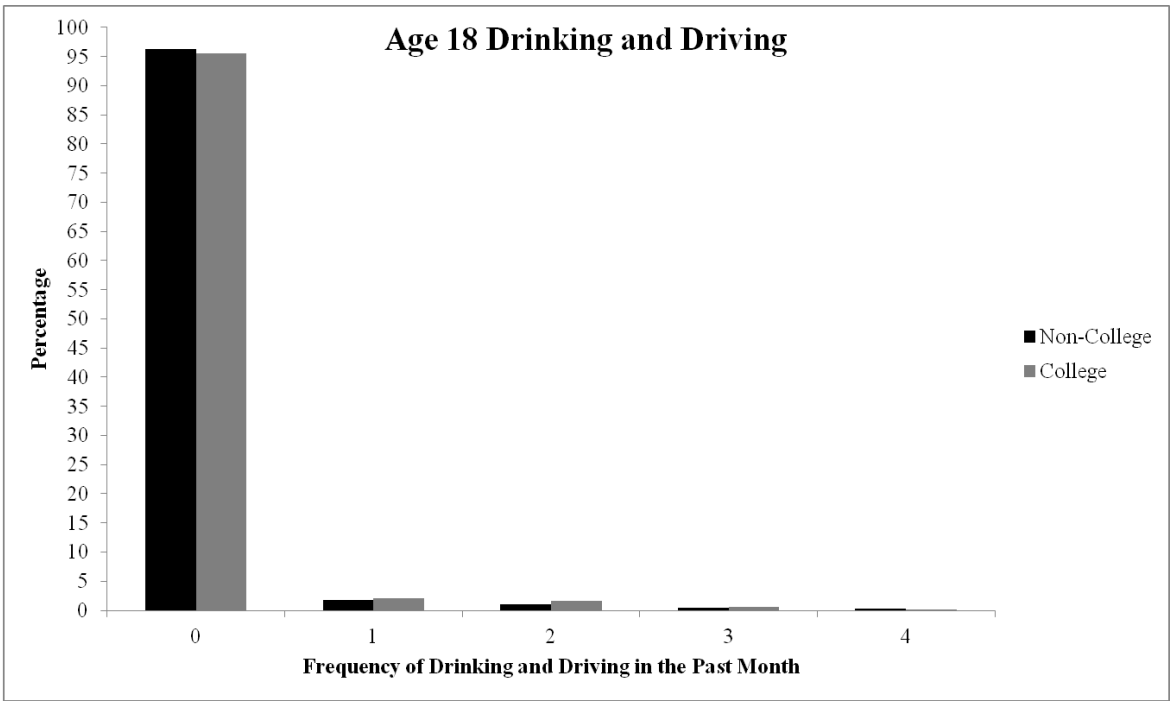


Figure 9. Bar graph illustrating the distribution of drinking and driving scores at age 21 among the college and non-college groups

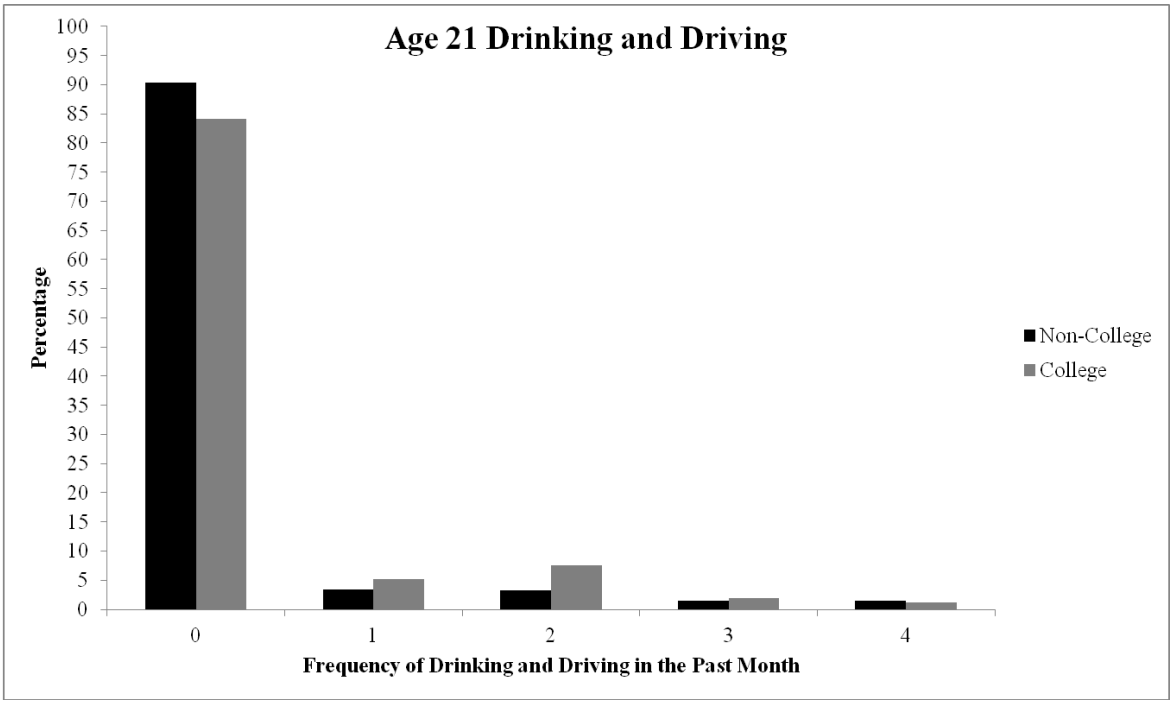
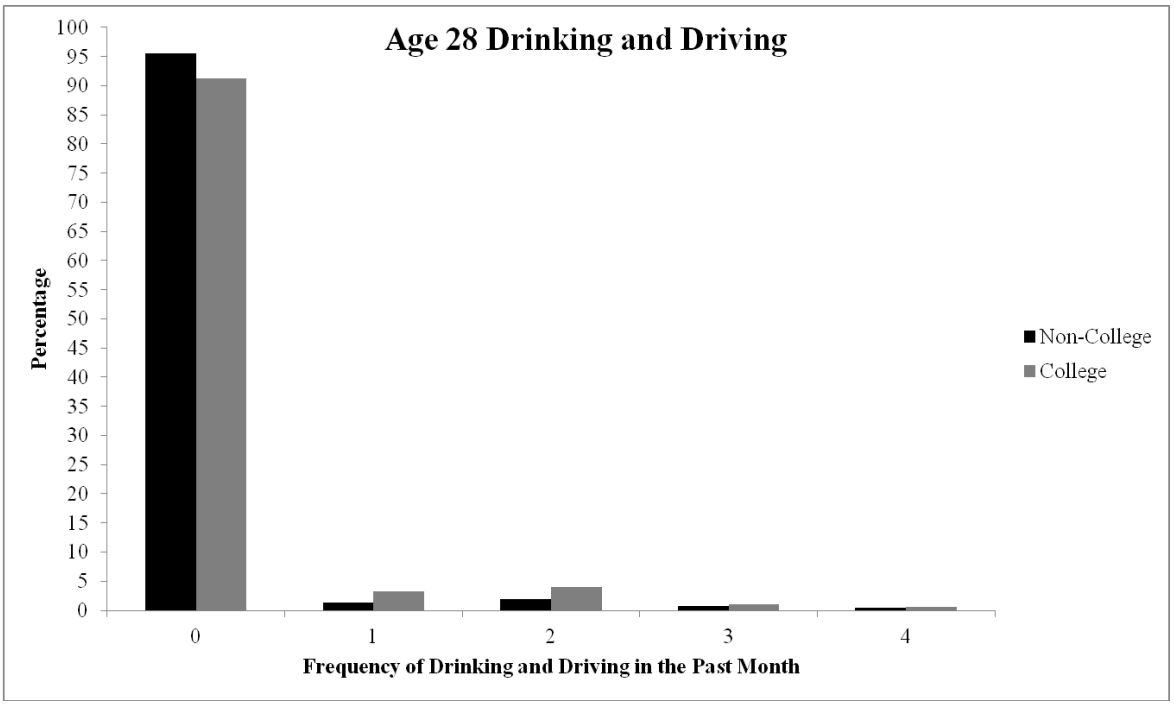


Figure 10. Bar graph illustrating the distribution of drinking and driving scores at age 28 among the college and non-college groups



3.2 PROPENSITY SCORE ANALYSIS

The attempt to create equivalent college and non-college sub-samples matched on pre-selected covariates was not successful. This attempt, and the planned alternative, is described below.

Propensity scores for the college and non-college group were calculated using logistic regression. College group status was regressed on the covariates indicated earlier. Participants' resulting predicted propensity scores were saved as a new variable. A propensity score could not be calculated for participants with missing covariate data; this resulted in the loss of 1883 participants from the analyses. An attempt was made to match the remaining 7101 participants from the college and non-college groups based on their propensity scores. This matching resulted in a sample of 6916 participants, 3458 in each group. When group differences in the

covariates were assessed to determine whether the matching had been successful, the groups still differed significantly from one another at a p-value of less than .05 on all of the matching variables except proportion living with parents at age 24 ($\chi^2(1) = .25$, $p = .61$).

As a result of the failed attempt to create college and non-college groups matched on propensity scores, the remaining analyses utilized all participants (College N = 4033, Non-College N = 4951) rather than only those matched based on propensity score. The propensity scores for these participants were used as a covariate in the main analyses. Table 5 shows the descriptives and group differences for the variables included in the propensity score.

3.3 GROWTH CURVE MODELS

3.3.1 Binge drinking growth curve model

For binge drinking, a piecewise growth model fit the data significantly better than a linear growth model, $\Delta\chi^2(4) = 205.87$, $p < .001$. The piecewise growth model could not be compared to a quadratic growth model using a chi-square difference test because both models had the same

Table 5. Descriptives and group differences in the covariates included in the propensity score

	Non-College		College		
	Mean	SD	Mean	SD	*t*-test
High School Achievement	5.00	1.43	6.34	1.34	-40.22***
Alcohol Use History	-.02	.84	-.09	.66	3.93***
Father's Highest Level of Education	11.72	4.86	13.65	3.15	-19.74***
Mother's Highest Level of Education	11.72	3.84	13.41	3.21	-21.51***
Household Income	44293.67	91134.00	96908.23	151204.33	-17.53***
	Percentage		Percentage		χ^2
Full-Time Employment at Age 17	2.72		1.30		17.63***
Marriage/Cohabitation at Age 17	2.86		.61		51.60***
Parenthood at Age 17	4.16		1.30		53.31***
Gender (% Female)	43.87		55.47		93.01***
Race/Ethnicity (%White)	45.89		60.29		150.93***
Live with Parents at Age 18	77.70		89.18		164.96***
Live with Parents at Age 19	63.04		78.63		203.34***
Live with Parents at Age 20	51.56		64.81		124.66***
Live with Parents at Age 21	43.15		54.63		91.20***
Live with Parents at Age 22	37.42		45.55		47.03***
Live with Parents at Age 23	31.69		36.15		15.30***
Live with Parents at Age 24	28.60		29.15		.25

$^{+}$ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$

Notes: The response scale for high school achievement was 1 (Mostly below D's), 2 (Mostly D's), 3 (About half C's and half D's), 4 (Mostly C's), 5 (About half B's and half C's), 6 (Mostly B's), 7 (About half A's and half B's), and 8 (Mostly A's). Alcohol use history was a z-score average of frequency of alcohol use at age 17 and age of first drink. The response scale for parent's highest level of education was 0 (None), 1 (1st grade), 2 (2nd grade), 3 (3rd grade), 4 (4th grade), 5 (5th grade), 6 (6th grade), 7 (7th grade), 8 (8th grade), 9 (9th grade), 10 (10th grade), 11 (11th grade), 12 (12th grade), 13 (1st year college), 14 (2nd year college), 15 (3rd year college), 16 (4th year college), 17 (5th year college), 18 (6th year college), 19 (7th year college), and 20 (8th year college). The household income response scale was open ended.

degrees of freedom. Fit statistics for the piecewise growth model, $\chi^2(66) = 81.88$, $p = .09$; RMSEA = .01; CFI = 1.00, and quadratic growth model, $\chi^2(66) = 137.68$, $p < .001$; RMSEA = .01; CFI = .99, indicated that, although both models fit the data well when assessed for the entire sample, the piecewise growth model fit the data slightly better. The piecewise growth model also provided more easily interpreted associations between slope parameters and other variables and allowed for the comparison of effects across specific developmental periods. As such, the piecewise growth model was retained for further analyses.

For the entire sample, participants reported binge drinking, on average, between 1 and 2 times in the past month at age 18 (i.e. the intercept; *Mean* = 1.35, $p < .001$). There was also significant variability in binge drinking at age 18 (*Variance* = 9.50, $p < .001$). Participants reported a significant increase in binge drinking between the ages of 18 and 22 (*Mean* = .11, $p < .001$) and a significant decrease in binge drinking between the ages of 22 and 31 (*Mean* = -.07, $p < .001$). There was significant variability in the slopes for binge drinking from ages 18 to 22 (*Variance* = .61, $p < .001$) and from ages 22 to 31 (*Variance* = .10, $p < .001$).

The piecewise growth model also fit the binge drinking data well in the multigroup framework, $\chi^2(154) = 195.87$, $p < .05$; RMSEA = .01; CFI = .99. Controlling for propensity score, the non-college participants reported a higher average frequency of binge drinking at age 18 (*Mean* = 1.76, $p < .001$) than the college participants (*Mean* = 1.38, $p < .001$), $\Delta\chi^2(1) = 3.96$, $p < .05$. The average binge drinking slope from 18 to 22 did not significantly differ between the groups (Not Enrolled: *Mean* = .08, $p < .05$; Enrolled: *Mean* = .14, $p < .01$; $\Delta\chi^2(1) = .98$, $p = .32$). Participants in the two groups also reported similar average slopes from 22 to 31 (Not Enrolled: *Mean* = -.08, $p < .001$; Enrolled: *Mean* = -.04, $p = .11$; $\Delta\chi^2(1) = 1.46$, $p = .23$).

3.3.2 Differences between the alcohol problem growth curve models and binge drinking growth curve model

A piecewise growth model also fit the data for the entire sample better than the other potential functional forms for drinking before/during school/work, $\chi^2(82) = 93.32$, $p = .18$; RMSEA = .00; CFI = .98. However, the behavior was infrequent (e.g., only 7.60% reported the behavior in the past month at age 18). Participants reported drinking before/during school/work between 0 and 1 times in the past month at age 18 (*Mean* = .32, $p < .001$). The slope terms between the ages of

18 and 22 (*Mean* = .01, p = .35) and between the ages of 22 and 31 (*Mean* = -.003, p = .36) were nonsignificant.

The piecewise growth model also fit the drinking before/during school/work data well in the multigroup framework, $\chi^2(170)$ = 165.18, p = .59; RMSEA = .00; CFI = 1.00. In contrast to the higher frequency of age 18 binge drinking in the non-college versus college group, non-college participants reported a similar average intercept (*Mean* = .59, p < .001) as the college participants for drinking before/during school/work (*Mean* = .42, p < .001), $\Delta\chi^2(1)$ = 3.04, p = .08. The college participants also exhibited a significantly higher average slope from 22 to 31 (*Mean* = .03, p < .05) than non-college participants (*Mean* = -.01, p = .55), $\Delta\chi^2(1)$ = 8.25, p < .01. All other findings in the multigroup framework were similar to the binge drinking growth curve model.

A freely estimated growth model fit the drinking and driving data for the entire sample better than the other potential functional forms, $\chi^2(18)$ = 50.13, p < .001; RMSEA = .02; CFI = .97. Drinking and driving could only be modeled from ages 24 to 31 due to the inconsistent measurement of this behavior. As a result, the intercept was estimated at age 24, rather than age 18 in the binge drinking model, and the slope was only modeled from age 24 to 31. In contrast to the decreasing slope, and significant variability, for binge drinking between ages 22 and 31, drinking and driving increased between ages 24 and 31 (*Mean* = .04, p < .01) and the variability in the slope was not significant (*Variance* = .06, p = .09).

The fit statistics indicated that the freely estimated growth model also fit the drinking and driving data well in the multigroup framework, $\chi^2(54)$ = 102.67, p < .001; RMSEA = .02; CFI = .96. The non-college (*Mean* = .08, p < .001) and college participants (*Mean* = .12, p < .001) had

a similar frequency of drinking and driving at age 24, $\Delta\chi^2(1) = 1.02$, $p = .31$. All other results were similar to the binge drinking growth curve model.

To determine whether the results within the group of participants who were enrolled in college were affected by degree attainment, differences in the binge drinking and drinking problems growth curves between participants who attended college without obtaining a degree and participants who graduated were also examined. There were no differences in the intercept or growth factors of binge drinking, drinking before/during school/work, or drinking and driving between those who attended college without obtaining a degree and those who obtained a college degree (Table 6).

Table 6. Test of group differences in binge drinking and alcohol problems between participants who attended college without graduating and participants who graduated from college

	No Degree (N = 1156)	Degree (N = 2413)	χ^2 Difference Test
Binge Drinking			
Mean Intercept	1.38***	1.62***	.47
Mean Slope 18-22	.13$^+$	.07	.35
Mean Slope 22-31	-.02	-.06$^+$	.76
Drinking Before/During School/Work			
Mean Intercept	.42***	.44***	.02
Mean Slope 18-22	-.01	-.03	.23
Mean Slope 22-31	.01	.02	.12
Drinking and Driving			
Mean Intercept	.59***	.51***	1.45
Mean Slope 24-31	.73***	.86***	1.55

$^+$ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$

Notes: The χ^2 difference test represents the change in the χ^2 value of a model when a parameter in the growth curve model was equal between the two groups compared the parameter being freely estimated between the two groups. The degrees of freedom for each test was 1, and the critical value for a p-value of less than .05 for all of the tests was 3.84. As none of the tests were greater than 3.84, there were no significant differences between the two groups.

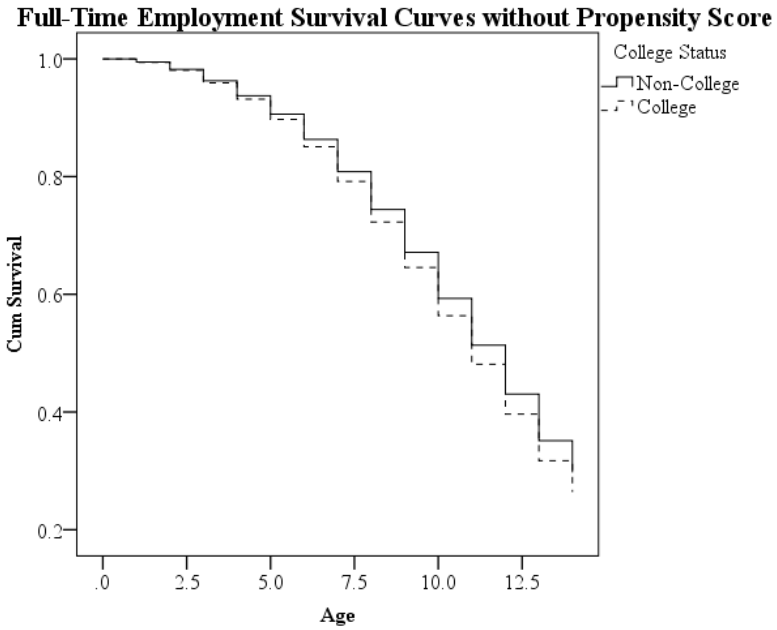
3.4 COX REGRESSION SURVIVAL ANALYSES

Cox regression survival analyses using college attendance group as the predictor were conducted for each adult role. Survival analyses including and excluding propensity score as a predictor were used to examine how the association between college attendance and adult role transitions changed as a function of including covariates. Analyses were initially conducted in SPSS and checked in Mplus with and without covariates.

3.4.1 Full-time employment

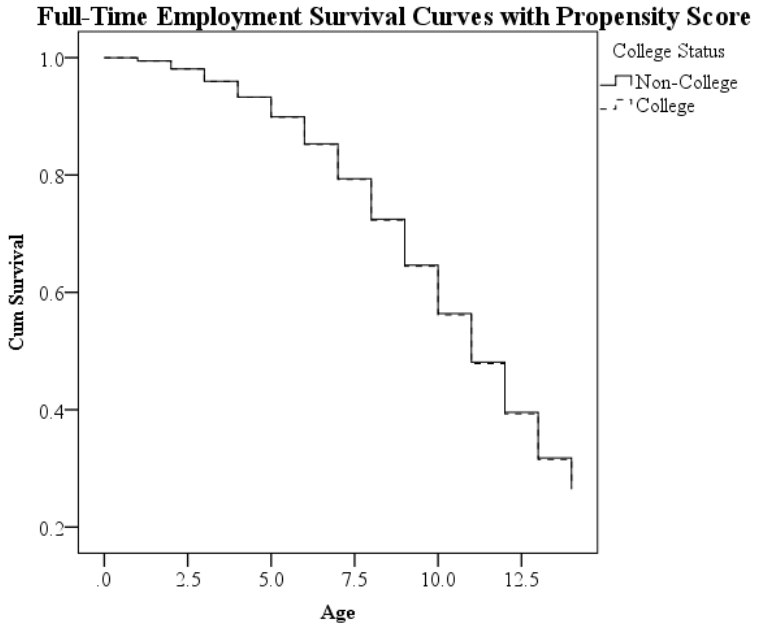
Participants who reported any college enrollment between the ages of 18 and 24 transitioned to full-time employment earlier than participants who did not report being enrolled in college (B = .09, p < .001; Figure 11) even though non-college participants' average age at transition to full-time employment was lower than the average age of college participants (*Mean* = 21.23; *SD* = 2.58 vs. *Mean* = 22.70; *SD* = 2.59) among participants who had transitioned to full-time employment. Because a larger proportion of the non-college sample (28.76%) never transitioned to full-time employment compared to the college sample (19.04%), the college sample transitioned earlier than their non-college peers as a group even though the non-college participants who transitioned to full-time employment did so at a slightly younger age than their college peers. When only participants who transitioned to full-time employment were analyzed, non-college participants transitioned to full-time employment earlier than college participants (B = -.10, p < .001). However, when propensity score was included as a predictor in the analysis with all participants, the group difference was no longer statistically significant (B = .01, p = .65; Figure 12).

Figure 11. Full-time employment survival curves among the college and non-college groups without the propensity score covariate



Note- Zero on the x-axis represents age 18 status (i.e. the first point at which employment status was examined). The other time points on the x-axis represent years since age 18 (e.g. 2.5 represents age 20.5; 5.0 represents age 23).

Figure 12. Full-time employment survival curves among the college and non-college groups with the propensity score covariate

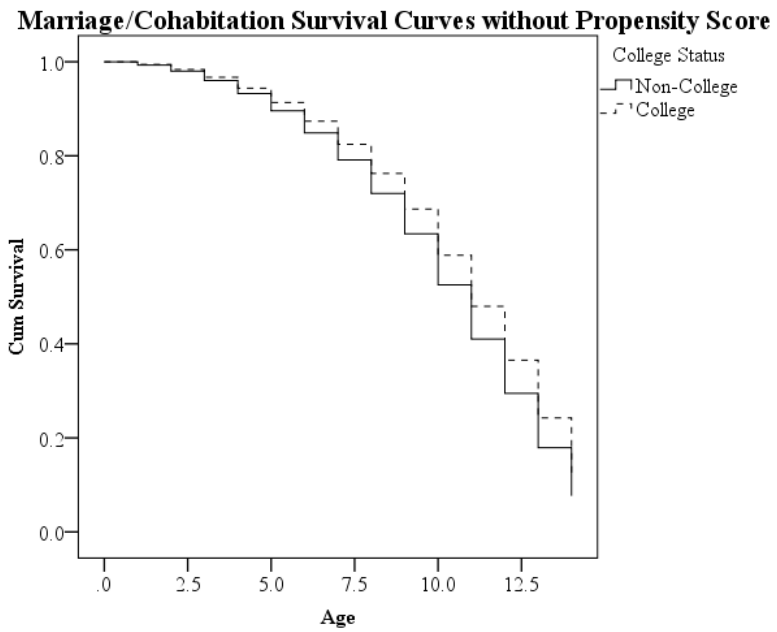


Note- Zero on the x-axis represents age 18 status (i.e. the first point at which employment status was examined). The other time points on the x-axis represent years since age 18 (e.g. 2.5 represents age 20.5; 5.0 represents age 23).

3.4.2 Marriage/Cohabitation

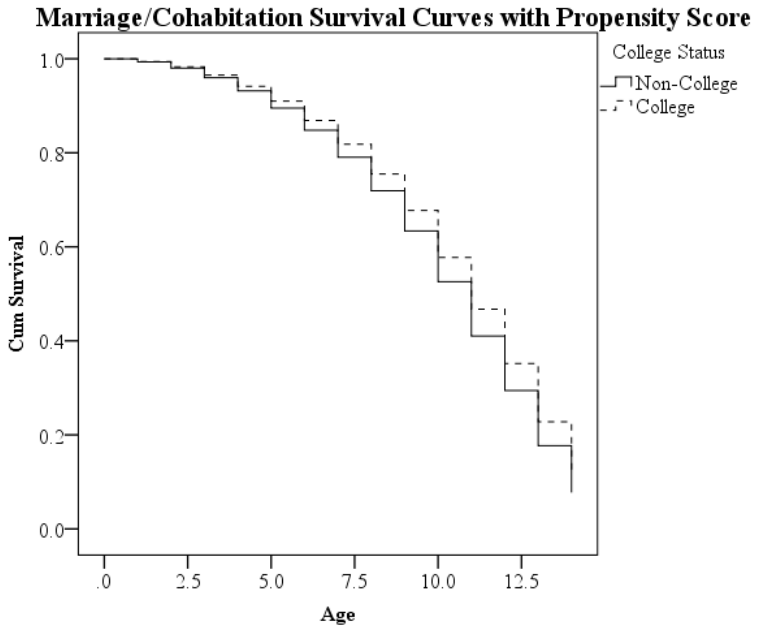
Participants who were never enrolled in college between the ages of 18 and 24 transitioned to marital/cohabitation relationships earlier than participants who were enrolled in college (*B* = -.19, *p* < .001; Figure 13). Non-college participants transitioned to a marital/cohabitation relationship around age 22 on average (*Mean* = 21.98; *SD* = 3.18), and college participants transitioned to a marital/cohabitation relationship around age 24 on average (Mean = 23.57; *SD* = 3.04). The results did not change after controlling for propensity score (*B* = -.16, *p* < .001; Figure 14).

Figure 13. Marriage/cohabitation survival curves among the college and non-college groups without the propensity score covariate



Note- Zero on the x-axis represents age 18 status (i.e. the first point at which marriage/cohabitation status was examined). The other time points on the x-axis represent years since age 18 (e.g. 2.5 represents age 20.5; 5.0 represents age 23).

Figure 14. Marriage/cohabitation survival curves among the college and non-college groups with the propensity score covariate



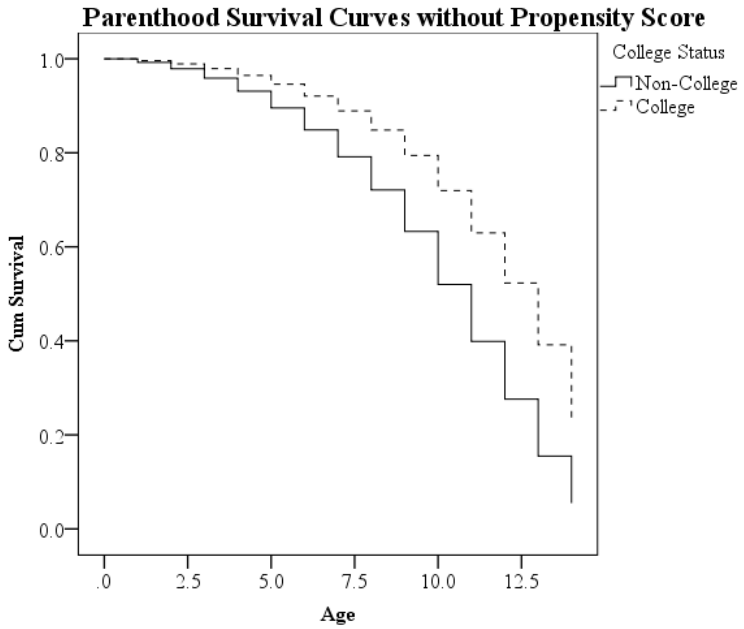
Note- Zero on the x-axis represents age 18 status (i.e. the first point at which marriage/cohabitation status was examined). The other time points on the x-axis represent years since age 18 (e.g. 2.5 represents age 20.5; 5.0 represents age 23).

3.4.3 Parenthood

Participants who were never enrolled in college between the ages of 18 and 24 transitioned to parenthood earlier than participants who were enrolled in college (B = -.69, p < .001; Figure 15). Non-college participants transitioned to parenthood around age 22 on average (*Mean* = 22.32; *SD* = 3.39), and college participants transitioned to parenthood around age 24 on average (*Mean* = 24.34; *SD* = 3.54). The results did not change after controlling for propensity score (B = -.44, p < .001; Figure 16).

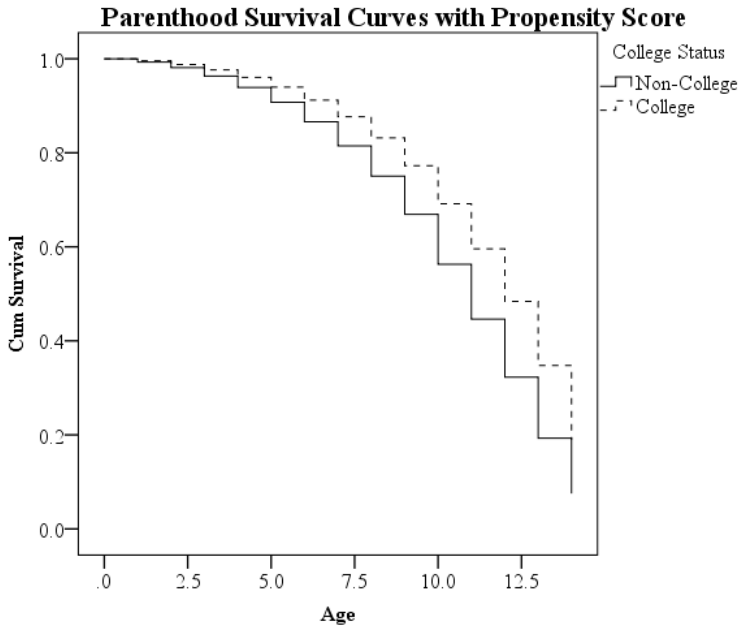
To avoid overcontrol in the growth models, the survival functions from the survival analyses excluding propensity score were saved for use as predictors in the piecewise growth models.

Figure 15. Parenthood survival curves among the college and non-college groups without the propensity score covariate



Note- Zero on the x-axis represents age 18 status (i.e. the first point at which parenthood status was examined). The other time points on the x-axis represent years since age 18 (e.g. 2.5 represents age 20.5; 5.0 represents age 23).

Figure 16. Parenthood survival curves among the college and non-college groups with the propensity score covariate



Note- Zero on the x-axis represents age 18 status (i.e. the first point at which parenthood status was examined). The other time points on the x-axis represent years since age 18 (e.g. 2.5 represents age 20.5; 5.0 represents age 23).

3.5 SURVIVAL FUNCTIONS AS PREDICTORS OF GROWTH CURVE MODELS

The survival functions from the Cox regressions were entered as predictors of the alcohol use and problems growth curve models. Propensity score continued to be included as a covariate in the models. Each of the three survival functions were initially examined in separate models. Due to statistically significant correlations between entry into full-time employment and marriage/cohabitation (r = .14, p < .001) and between entry into marriage/cohabitation and parenthood (r = .46, p < .001), analyses including all three survival functions simultaneously were also conducted. Multigroup analyses, which were not directly pertinent to the hypotheses of the current study, can be found in Appendix A.

3.5.1 Survival functions predicting binge drinking

3.5.1.1 *Full-time employment*

For the entire sample, the piecewise growth curve model of binge drinking had good model fit, $\chi^2(88)$ = 116.15, p < .05; RMSEA = .01; CFI = 1.00, when the work survival function was added as a predictor of binge drinking. Entry into full-time employment was not associated with the binge drinking intercept (β = .02, p = .23), slope from 18 to 22 (β = .03, p = .10), or slope from 22 to 31 (β = -.03, p = .08).

3.5.1.2 *Marriage/Cohabitation*

For the entire sample, the piecewise growth curve model of binge drinking had good model fit, $\chi^2(88)$ = 127.31, p < .01; RMSEA = .01; CFI = .99, when the marriage/cohabitation survival function was added as a predictor of binge drinking. Later entry into marriage/cohabitation was

associated with a lower level of binge drinking at age 18 (β = -.03, p < .05). Later entry into marriage/cohabitation was also associated with a slower increase in binge drinking from 18 to 22 (β = -.10, p < .001) and a slower decrease in binge drinking from 22 to 31 (β = .13, p < .001).

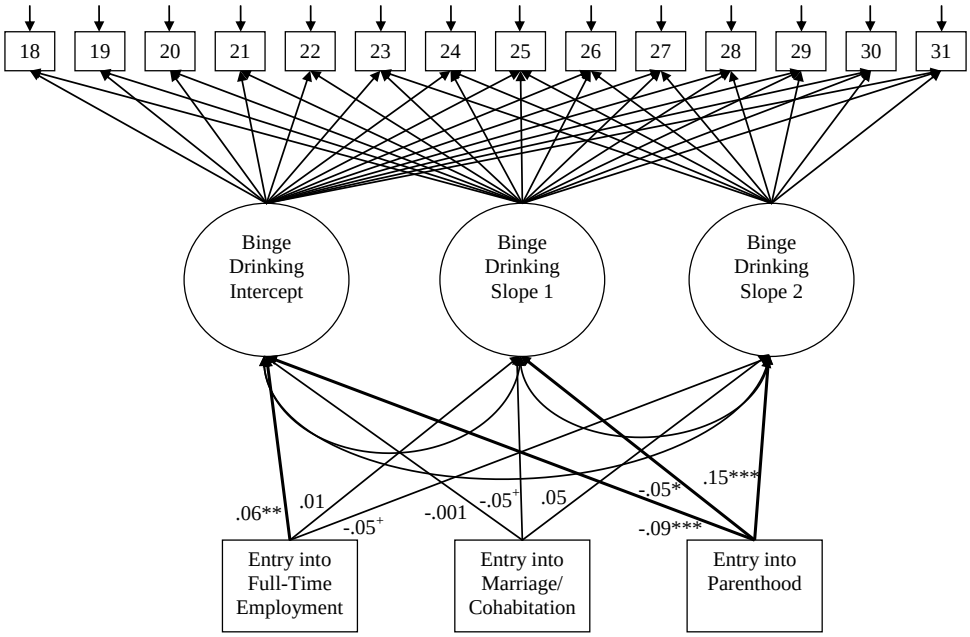
3.5.1.3 *Parenthood*

For the entire sample, the piecewise growth curve model of binge drinking had good model fit, $\chi^2(88)$ = 135.61, p < .001; RMSEA = .01; CFI = .99, when the parenthood survival function was added as a predictor of binge drinking. Later entry into parenthood was associated with a lower level of binge drinking at age 18 (β = -.10, p < .001). Later entry into parenthood was also associated with a lower increase in binge drinking from 18 to 22 (β = -.07, p < .01) and a lower decrease in binge drinking from 22 to 31 (β = .19, p < .001).

3.5.1.4 *All adult roles*

For the entire sample, the piecewise growth curve model of binge drinking had good model fit, $\chi^2(110)$ = 155.97, p < .01; RMSEA = .01; CFI = .99, when all three survival functions were added as predictors of binge drinking (Figure 17). In contrast to the nonsignificant associations between full-time employment, tested by itself, in association with binge drinking, later entry into full-time employment was now significantly associated with a higher level of binge drinking at age 18 (β = .06, p < .01). None of the associations between entry into marriage/cohabitation and binge drinking remained significant when all three survival functions were included in the same model. All of the associations between entry into parenthood and binge drinking remained significant.

Figure 17. Associations between the timing of all three adult role transitions and binge drinking for the total sample



$^{+}$ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$
Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

3.5.2 Differences between survival functions predicting alcohol problems and survival functions predicting binge drinking

3.5.2.1 *Full-time employment*

The piecewise growth curve model of drinking before/during school/work also had good model fit, $\chi^2(93) = 106.06$, $p = .17$; RMSEA = .01; CFI = .98, when the work survival function was added as a predictor of drinking before/during school/work. Unlike the absence of associations in the binge drinking model, later entry into full-time employment was associated with higher levels of drinking before/during school/work at age 18 ($\beta = .05$, $p < .01$). All other associations were nonsignificant. These results were same as those observed in the binge drinking model.

The freely estimated growth curve model of drinking and driving also had good model fit, $\chi^2(24) = 61.03$, $p < .001$; RMSEA = .02; CFI = .97, when the work survival function was

added as a predictor of drinking and driving. There were no significant associations between the work survival function and drinking and driving, which was the same result observed with the binge drinking model.

3.5.2.2 *Marriage/Cohabitation*

The piecewise growth curve model of drinking before/during school/work also had good model fit, $\chi^2(93) = 124.19$, $p < .05$; RMSEA = .01; CFI = .95, when the marriage/cohabitation survival function was added as a predictor of drinking before/during school/work. Unlike the significant negative associations between later marriage/cohabitation and the intercept and slope from 18 to 22 in the binge drinking model, entry into marriage/cohabitation was not significantly associated with the drinking before/during school/work intercept ($\beta = .01$, $p = .64$) or slope from 18 to 22 ($\beta = -.06$, $p = .08$).

The freely estimated growth curve model of drinking and driving also had good model fit, $\chi^2(24) = 51.29$, $p < .01$; RMSEA = .01; CFI = .97, when the marriage/cohabitation survival function was added as a predictor of drinking and driving. Unlike the significant association between later marriage/cohabitation and a flatter slope from 22 to 31 in the binge drinking model, entry into marriage/cohabitation was not associated with the drinking and driving slope from 24 to 31 ($\beta = .01$, $p = .68$).

3.5.2.3 *Parenthood*

The piecewise growth curve model of drinking before/during school/work also had good model fit, $\chi^2(93) = 100.28$, $p = .28$; RMSEA = .00; CFI = .99, when the parenthood survival function was added as a predictor of drinking before/during school/work. Unlike the significant associations between later entry into parenthood, a lower level of age 18 binge drinking, and a

flatter overall trajectory in the binge drinking model, entry into parenthood was not associated with drinking before/during school/work.

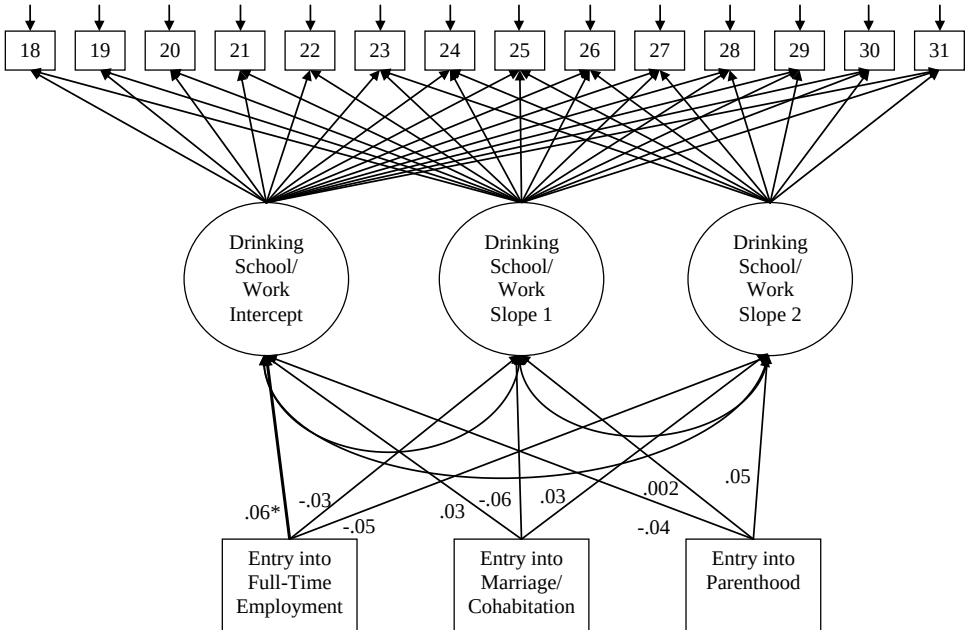
The freely estimated growth curve model of drinking and driving also had good model fit, $\chi^2(22) = 29.86$, $p = .12$; RMSEA = .01; CFI = .98, when the parenthood survival function was added as a predictor of drinking and driving. Unlike the significant associations between later entry into parenthood, a lower level of age 18 binge drinking, and a flatter overall trajectory in the binge drinking model, entry into parenthood was not associated with drinking and driving.

3.5.2.4 *All adult roles*

The piecewise growth curve model of drinking before/during school/work also had good model fit, $\chi^2(115) = 119.16$, $p = .38$; RMSEA = .00; CFI = .99, when all three survival functions were added as predictors of drinking before/during school/work (Figure 18). Later entry into full-time employment continued to be associated with higher levels of drinking before/during school/work at age 18 ($\beta = .05$, $p < .01$). The associations between the marriage/cohabitation and parenthood survival functions with drinking before/during school/work remained nonsignificant.

The freely estimated growth curve model of drinking and driving also had good model fit, $\chi^2(35) = 57.94$, $p < .01$; RMSEA = .02; CFI = .95, when all three survival functions were added as predictors of drinking and driving (Figure 19). Later entry into full-time employment was associated with higher levels drinking and driving at age 24 ($\beta = .07$, $p < .05$). All other associations were nonsignificant.

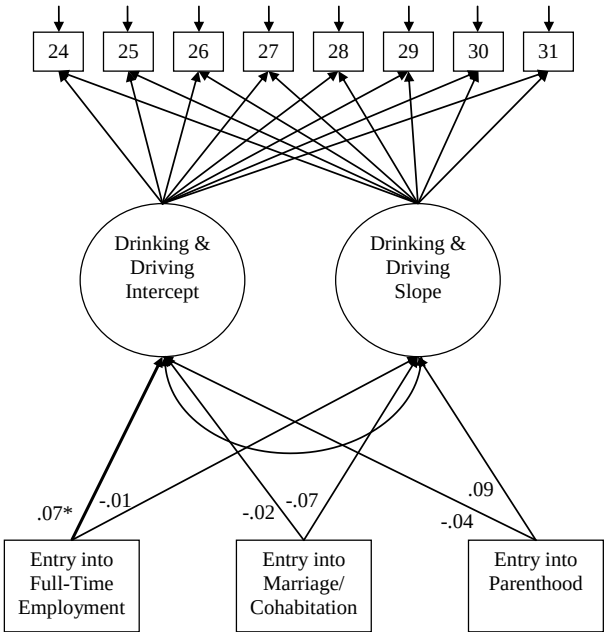
Figure 18. Associations between the timing of all three adult role transitions and drinking before/during school/work for the total sample



$^{+}$ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$

Notes- Path coefficients are standardized. Bold solid lines indicate a significant association**.**

Figure 19. Associations between the timing of all three adult role transitions and drinking and driving for the total sample. Path coefficients are standardized



$^{+}$ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$

Notes- Path coefficients are standardized. Bold solid lines indicate a significant association**.**

3.5.3 Summary

A later transition to full-time employment was associated with a higher level of binge drinking at age 18 only when all three survival functions were included in the model. This result was replicated for drinking before/during school/work when all three survival functions were included in the model and when only the transition to full-time employment was included in the model. A later transition to full-time employment was associated with a higher level of drinking/driving at age 24 only when all three survival functions were included in the model. The timing of full-time employment was not associated with any alcohol variable slopes. Later transitions to marriage/cohabitation and parenthood were associated with lower levels of binge drinking at age 18, a lower increase in binge drinking from 18 to 22, and a flatter binge drinking trajectory from 22 to 31. Only the findings regarding parenthood remained significant when all three survival functions were tested simultaneously. These associations were not observed for the alcohol problem variables.

3.6 MEAN LEVEL DIFFERENCES IN ADOLESCENT PSYCHOLOGICAL FUNCTIONING

Before adolescent psychological functioning was added as a predictor to the growth curve models, mean level differences between the college and non-college groups were examined. Both group means for the total adolescent psychological functioning sum score (Table 7) fell between not having psychological dysfunction on any of the items (summed scale score of 0) or sometimes having difficulty (summed scale score of 1). Non-college participants had

significantly worse adolescent psychological functioning than college participants, *t(8982)* = 11.01, *p* < .001. This difference remained significant after controlling for participants' propensity scores, *F(1, 7098)* = 20.11, *p* < .001. Examining the individual items used to assess adolescent psychological functioning among all participants, non-college participants had higher levels of lying or cheating, *t(8974)* = 9.71, *p* < .001, and being unhappy sad or depressed, *t(8974)* = 4.65, *p* < .001, than college participants. These differences remained significant after controlling for propensity score, *F(1, 7091)* = 8.34, *p* < .01; *F(1, 7091)* = 5.98, *p* < .05.

Table 7. Means, standard deviations, ANCOVA results, and effect sizes for adolescent psychological functioning

	Never Enrolled		Enrolled			
	Mean	*SD*	Mean	*SD*	ANCOVA	Cohen's *d*
Lying/Cheating	.21	.46	.12	.34	8.34**	.07
Unhappy/Sad	.14	.38	.11	.33	5.98*	.06
Attention Problems	.29	.57	.18	.45	15.44***	.13
Getting Along	.13	.39	.08	.29	9.64**	.10
Poor School Work	.17	.45	.06	.27	11.89**	.12
Sleep Problems	.08	.31	.07	.28	.39	.02
Total Score	.59	1.21	.36	.86	4.66*	.07

[+] *p* < .10, **p* < .05, *** *p* < .01, ****p* < .001
Notes: The response scale for the adolescent psychological functioning items was 0 (Not true), 1 (Sometimes true), and 2 (Often true).

For the gender specific items, male non-college participants had more attention problems, *t(4594)* = 6.94, *p* < .001, and problems getting along with other kids, *t(4591)* = 4.89, *p* < .001, than male college participants, and female non-college participants had poorer school work than female college participants, *t(4380)* = 9.77, *p* < .001. Female non-college participants had similar trouble sleeping as female college participants, *t(4380)* = 1.28, *p* = .20. The results for the differences for the gender specific items did not change after controlling for propensity score. The effect sizes for the mean level differences for the total summed score and individual items were all small (Cohen's *d* = .02 - .13).

Because average adolescent psychological functioning scores were relatively low, the proportion of participants who often had at least one of the behaviors (scale score of 2 on at least one item) was also examined for descriptive purposes. Only 483 participants in the total sample, approximately 5% of the total sample, fit this criterion. Of these 483 participants, 74.9% were in the non-college group. After controlling for propensity score, non-college participants still had significantly worse adolescent psychological functioning than college participants in this subsample, $F(1, 368) = 4.93$, $p < .05$.

3.7 ADOLESCENT PSYCHOLOGICAL FUNCTIONING AS A PREDICTOR

Adolescent psychological functioning was entered as a predictor in the growth curve models of binge drinking, drinking before or during school or work, and driving after drinking and the survival functions. The interaction between gender and the shared psychological functioning items, which was included in the models to assess potential gender differences due to the items, was not significantly associated with alcohol use or problems. Similarly, the interaction between gender and the non-shared functioning items was also not significantly associated with alcohol use or problems.

3.7.1 Binge drinking

3.7.1.1 *Full-time employment*

For the entire sample, the piecewise growth curve model of binge drinking had good model fit, $\chi^2(100) = 131.84$, $p < .05$; RMSEA = .01; CFI = .99, with adolescent psychological functioning

as a predictor of binge drinking and entry into full-time employment. Controlling for propensity score, adolescent psychological functioning was not significantly associated with the binge drinking intercept (β = -.03, p = .15). Greater psychological dysfunction was associated with a greater increase in binge drinking from age 18 to 22 (β = .08, p < .01) but not with changes in binge drinking from age 22 to 31 (β = -.08, p = .05). Greater psychological dysfunction was also associated with a later transition to fulltime employment (β = .08, p < .001). Entry into fulltime employment was not associated with the binge drinking intercept (β = .01, p = .76), binge drinking slope from 18 to 22 (β = .01, p = .66), or the binge drinking slope from 22 to 31 (β = -.05, p = .10). As such, there were no significant indirect effects of adolescent psychological functioning on binge drinking through entry into fulltime employment.

In the multigroup framework, the model including the fulltime employment survival function also had good model fit, $\chi^2(200)$ = 303.26, p < .001; RMSEA = .02; CFI = .97. Adolescent psychological functioning was not significantly associated with the binge drinking intercept among non-college participants (β = -.06, p = .37) or college participants (β = -.01, p = .57); these associations did not differ between the groups, $\Delta\chi^2(1)$ = .02, p = .88. Both groups had a nonsignificant association between adolescent psychological functioning and the binge drinking slope from 18 to 22 (Non-College: β = .27, p = .42; College: β = .03, p = .19), and these associations did not differ between the groups, $\Delta\chi^2(1)$ = 2.17, p = .14. More adolescent psychological dysfunction was significantly associated with a greater decrease in binge drinking between 22 and 31 among non-college participants (β = -.15, p < .05) but not among college participants (β = -.02, p = .66); these associations did not differ between the groups, $\Delta\chi^2(1)$ = .84, p = .36. Greater psychological dysfunction was associated with a later transition to fulltime employment among the non-college group (β = .05, p < .05) and college group (β = .08, p < .01);

these associations did not differ between the groups, $\Delta\chi^2(1) = 2.29$, $p = .13$. For non-college and college participants, entry into fulltime employment was not associated with the binge drinking intercept (Non-College: $\beta = .10$, $p = .40$; College: $\beta = -.01$, $p = .64$), the slope from 18 to 22 (Non-College: $\beta = .02$, $p = .89$; College: $\beta = .02$, $p = .50$), or the slope from 22 to 31 (Non-College: $\beta = -.09$, $p = .09$; College: $\beta = -.04$, $p = .19$). As such, there were no significant indirect effects of adolescent psychological functioning on binge drinking through entry into fulltime employment for either group.

3.7.1.2 *Marriage/Cohabitation*

For the entire sample, the piecewise growth curve model of binge drinking had good model fit, $\chi^2(100) = 150.80$, $p < .001$; RMSEA = .01; CFI = .98, with adolescent psychological functioning as a predictor of binge drinking and entry into marriage/cohabitation. Adolescent psychological functioning was not significantly associated with the binge drinking intercept ($\beta = -.03$, $p = .17$). Greater psychological dysfunction was associated with a greater increase in binge drinking during emerging adulthood ($\beta = .09$, $p < .001$) and a greater decrease in binge drinking during young adulthood ($\beta = -.09$, $p < .05$). Greater psychological dysfunction was also associated with a later transition to marriage/cohabitation ($\beta = .10$, $p < .001$). Entry into marriage/cohabitation was not associated with the binge drinking intercept ($\beta = -.01$, $p = .70$). Later entry into marriage/cohabitation was significantly associated with a lower increase in binge drinking from 18 to 22 ($\beta = -.13$, $p < .001$) and a lower decrease in binge drinking from 22 to 31 ($\beta = .17$, $p < .001$). The indirect effects of adolescent psychological functioning on the binge drinking slope from 18 to 22 ($\beta = -.01$, $p < .01$), as well as the binge drinking slope from 22 to 31 ($\beta = .02$, $p < .001$), through entry into marriage/cohabitation were significant.

In the multigroup framework, the model including the marriage/cohabitation survival function also had good model fit, $\chi^2(200)$ = 306.77, p < .001; RMSEA = .02; CFI = .97. Adolescent psychological functioning was not significantly associated with the binge drinking intercept among non-college participants (β = -.05, p = .46) or college participants (β = -.01, p = .49); these associations did not differ between the groups, $\Delta\chi^2(1)$ = .03, p = .86. The association between adolescent psychological functioning and the binge drinking slope from 18 to 22 was not significant for non-college (β = .31, p = .49) or college participants (β = .04, p = .06); these associations did not differ between the groups, $\Delta\chi^2(1)$ = 1.41, p = .24. More adolescent psychological dysfunction was significantly associated with a greater decrease in binge drinking between 22 and 31 among non-college participants (β = -.17, p < .05), but adolescent psychological functioning was not associated with the binge drinking slope from 22 to 31 among college participants (β = -.04, p = .52). These associations, however, did not differ between the groups, $\Delta\chi^2(1)$ = .86, p = .35. Greater psychological dysfunction was associated with a later transition to marriage/cohabitation among the non-college group (β = .08, p < .001) and the college group (β = .10, p < .001), and this association did not differ between the groups, $\Delta\chi^2(1)$ = 1.85, p = .17. For non-college participants, entry into marriage/cohabitation was not associated with the binge drinking intercept (β = -.11, p = .28) or binge drinking slope from 18 to 22 (β = -.22, p = .51), but later entry into marriage/cohabitation was significantly associated with a lower decrease in binge drinking from 22 to 31 (β = .22, p < .001). The indirect effect of adolescent psychological functioning on the binge drinking slope from 22 to 31 through entry into marriage/cohabitation was significant (β = .02, p < .05). For college participants, entry into marriage/cohabitation was not associated with the binge drinking intercept (β = .02, p = .28). Later entry into marriage/cohabitation was associated with a lower increase in binge drinking

from 18 to 22 (β = -.12, p < .001) and a lower decrease in binge drinking from 22 to 31 (β = .12, p < .01). The indirect effects of adolescent psychological functioning on the binge drinking slope from 18 to 22 (β = -.01, p < .01), as well as the binge drinking slope from 22 to 31 (β = .01, p < .05), through entry into marriage/cohabitation were significant.

3.7.1.3 *Parenthood*

For the entire sample, the piecewise growth curve model of binge drinking had good model fit, $\chi^2(100)$ = 180.87, p < .001; RMSEA = .02; CFI = .97, with adolescent psychological functioning as a predictor of binge drinking and entry into parenthood. Adolescent psychological functioning was not significantly associated with the binge drinking intercept (β = -.01, p = .44). Greater psychological dysfunction was associated with a greater increase in binge drinking during emerging adulthood (β = .09, p < .001) and a greater decrease in binge drinking during young adulthood (β = -.11, p < .01). Greater psychological dysfunction was also associated with a later transition to parenthood (β = .12, p < .001). Later entry into parenthood was associated with less binge drinking at age 18 (β = -.13, p < .01) and a lower decrease in the binge drinking slope from 22 to 31 (β = .28, p < .001), but it was not associated with the binge drinking slope from 18 to 22 (β = -.08, p = .08). The indirect effects of adolescent psychological functioning on the binge drinking intercept (β = -.02, p < .01 and slope from 22 to 31 (β = .03, p < .001) through entry into parenthood were significant.

In the multigroup framework, the model including the parenthood survival function also had good model fit, $\chi^2(200)$ = 350.10, p < .001; RMSEA = .02; CFI = .95. Adolescent psychological functioning was not significantly associated with the binge drinking intercept among non-college participants (β = -.04, p = .56) or college participants (β = .00, p = .99); these associations did not differ between the groups, $\Delta\chi^2(1)$ = .11, p = .74. Adolescent psychological

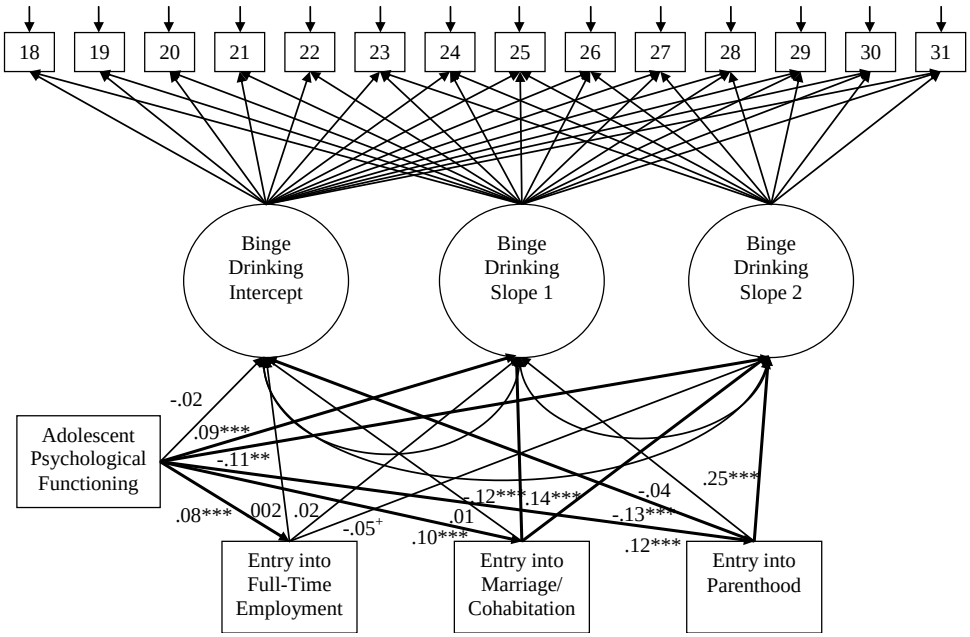
functioning was not significantly associated with the binge drinking slope from 18 to 22 for non-college participants (β = .33, p = .58), but more psychological dysfunction was associated with a greater increase in binge drinking from 18 to 22 among college participants (β = .05, p < .05). However, these associations did not differ between the groups, $\Delta\chi^2(1)$ = .39, p = .53. More adolescent psychological dysfunction was significantly associated with a greater decrease in binge drinking between 22 and 31 among non-college participants (β = -.17, p < .05), but adolescent psychological functioning was not associated with the binge drinking slope from 22 to 31 among college participants (β = -.07, p = .21). However, these associations did not differ between the groups, $\Delta\chi^2(1)$ = .18, p = .67. Greater psychological dysfunction was associated with a later transition to parenthood among the non-college group (β = .08, p < .001) and the college group (β = .18, p < .001), and this association was stronger among college participants than among non-college participants, $\Delta\chi^2(1)$ = 38.87, p < .001. For non-college participants, entry into parenthood was not associated with the binge drinking intercept (β = -.36, p = .31) or binge drinking slope from 18 to 22 (β = -.06, p = .72), but later entry into parenthood was significantly associated with a lower decrease in binge drinking from 22 to 31 (β = .30, p < .001). The indirect effect of adolescent psychological functioning on the binge drinking slope from 22 to 31 through entry into parenthood was significant (β = .02, p < .01). For college participants, later entry into parenthood was significantly associated with a lower level of binge drinking at age 18 (β = -.08, p < .05), a lower increase in the binge drinking slope from 18 to 22 (β = -.13, p < .05), and a lower decrease in the binge drinking slope from 22 to 31 (β = .27, p < .001). The indirect effects of adolescent psychological functioning on the binge drinking intercept (β = -.01, p < .05), slope from 18 to 22 (β = -.02, p < .05), and slope from 22 to 31 (β = .05, p < .001) through entry into parenthood were all significant.

3.7.1.4 *All adult roles*

For the entire sample, the piecewise growth curve model of binge drinking had acceptable model fit, $\chi^2(127)$ = 333.36, p < .001; RMSEA = .02; CFI = .94, with adolescent psychological functioning as a predictor of binge drinking and entry into all three adult roles (Figure 20). The results were similar to the associations in the models with the individual adult roles.

In the multigroup framework, the model including all three survival functions also had acceptable model fit, $\chi^2(254)$ = 532.35, p < .001; RMSEA = .03; CFI = .93. The results were similar to the associations in the models with the individual adult roles for both the non-college (Figure 21) and college participants (Figure 22).

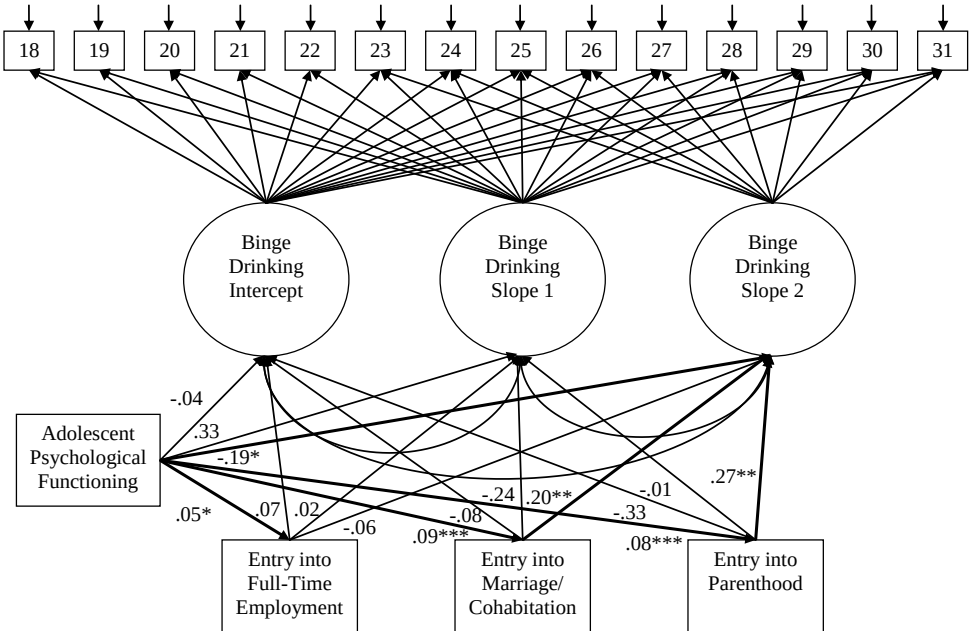
Figure 20. Associations between adolescent psychological functioning, the timing of all three adult role transitions, and binge drinking for the total sample



+ p < .10, *p < .05, ** p < .01, ***p < .001

Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

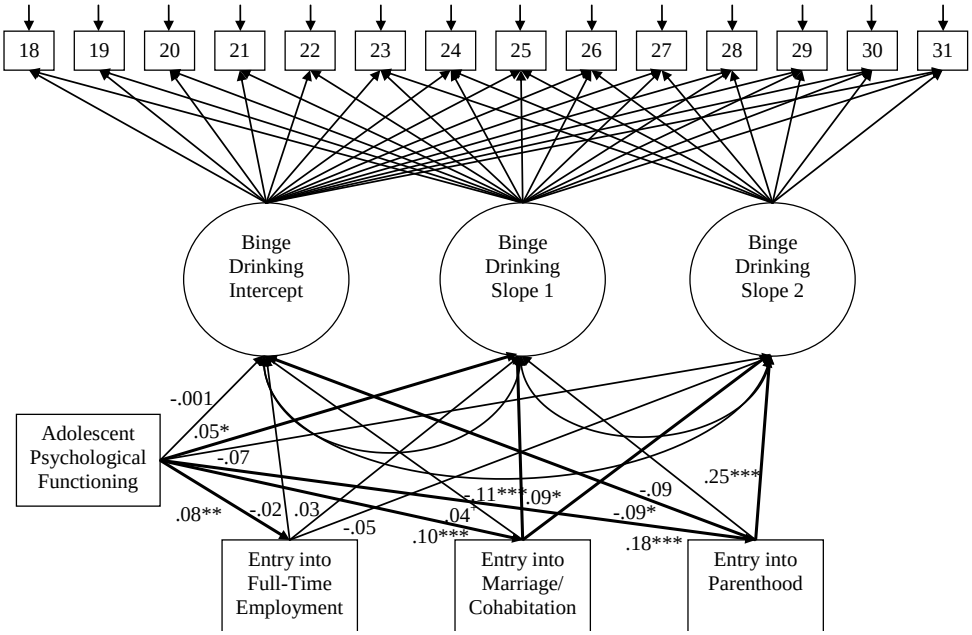
Figure 21. Associations between adolescent psychological functioning, the timing of all three adult role transitions, and binge drinking for the participants who never enrolled in college



$^{+}$ $p < .10$, $*p < .05$, $** p < .01$, $***p < .001$

Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

Figure 22. Associations between adolescent psychological functioning, the timing of all three adult role transitions, and binge drinking for the participants who were enrolled in college



$^{+}$ $p < .10$, $*p < .05$, $** p < .01$, $***p < .001$

Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

3.7.2 Summary

Greater psychological dysfunction was consistently associated with later transitions to adult roles in both groups. In turn, later transitions to marriage/cohabitation and parenthood were associated with a flatter binge drinking trajectory between 22 and 31 in both groups. Later transitions to marriage/cohabitation and parenthood were also associated with a lower increase in binge drinking from 18 to 22 among the college group. Greater psychological dysfunction was directly associated with a greater decrease in binge drinking from 22 to 31 among the non-college group.

3.7.3 Differences between adolescent psychological functioning predicting survival functions and drinking before/during school/work and psychological functioning predicting binge drinking

3.7.3.1 *Full-time employment*

For the entire sample, the piecewise growth curve model of drinking before/during school/work had good model fit, $\chi^2(104) = 102.09$, $p = .53$; RMSEA = .00; CFI = 1.00, with adolescent psychological functioning as a predictor of drinking before/during school/work and entry into full-time employment. Compared to the significant association between more adolescent psychological dysfunction and a greater increase in the slope from 18 to 22 in the binge drinking model, adolescent psychological functioning was not significantly associated with the drinking before/during school/work slope from 18 to 22 ($\beta = -.01$, $p = .84$). All other results were the same as the binge drinking results.

In the multigroup framework, the model including the fulltime employment survival function had acceptable model fit, $\chi^2(216) = 279.83$, $p < .01$; RMSEA = .01; CFI = .90.

Compared to the significant association between a higher level of adolescent psychological dysfunction and a greater decrease in the slope from 22 to 31 in the binge drinking model, adolescent psychological functioning was not significantly associated with the drinking before/during school/work slope from 22 and 31 among the non-college participants (β = .01, p = .46). All other results were the same as the binge drinking results.

3.7.3.2 *Marriage/Cohabitation*

For the entire sample, the piecewise growth curve model of drinking before/during school/work had good model fit, $\chi^2(104)$ = 102.11, p = .53; RMSEA = .00; CFI = 1.00, with adolescent psychological functioning as a predictor of drinking before/during school/work and entry into marriage/cohabitation. Compared to the significant associations between more adolescent psychological dysfunction, a greater increase in the slope from 18 to 22, and a greater decrease in the slope from 22 to 31 in the binge drinking model, adolescent psychological functioning was not significantly associated with the drinking before/during school/work slope from 18 to 22 (β = .01, p = .90) or slope from 22 to 31 (β = .09, p = .14). In addition, later entry into marriage/cohabitation was significantly associated with a higher drinking before/during school/work intercept (β = .06, p < .05), and the indirect effect of adolescent psychological functioning on the drinking before/during school/work intercept (β = .01, p < .05) was significant. This association and indirect effect were nonsignificant in the binge drinking model.

In the multigroup framework, the model including the marriage/cohabitation survival function had acceptable model fit, $\chi^2(215)$ = 276.304, p < .01; RMSEA = .01; CFI = .91. Compared to the significant association between a higher level of adolescent psychological dysfunction and a greater decrease in the slope from 22 to 31 in the binge drinking model, the association between adolescent psychological functioning and the drinking before/during

school/work slope from 22 to 31 was not significant in the non-college group (β = .01, p = .40). For non-college and college participants, there were no significant indirect effects of adolescent psychological functioning on drinking before/during school/work through entry into marriage/cohabitation.

3.7.3.3 *Parenthood*

For the entire sample, the piecewise growth curve model of drinking before/during school/work had good model fit, $\chi^2(104)$ = 102.91, p = .51; RMSEA = .00; CFI = 1.00, with adolescent psychological functioning as a predictor of drinking before/during school/work and entry into parenthood. Compared to the significant associations between more adolescent psychological dysfunction, a greater increase in the slope from 18 to 22, and a greater decrease in the slope from 22 to 31 in the binge drinking model, adolescent psychological functioning was not significantly associated with the drinking before/during school/work slope from 18 to 22 (β = .001, p = .98) or slope from 22 to 31 (β = .09, p = .17). There were no significant indirect effects of adolescent psychological functioning on drinking before/during school/work through entry into parenthood.

In the multigroup framework, the model including the parenthood survival function had acceptable model fit, $\chi^2(215)$ = 269.73, p < .01; RMSEA = .01; CFI = .93. Compared to the significant association between a higher level of adolescent psychological dysfunction and a greater decrease in the slope from 22 to 31 in the binge drinking model, the association between adolescent psychological functioning and the drinking before/during school/work slope from 22 to 31 was not significant among the non-college group (β = .01, p = .33). The association between greater psychological dysfunction and a later transition to parenthood was stronger among the non-college group (β = .08, p < .001) than the college group (β = .03, p < .001),

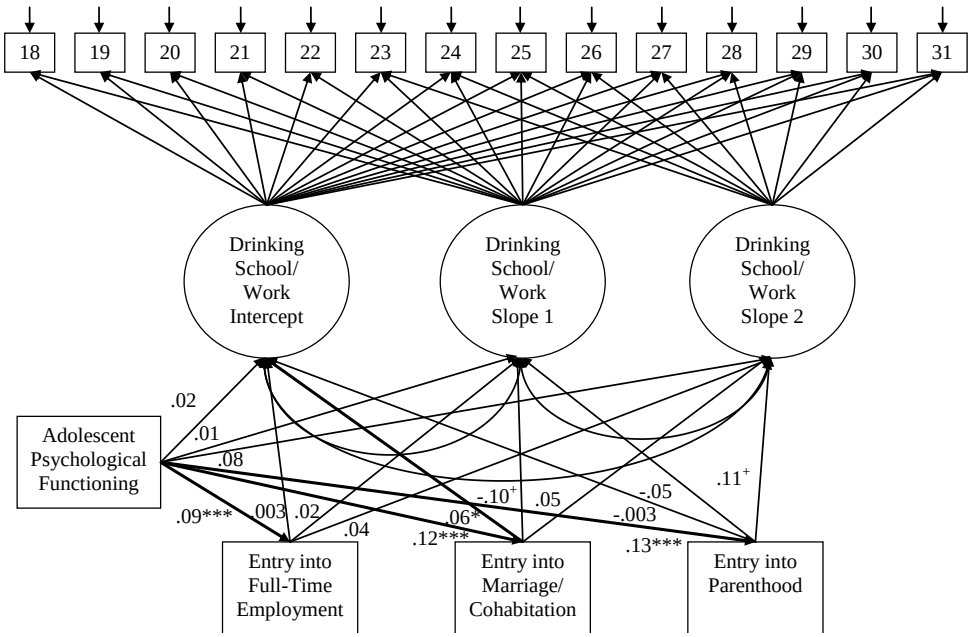
$\Delta\chi^2(1)$ = 22.79, p < .001, but this association was stronger among the college group in the binge drinking model. There were no significant indirect effects of adolescent psychological functioning on drinking before/during school/work through entry into parenthood in either group.

3.7.3.4 *All adult roles*

For the entire sample, the piecewise growth curve model of drinking before/during school/work had good model fit, $\chi^2(128)$ = 139.70, p = .23; RMSEA = .01; CFI = .97, with adolescent psychological functioning as a predictor of drinking before/during school/work and entry into all three adult roles (Figure 23). Compared to the models with the individual adult roles, none of the indirect effects of adolescent psychological functioning on drinking before/during school/work through the adult role transitions were significant. All other results were similar to the previously described models.

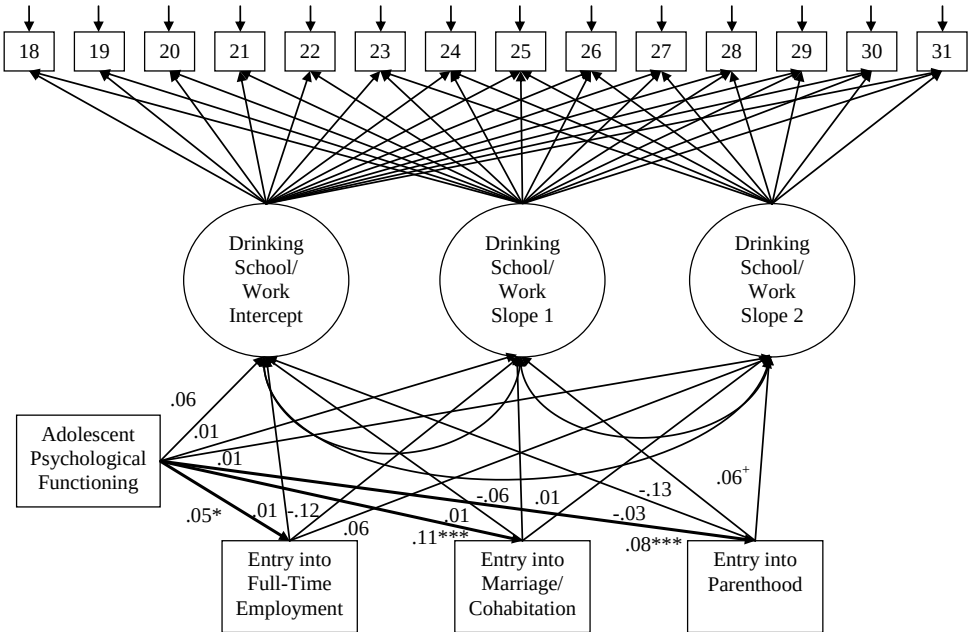
In the multigroup framework, the model including all three survival functions had acceptable model fit, $\chi^2(266)$ = 367.51, p < .001; RMSEA = .01; CFI = .90. Compared to the models with the individual adult roles, the associations between greater psychological dysfunction and a later transition to full-time employment (Non-College: β = .05, p < .05; College: β = .09, p < .001; $\Delta\chi^2(1)$ = 4.74, p < .05) and a later transition to parenthood (Non-College: β = .08, p < .001; College: β = .16, p < .001; $\Delta\chi^2(1)$ = 27.01, p < .001) were stronger among college participants (Figure 25) than non-college participants (Figure 24). All other results were similar to the models with the individual adult roles.

Figure 23. Associations between adolescent psychological functioning, the timing of all three adult role transitions, and drinking before/during school/work for the total sample



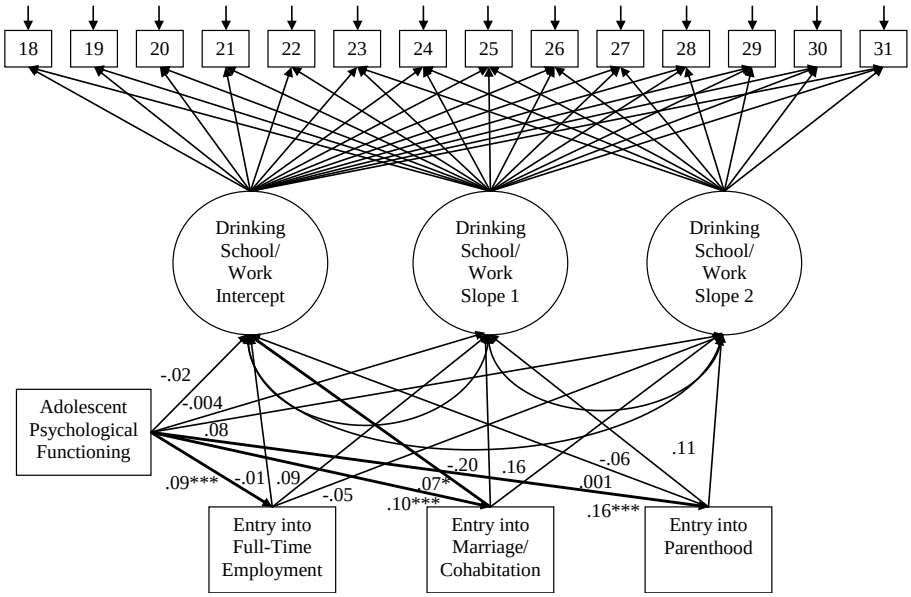
+ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$
Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

Figure 24. Associations between adolescent psychological functioning, the timing of all three adult role transitions, and drinking before/during school/work for the participants who never enrolled in college



+ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$
Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

Figure 25. Associations between adolescent psychological functioning, the timing of all three adult role transitions, and drinking before/during school/work for the participants who were enrolled in college



$^{+}$ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$

Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

3.7.4 Differences between adolescent psychological functioning predicting survival functions and drinking and driving and psychological functioning predicting binge drinking

3.7.4.1 *Full-time employment*

For the entire sample, the freely estimated growth curve model of drinking and driving had good model fit, $\chi^2(25)$ = 36.76, p = .06; RMSEA = .01; CFI = .98, with adolescent psychological functioning as a predictor of drinking and driving and entry into full-time employment. All of the results were consistent with the binge drinking results.

In the multigroup framework, the model including the fulltime employment survival function had acceptable model fit, $\chi^2(69)$ = 136.95, $p < .001$; RMSEA = .02; CFI = .90. There were no differences in the general pattern of results compared to the binge drinking model.

3.7.4.2 *Marriage/Cohabitation*

For the entire sample, the freely estimated growth curve model of drinking and driving had good model fit, $\chi^2(29) = 62.74$, $p < .001$; RMSEA = .02; CFI = .95, with adolescent psychological functioning as a predictor of drinking and driving and entry into marriage/cohabitation. Compared to the significant association between a higher level of adolescent psychological dysfunction and a greater decrease in the slope from 22 to 31 in the binge drinking model, adolescent psychological functioning was not significantly associated with the drinking and driving slope ($\beta = -.01$, $p = .46$). Additionally, there were no significant indirect effects of adolescent psychological functioning on drinking and driving through entry into marriage/cohabitation.

In the multigroup framework, the model including the marriage/cohabitation survival function also had good model fit, $\chi^2(62) = 97.49$, $p < .01$; RMSEA = .02; CFI = .95. There were no significant indirect effects of adolescent psychological functioning on drinking and driving through entry into marriage/cohabitation in either group.

3.7.4.3 *Parenthood*

For the entire sample, the freely estimated growth curve model of drinking and driving had acceptable model fit, $\chi^2(29) = 65.02$, $p < .001$; RMSEA = .02; CFI = .94, with adolescent psychological functioning as a predictor of drinking and driving and entry into parenthood. Compared to the significant association between a higher level of adolescent psychological dysfunction and a greater decrease in the slope from 22 to 31 in the binge drinking model, adolescent psychological functioning was not significantly associated with the drinking and driving slope ($\beta = -.03$, $p = .13$). There were also no significant indirect effects of adolescent psychological functioning on the drinking and driving through entry into parenthood.

In the multigroup framework, the model including the parenthood survival function also had good model fit, $\chi^2(68)$ = 102.76, p < .01; RMSEA = .02; CFI = .95. There were no significant indirect effects of adolescent psychological functioning on drinking and driving through entry into parenthood in either group.

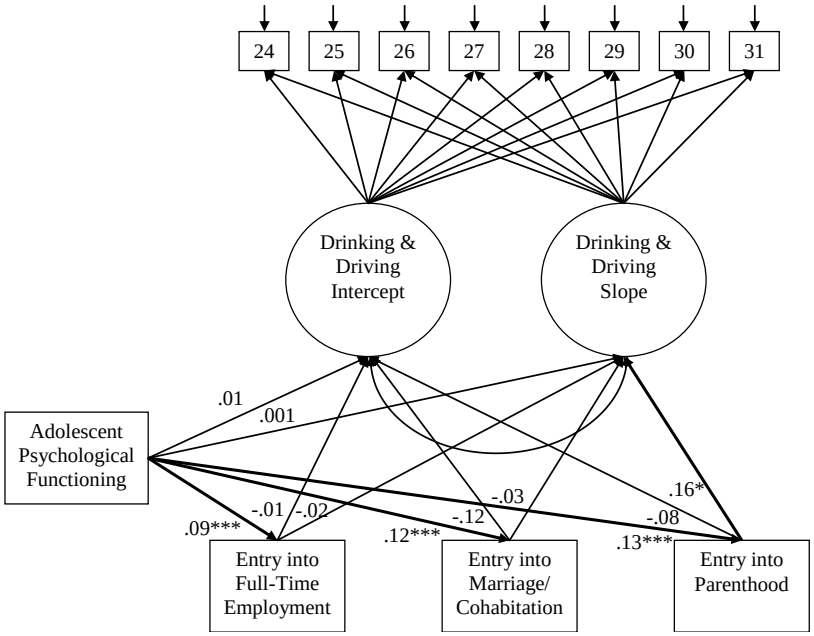
3.7.4.4 *All adult roles*

For the entire sample, the freely estimated growth curve model of drinking and driving had good model fit, $\chi^2(38)$ = 84.33, p < .001; RMSEA = .02; CFI = .95, with adolescent psychological functioning as a predictor of drinking and driving and entry into all three adult roles (Figure 26). Compared to the models with the individual adult roles, a later transition to parenthood was associated with a greater increase in drinking and driving (β = .16, p < .05). The indirect effect of adolescent psychological functioning on the drinking and driving slope through entry into parenthood was significant (β = .02, p < .05). All other results were similar to the models with the individual adult roles.

In the multigroup framework, the model including all three survival functions had acceptable model fit, $\chi^2(98)$ = 180.18, p <.001; RMSEA = .02; CFI = .92. Compared to the models with the individual adult roles, the associations between greater psychological dysfunction and a later transition to full-time employment (Non-College: β = .06, p < .05; College: β = .09, p < .001; $\Delta\chi^2(1)$ = 4.67, p < .05) and a later transition to parenthood (Non-College: β = .07, p < .001; College: β = .15, p < .001; $\Delta\chi^2(1)$ = 315.98, p < .001) were stronger among college participants (Figure 28) than non-college participants (Figure 27). For the non-college group, a later transition to parenthood was associated with a greater increase in drinking and driving during young adulthood (β = .09, p < .05). The indirect effect of adolescent psychological functioning on the drinking and driving slope through entry into parenthood was

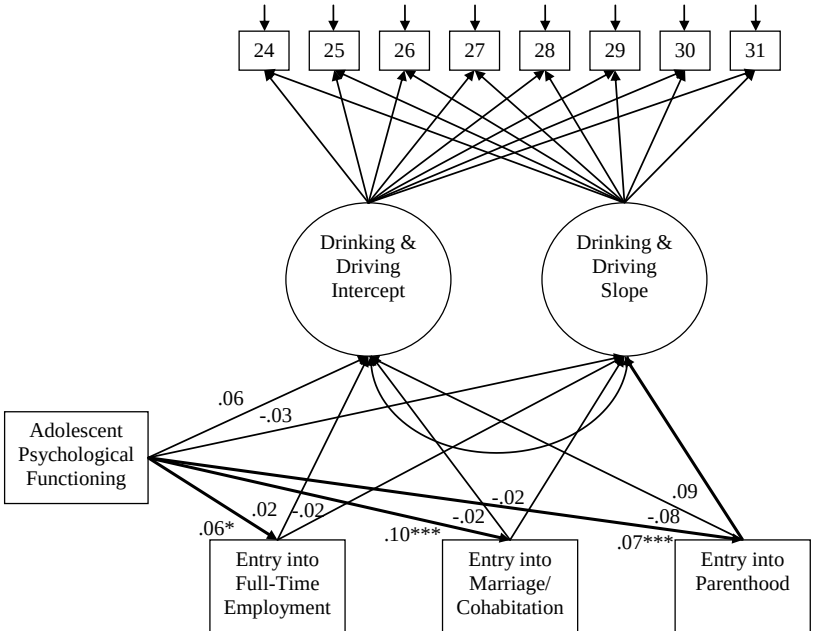
significant (β = .01, p < .05). For the college group, a later transition to parenthood was associated with a lower level of drinking and driving at age 24 (β = -1.10, p < .001). The indirect effect of adolescent psychological functioning on the drinking and driving intercept through entry into parenthood was significant (β = -.17, p < .001).

Figure 26. Associations between adolescent psychological functioning, the timing of all three adult role transitions, and drinking and driving for the total sample



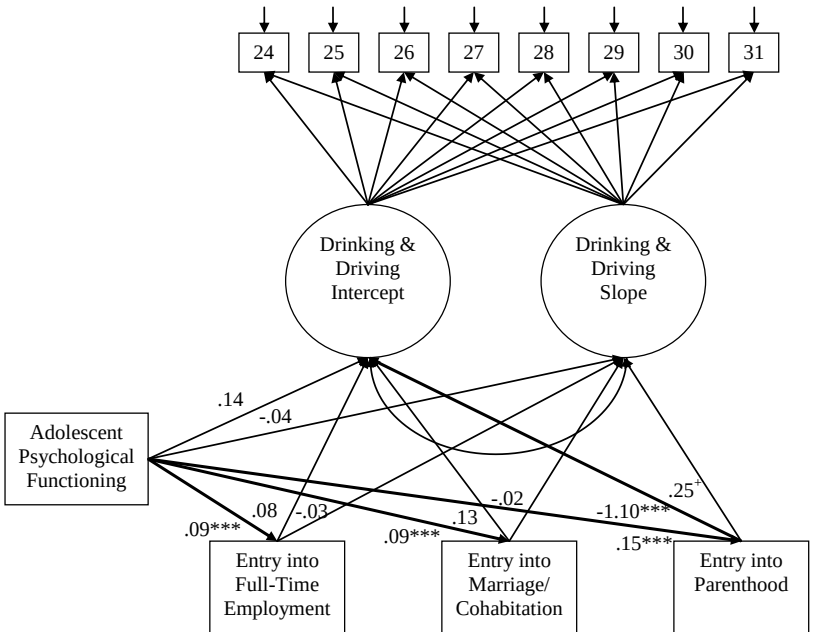
$^{+}$ p < .10, *p < .05, ** p < .01, ***p < .001
Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

Figure 27. Associations between adolescent psychological functioning, the timing of all three adult role transitions, and drinking and driving for the participants who never enrolled in college



$^{+}$ $p < .10$, $*p < .05$, $** p < .01$, $***p < .001$
Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

Figure 28. Associations between adolescent psychological functioning, the timing of all three adult role transitions, and drinking and driving for the participants who were enrolled in college



$^{+}$ $p < .10$, $*p < .05$, $** p < .01$, $***p < .001$
Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

3.7.5 Summary

Greater psychological dysfunction was associated with later transitions to adult roles, but there were no consistent associations, direct or indirect, between adolescent psychological functioning and the alcohol problems.

3.8 SUMMARY OF THE MAIN RESULTS

3.8.1 Aim 1. Examine differences in trajectories of alcohol use/problems between those who did or did not pursue postsecondary education

Overall, the college and non-college groups had relatively similar trajectories of binge drinking and alcohol problems. The only notable differences were that non-college participants had a higher frequency of binge drinking at age 18 and college participants had a slight increase in drinking before/during school/work trajectory between the ages of 22 and 31.

3.8.2 Aim 2. Test whether the timing of adult role transitions differed between the college groups and how the timing of adult role transitions related to alcohol use/problems

Non-college participants transitioned to marriage/cohabitation and parenthood earlier than college participants, but the two groups transitioned to full-time employment at similar rates. Later transition to full-time employment was associated with higher levels of binge drinking and drinking before/during school/work at age 18, as well as higher levels of drinking and driving at

age 24. A later transition to parenthood was associated with lower levels of binge drinking at age 18, a lower increase in binge drinking from 18 to 22, and a flatter decrease in binge drinking from 22 to 31. These associations were relatively robust, as they remained significant when all three survival functions were included in the same model. Similarly observed associations for timing of marriage/cohabitation fell to nonsignificance when analyzed with parenthood and full-time employment in the models.

3.8.3 Aim 3. Assess how adolescent psychological functioning affected the timing of adult role transitions and maturing out and differences in these associations based on college attendance

The non-college group had higher levels of adolescent psychological dysfunction than the college group, but the magnitude of the effect was small. The only direct effect of psychological dysfunction on binge drinking was the association with a greater decrease in binge drinking from 22 to 31 among the non-college group. Greater psychological dysfunction was associated with later transitions to all three adult roles in both groups. Later transitions to marriage/cohabitation and parenthood were, in turn, associated with a flatter binge drinking trajectory between 22 and 31 in both groups. Later transitions to marriage/cohabitation and parenthood were also associated with a flatter trajectory in binge drinking from 18 to 22 among the college group. Adolescent psychological functioning did not predict the alcohol problems trajectories.

4.0 DISCUSSION

The purpose of the current study was to examine heavy alcohol consumption as a function of college attendance, as well as the contribution of adult role transitions and adolescent psychological adjustment to alcohol consumption, from the late teens to the early thirties. This was achieved by first comparing trajectories of binge drinking and alcohol problems between individuals who did, or did not, attend college during the traditional college years. Then, the associations between the trajectories and 1) variables indicating the timing of entry into full-time employment, marriage/cohabitation, and parenthood, as well as 2) psychological adjustment in adolescence, were tested. Analyses were conducted in a large, nationally representative sample that included racial/ethnic minorities often neglected in the literature. Contrary to expectation, the college and non-college groups demonstrated relatively similar patterns of binge drinking and problems related to drinking. Although individuals who did not attend college had higher initial levels of heavy drinking, attending college did not relate to the patterns of drinking over time. Specifically, the college and non-college groups had similar increases in binge drinking during emerging adulthood and similar patterns of maturing out from the mid-twenties to the early thirties. The college group transitioned to marriage/cohabitation and parenthood later than the non-college group, and later parenthood in particular was associated with less binge drinking at age 18 and a flatter binge drinking trajectory overall. These results indicated that later transitions to marriage/cohabitation and parenthood are associated with less risky drinking behavior during

a developmental period at which participation in risky behaviors peaks. Similarly, the non-college group had higher levels of adolescent psychological dysfunction compared to the college group, but, paradoxically, poorer adolescent psychological functioning was associated with later transitions to adult roles in both groups. Later transitions to adult roles, in turn, were associated with flatter binge drinking trajectories. These findings, which were present after controlling for important differences between adults who did and did not attend college, provide the first longitudinal comparison of heavy drinking among young adults who pursue different education pathways. They counter the prevailing belief that increased drinking during the late teens and early twenties, as well as subsequent decreases during the later twenties and thirties, is limited to college attenders.

4.1 TRAJECTORIES OF ALCOHOL USE AND PROBLEMS

Non-college participants reported more frequent binge drinking at age 18 compared to college participants. This is consistent with prior research indicating that high school students who later attended college had lower levels of alcohol use during adolescence than their peers who did not attend college (O'Malley & Johnston, 2002). It is important to note that, at age 18, most of the participants were likely either still enrolled in high school or had only been outside of the high school environment for a few months. This is illustrated by the somewhat lower level of college enrollment among 18 year olds compared to the other traditional college ages (Table 1). Thus, the lower level of binge drinking among college students compared to their non-college peers at age 18 does not mean that college students' participation in binge drinking is infrequent during the college years compared to non-college peers. Rather, this difference in the current study may

capture established differences in binge drinking among the sample participants still enrolled in high school at age 18 even after controlling for background characteristics thought to influence college attendance, including alcohol use history.

One possible explanation for the higher level of binge drinking among non-college participants is the different level of conventionality, defined as being concerned with what is socially acceptable, among adolescents who do and do not attend college. Individuals who later attend college tend to be more conventional during adolescence compared to their peers who do not attend college (Gotham et al., 1997; O'Malley, 2004/2005). Frequent adolescent drinking is often considered a socially deviant behavior, and adolescents who plan to attend college will choose to abstain from, or infrequently participate in, exceptionally heavy drinking to avoid being labeled as deviant (Bachman et al., 1997; Chassin et al., 2009; Read et al., 2002). Upon entering college, where heavy drinking is considered normative, many adolescents who previously abstained from alcohol or drank infrequently report increases in alcohol use (Brown & Klute, 2003; Wood et al., 2004). Although group differences in conventionality is one potential explanation for the more frequent binge drinking by 18 year olds not attending college, it is important for future research to examine other potential explanations, such as additional personality traits or other background characteristics not included in the propensity score covariate in the current study, to clarify why this early difference in binge drinking is present.

As expected from prior studies, binge drinking increased from ages 18 to 22 and then decreased until age 31 (Dawson et al., 2006; Littlefield et al., 2009; SAMHSA, 2011). Contrary to the hypotheses, however, the increases and subsequent decreases in binge drinking during these developmental periods did not differ based on college attendance. These findings are important because they demonstrate that changes in binge drinking, a dangerous drinking

behavior thought to be primarily exacerbated on college campuses, are similarly prevalent among individuals in their late teens and early twenties regardless of college attendance. Thus, assumptions to date that developmentally limited heavy drinking is primarily a phenomenon limited to college students (Wechsler et al., 1998; Wechsler et al., 2000), appear to be incorrect. The scope of the current study, including its use of a large nationally representative sample, makes the current findings particularly noteworthy relative to the smaller studies of college students that characterize the literature on binge drinking.

Prior studies that found more drinking by college students compared to non-college peers reported mean level group differences rather than longitudinal trajectories of alcohol use and problems (NSDUH, 2003). For example, the NSDUH (2003) reported mean level differences in alcohol use between 18 to 21 year olds who were and were not enrolled in college. Drinking was only assessed at one time point and, as a result, could not reveal changes in drinking behaviors over time. Similarly, prior studies of the decrease in alcohol use in young adulthood that compared college and non-college drinking focused on mean level differences at certain ages (Merline, 2004). Specifically, Merline and colleagues (2004) only assessed mean level differences in heavy drinking at age 35. The use of latent variable growth curve modeling in the current study allowed for the assessment of changes in drinking behaviors over time in both the college and non-college groups rather than only examining mean level differences in drinking. In other words, the current study examined a slightly different question from previous studies, specifically group differences in changes in drinking behaviors over time. These analyses were a new approach to assessing potential differences in drinking between those who do and do not attend college. The current findings indicate that frequent binge drinking during emerging adulthood is relatively universal, as well as specific to this developmental period, and that rates

of increase and decrease throughout early adulthood are also generally independent of college attendance. Thus, popular media may portray increased binge drinking as a behavior limited primarily to college campuses, but this dangerous drinking practice appears to be just as common for same aged peers who do not attend college.

Change in problem behaviors stemming from alcohol use were also examined to determine whether the findings for binge drinking extended to impaired daily life functioning. Unfortunately, these variables (i.e., drinking before/during school/work, drinking and driving) were characterized by a number of limitations and conclusions are somewhat tentative. Alcohol-related problems were infrequent across the ages examined in the study (Figures 5-10). Less than 10% of the sample reported participating in drinking before/during school/work or drinking and driving for a majority of the ages, with a maximum of 12.6% of the sample reporting drinking and driving at age 21. This led to a highly skewed distribution of scores. However, these proportions are similar to reported rates of alcohol use disorders but lower than the proportions of other problematic drinking behaviors measured by more comprehensive assessments of alcohol problems or consequences of drinking (Gotham et al., 2003; Littlefield et al., 2009; Littlefield et al., 2010). In addition, the measure of drinking and driving was limited to half of the assessment waves, some of which were not consecutive. This restricted the age range during which the behavior could be modeled. These problems with the variables must be kept in mind when interpreting the associated results.

Counter to the expected decrease, college students reported a slight increase in drinking before or during school or work between the ages of 22 and 31. However, frequencies of this behavior were quite low overall (e.g. less than 10% reported at least one instance of drinking before or during school or work at age 28). Those who did not attend college had no significant

change in drinking before or during school or work between the ages of 18 to 31. Prior studies that have found pronounced decreases in alcohol problems have examined diagnoses of alcohol use disorders or negative consequences of drinking, such as drinking to the point of blacking out or getting into fights when drinking (Gotham et al., 2003; Littlefield et al., 2009). Although speculative, there may be important differences between these outcomes, which reflect drinking to the point of potential harm (disorder or multiple negative consequences such as blackouts or injury) versus consumption proximal to work/study. One speculation may be related to the different career paths that young adults with college degrees are more likely to obtain compared to their non-college peers (Doubleday, 2013). For example, moderate alcohol use is common at some social events hosted by professional offices to help employees bond or market services to potential clients. A participant who reported drinking at work in this context would not be reporting problematic, or harmful, drinking. Future research clarifying the context in which drinking before or during school or work, as well as other potential signs of problematic drinking, would help to determine whether those who attended college are showing signs of problematic alcohol use during young adulthood.

Similarly, more information about the context in which participants may be drinking and driving during young adulthood may be needed. Participants in the current sample had a slight increase in drinking and driving from the mid-twenties to the early thirties. This finding contradicts the usual pattern of maturing out of alcohol problems that is typically seen during this developmental period (Dawson et al., 2006; Littlefield et al., 2009; Windle, 2003). The slight increase could indicate that young adults continue to perceive the behavior to be less dangerous than more mature adults (NSDUH Report, 2003; 2006). The finding may also reflect more frequent light alcohol consumption followed by driving after the alcohol has been metabolized

(Zakhari, 2006). The question in the current study asked how frequently participants drove a car or other vehicle when they had been drinking alcohol. Thus, the timing between drinking and driving is left open to interpretation, which may explain the drinking and driving trajectory. As drinking environments and quantities tend to change across the third decade of life (O'Malley, 2004/2005), it would be premature to conclude that the observed trajectory is a sign of problematic drinking behavior. Further clarification regarding the circumstances in which participants in the current study drove after drinking is needed. It could also be informative to assess whether frequency of drinking and driving is associated with other markers of alcohol problems (e.g., repeated charges for driving under the influence of alcohol) among participants in the current study, as has been found in other studies (Zador et al., 2000).

4.2 ADULT ROLE TRANSITIONS

Surprisingly, there was no difference in the timing of entry into full-time employment between the college and non-college groups after controlling for pre-existing characteristics known to differ between individuals who do and do not attend college (e.g., family SES). This was particularly surprising given the higher proportion of participants working full-time at age 19 in the non-college group (29.88%) than in the college group (13.35%). The low proportion of non-college participants employed full-time prior to the early twenties contradict prior findings that indicate that transitions to full-time employment are most likely to occur immediately after an individual has left school (Bachman et al., 1997; Schulenberg et al., 2000; Schulenberg & Maggs, 2002; Wood et al., 2000). For example, Schulenberg and Maggs (2002) found in a review of the literature that the number of individuals reporting full-time employment increased

following graduation from high school, around the late teens, among those who did not attend college. The findings in the current study may differ due to the impact of the recent economic recession. Among those who graduated from high school in the late 1990s or early 2000s, including the participants in the current study, unemployment is dramatically higher among those who only attained a high school diploma compared to those who attended or graduated from college (Pew Research Center, 2014). Young adults with only a high school diploma are less likely to be employed full-time than more educated peers when they are employed. This was illustrated in the current study, with almost 30% of the non-college participants failing to transition to full-time employment by age 31 compared to 19% of the college sample. These findings suggest that non-college participants in the current sample may have had greater difficulty finding full-time employment immediately after completing their education than the college participants have upon completing their education. This is an important finding given recent debate about the value of a college education in regards to employment and earnings (Bennett & Wilezol, 2013). It is also possible that individuals in their late teens and early twenties are using this developmental period to explore career options even if they do not attend college (Arnett, 1992; 2000). Further research assessing whether non-college emerging adults are actively delaying entry into full-time employment or are having difficulty attaining full-time employment could be beneficial. Specifically, guidance counselors, or others who interact with graduating high school seniors, could help students find resources to successfully transition to the workforce when they are ready to do so.

As hypothesized, individuals who did not attend college transitioned to marriage/cohabitation relationships and parenthood earlier than their peers who attended college. Similar results have been previously reported (England & Bearak, 2012; Mathews & Hamilton,

2009). However, prior studies only compared the mean age of transition to an adult role between groups. The use of cox regression survival analyses in the current study allowed for the comparison of the rate at which participants in both groups transitioned to these adult roles. In other words, prior studies found that non-college young adults transitioned to marriage/cohabitation and parenthood at younger ages, on average, than young adults who attend college, but the current study demonstrated that a greater proportion of the non-college participants transitioned to marriage/cohabitation and parenthood at an earlier age than the college participants (e.g., 61.9% of the non-college participants were married/cohabiting at age 22, the average age of entry into marriage/cohabitation for the non-college group, but only 37.3% of college participants were married/cohabiting by age 22).

Delayed transition to marriage/cohabitation and parenthood for adults attending college may reflect different attitudes toward marriage/cohabitation and parenthood compared to non-college adults. College students report actively delaying marriage/cohabitation and parenthood until after they complete school because they are unprepared for the responsibilities associated with these adult roles (Mather & Lavery, 2010; Scott et al., 2009). Individuals who do not attend college may also delay marriage/cohabitation and parenthood until reaching specific milestones, such as attaining a specific job, but these milestones may be obtained more quickly than the completion of a college degree. It is also possible that individuals who do not attend college do not have professional or personal milestones that conflict with transitioning to a serious romantic relationship or parenthood. Individuals who do not attend college could also have familial obligations, such as early parenthood, that prevent them from attending college. Few, if any, studies have examined entry into marriage/cohabitation or parenthood outside of samples of college educated adults. Thus, the current study provides a unique insight into the timing of

adult role transitions among young adults who do not attend college. Future work examining marriage/cohabitation and parenthood should include young adults who do not attend college and assess their rationale for entering, or delaying, these adult roles to determine whether those who do and do not attend college have different reasons for transitioning to these adult roles.

4.3 ADULT ROLE TRANSITIONS AND ALCOHOL TRAJECTORIES

4.3.1 Binge drinking

Later entry into full-time employment was associated with higher levels of binge drinking at age 18. Adolescents who participate in frequent heavy alcohol use can have greater difficulty obtaining full-time employment during young adulthood compared to peers who infrequently participate in alcohol use (Ellickson et al., 2003). This difficulty may, at least in part, be a result of greater detachment from school during adolescence among those who drink frequently, which can impact both later academic achievement and employment options (Hawkins et al., 1992). Adolescents who frequently participate in heavy drinking may also experience lasting consequences of drinking, such as a criminal record, that would limit later career options (Ellickson et al., 2003). Given the potential difficulty some of the young adults in the current sample may have had when attempting to find full-time employment, it could be important to address drinking among adolescents before it escalates to problematic levels.

Later entry into marriage/cohabitation and parenthood were both associated with lower increases in binge drinking during the traditional college years. Contrary to the hypotheses, later entry in marriage/cohabitation and parenthood were associated with flatter trajectories of

maturing out during the twenties and early thirties. However, because binge drinking was less frequent overall for those who attained these milestones at older ages, there was little maturing out that could occur during this time. These results support the findings in prior studies that young adults who enter serious romantic relationships and parenthood during their late twenties and thirties participated in lower levels of alcohol use when they were younger than those who do not transition to these adult roles (Gotham et al., 1997; O'Malley, 2004/2005). Later entry into adult roles, as well as lower levels of alcohol use, are thought to reflect greater conventionality with social norms compared to peers who drink more, enter adult roles fairly early, or do not enter these adult roles at all. Later entry into adult roles may also reflect planned rather than unexpected role transitions (Raley et al., 2012). For example, unplanned pregnancies are more common in the teens and early twenties than later in adulthood. This would mean that young adults who plan to have a serious romantic relationship or become a parent in the future drink less prior to transitioning to these adult roles rather than the transition itself resulting in a decrease in alcohol use. Further research is needed to clarify whether it is concern with what is socially acceptable, planning to transition to an adult role at a later date, or the actual transition to an adult role, with its associated changes in social environments, that affects binge drinking patterns during the twenties and thirties. Knowing which factor is more strongly associated with drinking during young adulthood could help to identify those with the potential for future problems with maturing out. In addition, future work should investigate how changes in marital/cohabitating or parent status affect drinking. Prior work has established that drinking increases as a result of divorce and associated loss of time with children (Chilcoat & Breslau, 1996; Newcomb, 1994). However, none of these studies have examined these role changes in relation to longitudinal trajectories of alcohol use that include drinking prior to the role change.

An understanding of how drinking behaviors prior to a divorce may affect later drinking could help identify those at particular risk of developing problematic alcohol use.

4.3.2 Alcohol problems

The timing of adult role attainment, for all three outcomes, was mostly unrelated to the variables tapping alcohol-related problems (drinking before/during school/work; drinking and driving). Prior research has found associations between the adult roles and lower levels of alcohol problems when the latter were defined as diagnosis of an alcohol use disorder or consequences of drinking (Gotham et al., 2003; Littlefield et al., 2009). The results of the current study indicate that entry into adult roles did not affect these specific problems associated with heavy drinking. It is possible that young adults who drink before or during school or work, or drive after drinking, have developed problematic drinking patterns that do not change in response to adult role transitions. For example, those who drive after drinking may have developed beliefs about their ability to drive while intoxicated that are unaffected by their marital/cohabiting or parental status. However, as mentioned earlier, the low frequencies of these behaviors may have affected the results. Further research examining the role of timing of adult role transitions in trajectories of alcohol problems using the more traditional measures of alcohol problems is needed to clarify the associations between adult role transitions and trajectories of the consequences of heavy drinking between the late teens and early thirties. This line of research would establish whether the associations between adult role transitions and drinking are limited to binge drinking or are similar for other markers of problematic drinking, which could help to identify those at risk for continued heavy drinking into adulthood.

4.4 ADOLESCENT PSYCHOLOGICAL FUNCTIONING

On average, non-college participants reported higher levels of adolescent psychological dysfunction than the college participants. However, the average levels of dysfunction in both groups were relatively low. Only about 5% of the participants in the current sample had at least one frequently occurring symptom of poor psychological adjustment (e.g., often true that the symptom described the participant). This rate of psychological dysfunction, measured using an aggregate variable, is lower than the rates of diagnoses of mental health disorders among adolescents (Costello et al., 2003; Merikangas et al., 2009). Costello and colleagues (2003) found a mental health disorder prevalence rate of approximately 13% among their sample of adolescents, and Merikangas and colleagues' (2009) review of epidemiological samples found that as many as 25% of adolescents experienced a mental health disorder during the previous year. The limited questions assessing adolescent psychological functioning in the current sample may have missed some participants' mental health problems. Future research would benefit from the use of more extensive assessment of mental health symptoms or disorders to better identify those with higher levels of adolescent psychological dysfunction.

A possible explanation for the college group differences in adolescent psychological dysfunction is the link between poorer mental health and detachment from education, including school dropout, in prior studies (Hammond et al., 2007; Lehr et al., 2004; Schargel, 2004; Wagner et al., 1993). Thus, adolescents with more psychological difficulties may be less likely to attend college because of problems related to success in school. For example, having a learning disability, which could result in poor school performance, or behavioral or emotional problems, such as attention difficulties, is linked to greater disengagement from school in the form of misbehavior and a lack of planning for education after high school (Alexander et al.,

1997; Alexander et al., 2001; Janosz et al., 1997; Kaufman et al., 1992). If so, these youth may be aided by the provision of resources to help with aspects of the educational environment with which they struggle. Other factors may also explain the group difference, such as different treatment seeking behavior for mental health problems due to SES and race/ethnicity, both variables that differed between the college and non-college groups (Blanco et al, 2008; Diala et al., 2001). However, the magnitude of the group difference was small, and the group differences should not be over-emphasized.

4.5 ADOLESCENT PSYCHOLOGICAL FUNCTIONING, ADULT ROLE TRANSITIONS, AND ALCOHOL TRAJECTORIES

Contrary to prediction, more adolescent psychological dysfunction was associated with later, rather than earlier, transitions to adult roles in both the college and non-college groups. Although these later transitions may be planned and adaptive, such as for those attending college, later transitions to adult roles among those with a history of psychological dysfunction may be indicative of problems with the transition to adulthood. The current findings may be reflecting the latter possibility. This would be consistent with prior research that has found impaired interpersonal relationships and educational/vocational achievement among individuals with histories of psychological dysfunction (Babinski et al., 2011; Barkley et al., 2008; Skodol et al., 2005; Whitehouse et al., 2009). For example, Whitehouse and colleagues (2009) found that young adults with a history of language impairment or autism spectrum disorder in childhood continued to have difficulty forming social relationships, attaining higher level education, and finding employment. This continued impairment is especially problematic because entry into

adult roles, particularly healthy romantic relationships, can be especially beneficial for young adults with histories of psychological dysfunction (Eakin et al., 2004). Thus, delays in entry into adult roles among this population may result in impairment in other aspects of life functioning.

Unexpectedly, more adolescent psychological dysfunction was associated with a flatter trajectory of binge drinking, particularly through later transitions to marriage/cohabitation and parenthood. These results differ from prior studies reporting higher levels of impairment in multiple aspects of life during the twenties and thirties, including higher levels of substance use, among those with histories of psychological dysfunction compared to peers without a history of poor psychological functioning (Juvonen et al., 2000; Lewinsohn et al., 2003; Mortensen et al., 2001; Ting, 1997). These results might differ due to the often developmentally limited, and socially normative, nature of alcohol use in early adulthood. Binge drinking usually takes place in social settings, environments young adults with a history of poor psychological adjustment may avoid due to problems with interpersonal relationships (Wood et al., 2000). Future research examining other heavy drinking behaviors or problems related to drinking, particularly those that are not developmentally or socially limited, among individuals with adolescent psychological dysfunction would help to clarify whether the binge drinking trajectory was representative of other drinking patterns among this population.

4.6 SUMMARY

Increased alcohol use during the late teens and early twenties, as well as later desistance through the mid- to late twenties and early thirties, appears to be a normative developmental process among those who do and do not attend college. This indicates that heavy drinking during the late

teens and early twenties is not specific to unique aspects of the college environment as has long been believed. As a result, intervention efforts addressing heavy drinking may need to target all young adults rather than focusing on college students. Part of enjoying the freedom associated with emerging adulthood is delaying transitions to adult roles. Later transitions to adult roles, particularly marriage/cohabitation and parenthood, were associated with less prevalent binge drinking across the transition to young adulthood. Previous research suggested that attaining an adult role, regardless of the timing of the transition, was associated with decreased alcohol use. The current study, which focused on the timing of these role transitions, found that delaying role transitions, particularly parenthood, was beneficial for alcohol use behavior during early adulthood in both college and non-college participants. Although directionality cannot be concluded, there may be some benefit in adult decision-making that involves focusing on individual educational and vocational pursuits before assuming responsibility for child-rearing. Finally, the surprising finding of flatter trajectories of binge drinking through later transitions to marriage/cohabitation and parenthood among those with more psychological dysfunction may reflect unmeasured variables that account for delayed role attainment and alcohol use, such as social difficulties. Taken together, these findings indicate that, counter to the prevalent belief that increased drinking during emerging adulthood and later maturing out are limited to college attenders, young adults who do not attend college may be equally at risk for participation in heavy alcohol use and its associated consequences as their college attending peers.

4.7 LIMITATIONS

Although this study had a number of strengths, such as a large nationally representative sample, there were also several limitations. As mentioned previously, the measures of alcohol problems were characterized by a number of limitations, such as narrowly defined alcohol problem behaviors. These limitations made it difficult to model changes in these behaviors over the course of development and interpret participation in these behaviors as a sign of problem drinking. Future research would benefit from using more traditional and comprehensive measures of alcohol problems. In addition, some of the variables were measured inconsistently or infrequently. Specifically, psychological functioning was only assessed during adolescence and drinking and driving was only assessed at six out of fifteen waves. Both of these measurement issues limited the developmental periods during which the respective variables could be examined in the statistical analyses. For example, stability of psychological dysfunction into adulthood may have produced different results compared to the single assessment in adolescence. Future research would benefit from consistent, as well as frequent, measurement of these and other variables of interest to better understand how these variables change from the late teens to the early thirties. Additionally, the mean ages at which participants transitioned to adult roles are younger than the ages reported in previous studies. A number of the participants may have transitioned to the adult roles after age 31. Had a longer follow-up period been used, the mean ages could have been older. Future research following the participants through their thirties would address this question. Including participants who attended two or four year colleges in the college group may also have affected the results. Although no significant differences in alcohol use or related problems were found between those who attended college without graduating and those who graduated, combining participants from

two year and four year colleges may have obscured potential differences in alcohol use. For example, students at two year college may be more likely to live at home than their peers at four year colleges. This could limit heavy drinking opportunities to a greater degree for two year students compared to four year students. Future research comparing drinking behaviors between students at two year and four year institutions would clarify whether combining these students into a single group affected the average alcohol trajectories in the current study. Finally, there are potential cohort effects due to the sample characteristics. For example, a greater number of graduating high school seniors are currently planning to attend college compared to the current sample due to the impact of the recent economic recession on the job market. Many participants in the current sample would also have been affected by the economic recession while attempting to transition to full-time employment. As a result, the findings in the current study may differ in a sample that did not experience the recession or are making decisions about attending college after witnessing the effects of the recession.

4.8 FUTURE DIRECTIONS

A number of questions were raised throughout the course of the current study. The unsuccessful attempt to create equivalent groups using propensity score analysis indicated that the college and non-college groups differed a great deal on the background characteristics included in the analyses. An understanding of why these group differences are present could help researchers understand the factors that influence college attendance. For example, the college and non-college group differed in high school achievement. Both high school academic achievement and subsequent college enrollment has been found to differ based on the high school an adolescent

attends, even after controlling for academic achievement prior to high school (Strategic Data Project, 2012). Thus, certain characteristics of the high school an adolescent attends helps to dictate a student's overall academic achievement and likelihood to attend college even among high achievers. However, little is currently known about the school characteristics that make students more or less likely to attend college. An understanding of these factors would not only help researchers to identify policies that could be implemented to help students attend college if they desire but could also help researchers determine why some individuals break the norms for their social group and choose to not attend, or attend, college.

The current study also collapsed college student participants across type of degree. Students who attend a four year degree granting institution may have very different experiences from participants who attend two year degree granting institutions. There is some evidence that students at four year colleges participate in higher levels of alcohol use than peers at two year colleges, but a number of these differences are no longer significant after controlling for living at home (Velazquez et al., 2011). Future research examining additional differences between two year and four year colleges could help explain the different levels of alcohol use among these populations. For example, first generation college students are more likely to enroll in two year colleges than four year colleges (Pascarella et al., 2004; Richardson & Skinner, 1992). First generation college students are also more likely to only spend time on campus when attending classes and become less involved in social activities, such as drinking, than non-first generation college students (Pascarella et al., 2004). In a prior study, two year college students had lower levels of alcohol use than those at four year colleges, but alcohol use was still prevalent (Velazquez et al., 2011). Thus, further research examining the differences between students at

two year and four year colleges could also be used to develop interventions tailored to the needs of these groups.

Finally, the contexts in which college students binge drink are well known and have been the target of intervention programs (Darkes & Goldman, 1993; Dimeff et al., 1999; Fried & Dunn, 2012; Larimer et al., 2001; Wiers & Kummeling, 2004). For example, BASICS is an intervention used with college students to address perceived drinking norms on campus, a known risk factor for heavy alcohol use (Dimeff et al., 1999; Larimer et al., 2001). Far less is known about the environments in which non-college emerging adults are binge drinking. The implications may be important in terms of continuing to develop effective alcohol interventions for this population. Because these two groups appear to have similar trajectories of binge drinking, it is important to understand the contexts in which non-college emerging adults are participating in binge drinking. Future research examining non-college emerging adults' binge drinking would help to identify similarities and differences in binge drinking behaviors compared to emerging adults in college. With this information, interventions could be developed to address this dangerous drinking behavior among this population.

4.9 CONCLUSION

The aim of the current study was to examine differences in trajectories of binge drinking and alcohol-related problems between individuals who did and did not attend college during the traditional college years, as well as the contribution of adult role transitions and adolescent psychological functioning to these trajectories. This is one of the first attempts to examine potential differences in longitudinal patterns of alcohol use and related problems based on

college attendance among a diverse, nationally representative sample of young adults. The results indicate that increased alcohol use during the late teens and early twenties, as well as decreased alcohol use through the mid- to late twenties and early thirties, is a universal process regardless of the post-secondary education pathway pursued. This is an important contribution to the literature because it describes the patterns of binge drinking among a previously ignored segment of the population, and it indicates that heavy drinking in early adulthood is not limited to college students. In addition, individuals who transitioned to adult roles later tended to have lower levels of alcohol use across this developmental span. Delayed parenthood, in particular, was importantly associated with reduced heavy drinking overall, suggesting that the responsibilities of parenthood may have the greatest impact on drinking behavior even prior to making the transition. Finally, transitions to marriage/cohabitation and parenthood mediated the associations between a general index of adolescent psychological health and binge drinking in early adulthood. Somewhat paradoxically, adolescents with more psychological difficulties transitioned to adult roles later and, in turn, had flatter binge drinking trajectories from the mid-twenties to the early thirties. Later full-time employment, marriage/cohabitation, and parenthood for this subgroup may follow from difficulty with transitioning to these expected adult milestones rather than planful, adaptive delay. Taken together, the findings from the current study may help to identify those at risk for participation in dangerous drinking behaviors across the transition to adulthood, as well as help to identify those who may benefit from potential intervention efforts both in the community and on college campuses.

APPENDIX A

MULTIGROUP RESULTS OF MODELS WITH SURVIVAL FUNCTIONS AS PREDICTORS

Survival functions predicting binge drinking.

Full-time employment.

In the multigroup framework, the model including the full-time employment survival function as a predictor of binge drinking also had good model fit, $\chi^2(176) = 213.19$, $p < .05$; RMSEA = .01; CFI = 1.00. Later entry into full-time employment was significantly associated with more binge drinking at age 18 ($\beta = .05$, $p < .05$) among non-college participants, but entry into full-time employment was not associated with binge drinking at age 18 for college participants ($\beta = .003$, $p = .85$). The associations between entry into full-time employment and the binge drinking intercept did not differ between the groups, $\Delta\chi^2(1) = 3.11$, $p = .08$. Both groups reported a similar nonsignificant association between entry into full-time employment and the binge drinking slope from 18 to 22 (Non-College: $\beta = .03$, $p = .19$; College: $\beta = .01$, $p = .67$; $\Delta\chi^2(1) = .72$, $p = .40$). Later entry into full-time employment was significantly associated with a greater decrease in binge drinking between 22 and 31 among non-college participants ($\beta = -.07$, $p < .01$), but entry into full-time employment was not associated with the binge drinking

slope from 22 to 31 among college participants (β = .01, p = .66). Entry into full-time employment was more strongly associated with the binge drinking slope from 22 to 31 in the non-college group than in the college group, $\Delta\chi^2(1)$ = 6.54, p < .05.

Marriage/Cohabitation.

In the multigroup framework, the model including the marriage/cohabitation survival function as a predictor of binge drinking also had good model fit, $\chi^2(176)$ = 243.30, p < .001; RMSEA = .01; CFI = .99. Entry into marriage/cohabitation was not associated with binge drinking at age 18 (β = -.02, p = .40) among non-college participants, but later entry into marriage/cohabitation was associated with less binge drinking at age 18 for college participants (β = -.05, p < .05). The associations between entry into marriage/cohabitation and the binge drinking intercept did not differ between the groups, $\Delta\chi^2(1)$ = 1.42, p = .23. In both groups, later entry into marriage/cohabitation was similarly associated with a lower increase in binge drinking from 18 to 22 (Non-College: β = -.11, p < .001; College: β = -.10, p < .001; $\Delta\chi^2(1)$ = .02, p = .88). Later entry into marriage/cohabitation was also significantly associated with a similar lower decrease in binge drinking between 22 and 31 among participants in both groups (Non-College: β = .14, p < .001; College: β = .13, p < .001; $\Delta\chi^2(1)$ = .04, p = .84).

Parenthood.

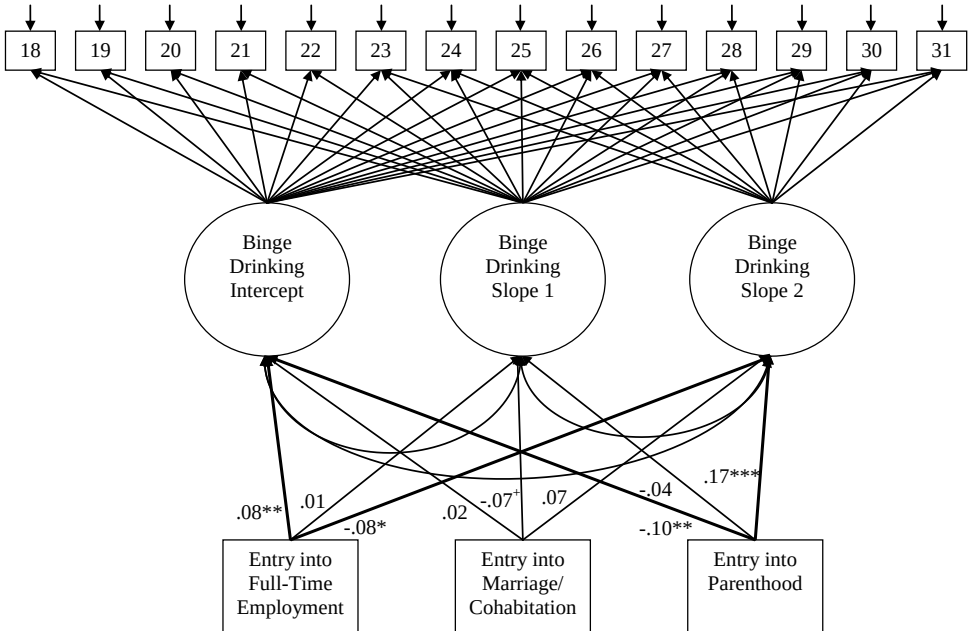
In the multigroup framework, the model including the parenthood survival function as a predictor of binge drinking also had good model fit, $\chi^2(176)$ = 243.80, p < .001; RMSEA = .02; CFI = .98. Later entry into parenthood was similarly significantly associated with less binge drinking at age 18 among non-college participants (β = -.10, p < .001) and college participants (β = -.10, p < .01), $\Delta\chi^2(1)$ = .40, p = .53. Later entry into parenthood was significantly associated with a lower increase in binge drinking from 18 to 22 among non-college participants (β = -.08, p

< .05) but was not associated with binge drinking from 18 to 22 among college participants (β = -.05, p = .09). The strength of the association between entry into parenthood and the binge drinking slope from 18 to 22 did not differ between groups, $\Delta\chi^2(1)$ = .07, p = .79). Later entry into parenthood was significantly associated with a lower decrease in binge drinking between 22 and 31 among non-college participants (β = .23, p < .001) and among college participants (β = .10, p < .05). Entry into parenthood was more strongly associated with the binge drinking slope from 22 to 31 in the non-college group than in the college group, $\Delta\chi^2(1)$ = 5.88, p < .05.

All adult roles.

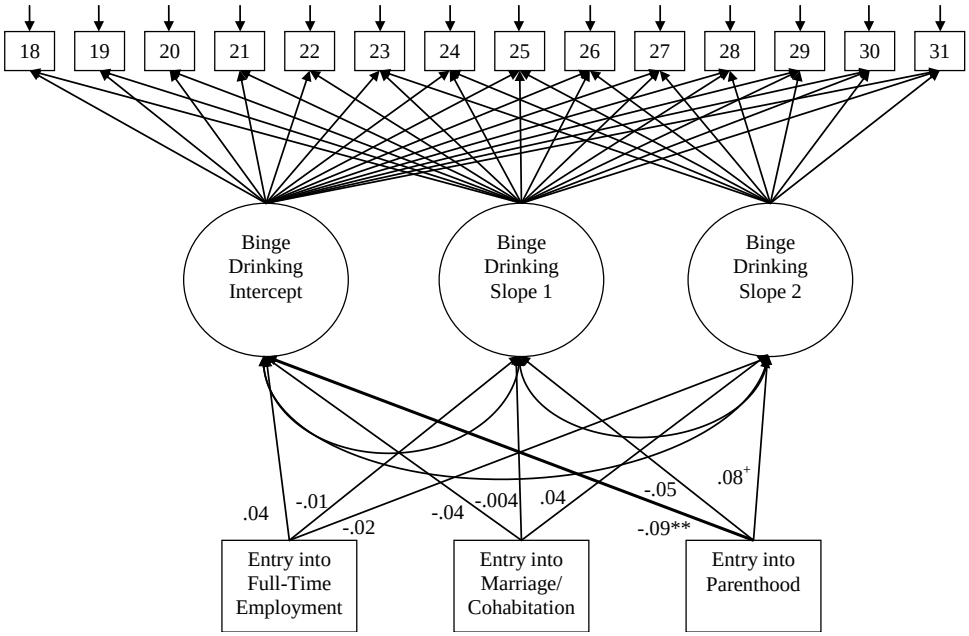
In the multigroup framework, the model including all three survival functions as predictors of binge drinking also had good model fit, $\chi^2(220)$ = 291.65, p < .001; RMSEA = .02; CFI = .98. For the non-college group (Figure 29), later entry into marriage/cohabitation was no longer associated with binge drinking between 18 and 22 (β = -.07, p = .05) or 22 and 31 (β = .07, p = .11). The association between entry into parenthood and binge drinking from 18 to 22 was also no longer significant (β = -.04, p = .22). All other associations between the survival functions and binge drinking for the non-college group remained the same. For the college group (Figure 30), none of the associations between entry into marriage/cohabitation and binge drinking retained significance. In addition, the associations between entry into parenthood and binge drinking from 18 to 22 (β = -.05, p = .13) and from 22 to 31 (β = .08, p = .08) were no longer significant. All other associations between the survival functions and binge drinking for the college group remained the same. There were no group differences in the strength of the associations between the survival functions and binge drinking.

Figure 29. Associations between the timing of all three adult role transitions and binge drinking for the participants who never enrolled in college



+ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$
Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

Figure 30. Associations between the timing of all three adult role transitions and binge drinking for the participants who were enrolled in college



+ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$
Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

Differences between survival functions predicting alcohol problems and survival functions predicting binge drinking

Full-time employment.

In the multigroup framework, the model including the full-time employment survival function as a predictor of drinking before/during school/work also had good model fit, $\chi^2(192) = 201.62$, $p = .30$; RMSEA = .00; CFI = .99. Unlike the association between later entry into full-time employment and a higher intercept in the binge drinking model, entry into full-time employment was not significantly associated with the drinking before/during school/work intercept in the non-college group; $\beta = -.001$, $p = .98$. Also unlike the association between later entry into full-time employment and a greater decrease in the slope from 22 to 31that was stronger in the no-college group in the binge drinking model, entry into full-time employment was not significantly associated with the drinking before/during school/work slope from 22 to 31 in the non-college group; $\beta = -.07$, $p = .23$, and the association did not differ between groups, $\Delta\chi^2(1) = .63$, $p = .43$.

In the multigroup framework, the model including the full-time employment survival function as a predictor of drinking and driving also had good model fit, $\chi^2(66) = 121.69$, $p < .001$; RMSEA = .02; CFI = .96. The association between entry into full-time employment and the drinking and driving intercept was stronger for the non-college group compared to the college group, $\Delta\chi^2(1) = 8.15$, $p < .01$, but this association did not differ between groups in the binge drinking model.

Marriage/Cohabitation.

In the multigroup framework, the model including the marriage/cohabitation survival function as a predictor of drinking before/during school/work also had good model fit, $\chi^2(192)$ = 222.60, p = .06; RMSEA = .01; CFI = .96. Entry into marriage/cohabitation was not associated with drinking before/during school/work in either group.

In the multigroup framework, the model including the marriage/cohabitation survival function as a predictor of drinking and driving also had good model fit, $\chi^2(66)$ = 101.86, p < .01; RMSEA = .02; CFI = .96. Unlike the nonsignificant association between entry into marriage/cohabitation and the intercept for non-college participants in the binge drinking model, later entry into marriage/cohabitation was associated with a lower level of drinking and driving at age 24 among non-college participants (β = -.10, p < .05). In addition, entry into marriage/cohabitation was not significantly associated with the drinking and driving slope between 24 and 31 in either group (Non-College: β = .02, p = .67; College: β = -.01, p = .85).

Parenthood.

In the multigroup framework, the model including the parenthood survival function as a predictor of drinking before/during school/work also had good model fit, $\chi^2(180)$ = 185.44, p = .37; RMSEA = .00; CFI = .99. Entry into parenthood was not associated with drinking before/during school/work in either group.

In the multigroup framework, the model including the parenthood survival function as a predictor of drinking and driving also had good model fit, $\chi^2(62)$ = 79.81, p = .06; RMSEA = .01; CFI = .96. Unlike the significant association between later entry into parenthood and a lower intercept in the binge drinking model, entry into parenthood was not significantly associated with

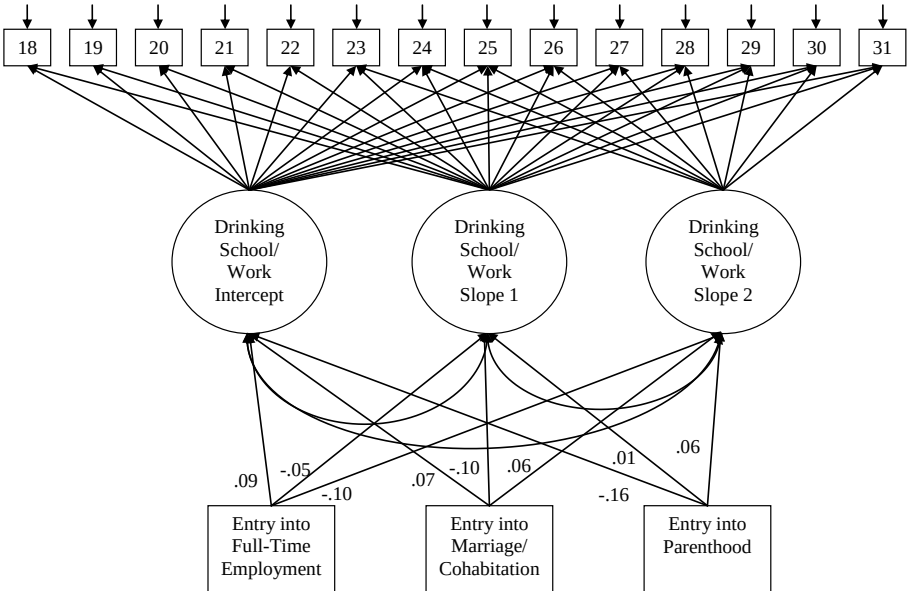
the drinking and driving intercept for the non-college group. The other associations between entry into parenthood and drinking and driving were the same as the binge drinking model.

All adult roles.

In the multigroup framework, the model including all three survival functions as predictors of drinking before/during school/work also had good model fit, $\chi^2(224) = 266.30$, $p < .05$; RMSEA = .01; CFI = .95. The associations between the survival functions and drinking before/during school/work remained nonsignificant in the non-college group (Figure 31). For the college group (Figure 32), later entry into full-time employment was significantly associated with a higher level of drinking before/during school/work at age 18 ($\beta = .08$, $p < .01$) when all three survival functions were included in the model. All other associations between the survival functions and drinking before/during school/work for the college group were nonsignificant.

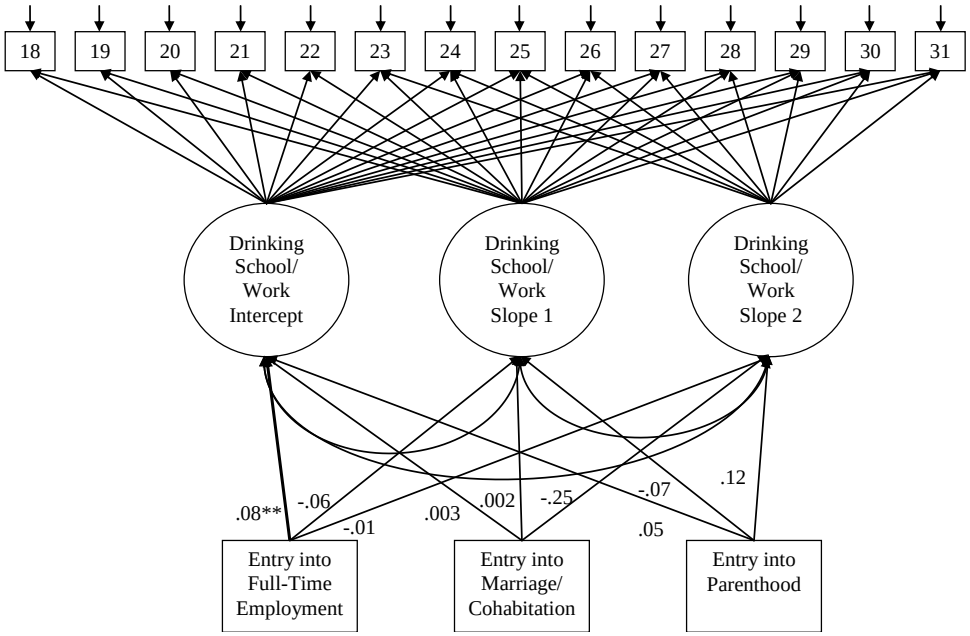
In the multigroup framework, the model including all three survival functions as predictors of drinking and driving also had good model fit, $\chi^2(93) = 182.94$, $p < .001$; RMSEA = .02; CFI = .95. The association between entry into marriage/cohabitation and drinking and driving was no longer significant for the non-college group ($\beta = -.05$, $p = .51$; Figure 33) or the college group ($\beta = -.01$, $p = .89$; Figure 34).

Figure 31. Associations between the timing of all three adult role transitions and drinking before/during school/work for the participants who never enrolled in college



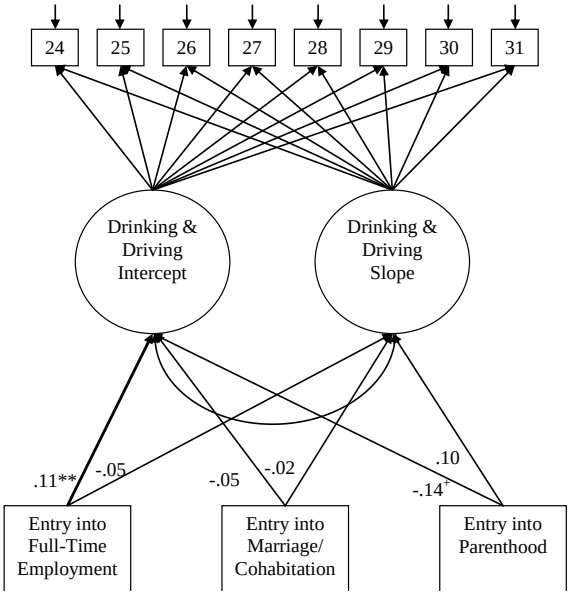
$^{+}$ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$
Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

Figure 32. Associations between the timing of all three adult role transitions and drinking before/during school/work for the participants who were enrolled in college



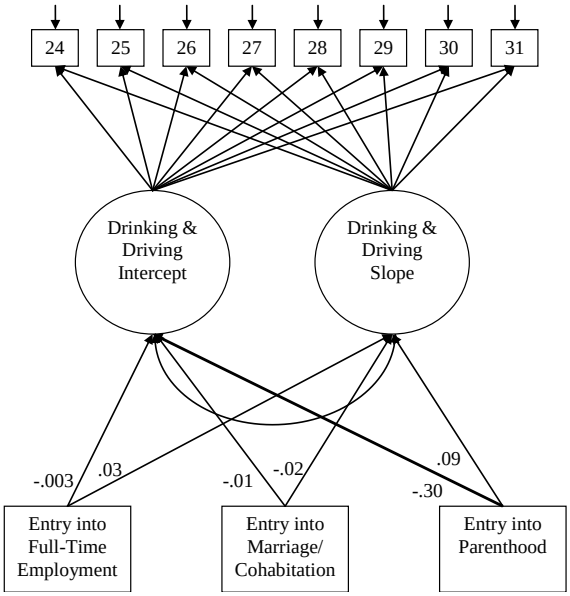
$^{+}$ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$
Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

Figure 33. Associations between the timing of all three adult role transitions and drinking and driving for the participants who never enrolled in college



$^{+}$ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$
Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

Figure 34. Associations between the timing of all three adult role transitions and drinking and driving for the participants who were enrolled in college



$^{+}$ $p < .10$, *$p < .05$, ** $p < .01$, ***$p < .001$
Notes- Path coefficients are standardized. Bold solid lines indicate a significant association.

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