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PARENTING AND COLLEGE STUDENT ALCOHOL USE:

A PERSON CENTERED APPROACH

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Abstract

Alcohol is the most commonly used drug among American adolescents, resulting in approximately 1700 accidental deaths of 18-24 year old college students and 600,000 unintentional student injuries annually. As such, a great deal of research has examined ways to prevent or limit underage alcohol use and associated negative consequences. An emerging body of literature has shown parenting characteristics to be predictive of decreased alcohol use across the transition to college. The present study sought to expand upon this research through the use of a holistic, person-centered approach in order to accomplish three distinct research aims: (1) identify groups of college students with unique profiles of perceived parenting characteristics and compare these profiles on college alcohol use and experienced negative consequences; (2) identify groups of college students with unique profiles of alcohol-related correlates and compare these profiles on college alcohol use and experienced negative consequences; and (3) examine the extent to which profiles of perceived parenting characteristics are associated with profiles of college alcohol-related risk.

A sample of 1,153 first-year university students between 17 and 23 years-of-age were assessed on a host of perceived parenting and personal alcohol-related items. Four profiles of perceived parenting characteristics were found using latent profile analysis (LPA): (1) *High Quality; Average Modeling and Approval*, (2) *Low Approval; Average Modeling and Quality*, (3) *Low Modeling, Approval, and Quality*, and (4) *High Modeling and Approval; Low Quality*. Follow-up analyses revealed that individuals in the *High Modeling and Approval; Low* Quality profile were inclined to experience significantly higher levels of alcohol use and associated negative consequences later in college,

whereas individuals in the *High Quality; Average Modeling and Approval* profile appeared to be associated with the least risky alcohol-related outcomes across profiles. Five profiles of student alcohol-related characteristics were also found using LPA: (1) *Abstainers,* (2) *Past Drinkers*, (3) *Light Drinkers*, (4) *Moderate Drinkers*, and (5) *High Risk Drinkers*. Latent transition analysis illustrated that students who perceived their parents as *High Modeling and Approval; Low Quality* had much higher probabilities of belonging in the *Moderate Drinker* or *High Risk Drinker* profiles than students in all other perceived parenting profiles.

Several findings have important implications relevant for researchers, interested parents, and prevention scientists. For example, results indicated that modeling parenting across the transition to college as a categorical latent variable may be an appropriate alternative to modeling it as a collection of continuous latent characteristics. Parents may benefit from the finding that, in addition to alcohol-specific parenting characteristics, parent-teen relationship quality may also be integral in the prevention of college alcohol misuse. Finally, parents and teens in this study evidenced important complexity in observed patterns of parenting and alcohol behaviors, such that profiles could be interpreted as qualitatively distinct types of individuals. These unique profiles suggest that a targeted approach reflecting the profiles found in the current study might greatly enhance prevention program efficacy.

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Introduction

In the United States, it is almost universally accepted that adolescence is a time of exploration and risk taking (Callas, Flynn, & Worden, 2004; Collins & Steinberg, 2006; Schulenberg, Maggs, Steinman, & Zucker, 2000). During this developmental period, individuals experiment with a relatively high level of risk behaviors including smoking, drinking, illicit drug use, and unprotected sexual activity (Gullone & Moore, 2000; Jackson, Sher, Cooper, & Wood, 2002; Steinberg, 2004). Alcohol, in particular, is the most commonly used drug among American adolescents (Callas et al., 2004). Data from the 2009 Monitoring the Future Study indicated that alcohol use had been tried by 37% of 8th graders, 59% of 10th graders and 72% of 12th graders in the United States and that 17%, 39% and 57% in these 3 grades had been drunk at least once in their lifetime. Further, reports of heavy episodic drinking (measured as having 5 or more drinks in a row) at least once in the prior two-week period was reported by 8% of 8th graders, 18% of 10th graders, and 25% of 12th graders (Johnston, O'Malley, Bachman, & Schulenberg, 2010). As noted in a review by Maggs and Schulenberg (2005), rarely does alcohol consumption occur before early adolescence. Within a few years however, as students transition from high school to college, alcohol use and misuse escalate to lifetime peaks (Dawson, Grant, Stinson, & Chou, 2004; Schulenberg et al., 1996).

For many reasons, the transition from high school to college is an important period during which to examine alcohol use and misuse. First, this period parallels the critical developmental transition between adolescence and young adulthood (Schulenberg et al., 1996). Few other periods in an individual's life are characterized by as many changes and transformations, and it has been argued that at no other point in the life span

are the individual and contextual changes as rapid (Collins & Steinberg, 2006; Schulenberg, Maggs, Steinman, & Zucker, 2000). These new developments can be grouped as including: changes in cognitive development; changes in relationships with parents, peers, and romantic partners; school and work transitions; and changes in self-definition and self-regulation (Collins & Steinberg, 2006; Schulenberg, Maggs, & Hurrelman, 1997). Second, approximately 60% of high school completers in the United States aged 16-24 enroll in some form of higher education by October of the same year (National Center for Education Statistics, 2004). There are 9.2 million college students aged 18 to 24 in the U.S., and compared to their age mates who do not go on to some further level of education or training, this population displays significant increases in alcohol and drug use (Borsari & Carey, 2001; U.S. Census Bureau, 2001). Alcohol is estimated to lead to 1700 accidental deaths of 18-24 year old college students annually, and 600,000 students are unintentionally injured due to alcohol, making this an important population in which to examine alcohol use and misuse (Hingson, Heeren, Winter, & Wechsler, 2005). Third, the emergence of new roles and new social environments during this period increases the opportunity for exploration and experimentation (Bynner, 2005; Arnett, 2000; Schulenberg & Maggs, 2002). The majority of college students attending a 4-year institution move on to campus during their first year (Johnston, O'Malley, Bachman, & Schulenberg, 2005; Schulenberg et al., 1996). Living on one's own forces the adolescent to make daily decisions regarding time use and life style choices without direct adult input (Arnett, 2000; Maggs, 1997; Schulenberg et al., 1996). Finally, as adolescents transition into college and move from their parent's home, new friendship networks are established and the parent-child relationship experiences change (Borsari &

Carey, 2001; Kenny & Sirin, 2006; Larose & Boivin, 1998; Scheier & Botvin, 1997; Steinberg, 2001).

Peers play a considerable role in the development and maintenance of alcohol use in college (Borsari & Carey, 2001; Marshall & Chassin, 2000; Nash, McQueen, & Bray, 2005; Perkins, 2002; Read, Wood, Davidoff, McLacken, & Campbell, 2002; Sher, Wood, & Gotham, 1996). For example, Read and colleagues (2002) found that students who reported heavier drinking peers tended to drink more than students who reported their peers drank less. However, it is important to note that parents continue to maintain important influences on student substance use behaviors (Abar, Abar & Turrisi, 2009; Patock-Peckham & Morgan Lopez, 2006; Turrisi, Wiersma, Hughes, 2000). For example, parental modeling of heavy use and attitudes that underage alcohol use is acceptable have been shown to directly predict student alcohol use (Abar, Abar, & Turrisi, 2009), whereas high levels of parental knowledge of their student's alcohol use indirectly reduces student use through their choice of less alcohol using friends (Abar & Turrisi, 2008). Given the typical college atmosphere, in which peer influences are more proximal, daily adult supervision is rare, and many social opportunities involve alcohol, research further exploring the relationship between parenting characteristics and college student risk may help to better inform prevention efforts aimed toward decreasing student alcohol misuse.

The present study aims to examine the relationship between parenting practices and college student risk during the transition to college. A model was proposed in which profiles of perceived parenting, based on parent-teen relationship and parent alcohol-related characteristics, were associated with profiles of college student risk, based on a host of known and theoretically relevant correlates of college alcohol use. Profiles, in

the current study, were defined as sub-groups of the population characterized by

differential response patterns to a set of theoretically and or empirically related variables.

Although a number of studies have examined parenting and college student risk (Abar,

Abar, & Turrisi, 2009; Abar & Turrisi, 2008; Patock-Peckham & Morgan-Lopez, 2006;

Reifman et al., 1998; Turner, Larimer, & Sarason, 2000; Turrisi et al., 2001; Turrisi,

Wiersma, & Huges, 2000; Wood, Read, Mitchell, & Brand, 2004), there is surprisingly

little research investigating how these constructs vary across sub-groups among the

college population. Further, based on a thorough review of the relevant literature, there

appears to be no research yet performed that has examined the associations that may exist

between particular profiles of perceived parent practices and the profiles of alcohol-

related risk students may display in college. Exploring these relationships represents an

important step toward identifying the most relevant targets of parent-based alcohol

interventions to reduce student use at the college level. Although previous variable-

centered work has provided insight into the impact of specific parenting behaviors on

student alcohol-use, these methods are limited to the examination of main effects and

lower-order interactions. In order to gain a new dimension in understanding of the

relationship between parenting and student alcohol use, an approach is required that takes

a more exploratory and holistic view, modeling how parenting more naturally occurs and

examining the potential impact of specific practices only when in the context of other

practices. To be more specific, this study aimed to provide a better understanding of the

risky and protective behaviors that parents practice and their potential associations with

college student alcohol use by (a) indentifying unobserved combinations of perceived

parenting practices, (b) identifying unobserved combinations of student alcohol-related

behaviors, and (c) examining the relationship between these two sets of combinations.

Prevalence of Alcohol Use and Experienced Consequences in College

Studies conducted over the past two decades reveal the highest proportion of

heavy drinkers and individuals with diagnosable alcohol substance disorders are 18-29

year olds, the ages encompassing over 92% of all enrolled college students (Dawson et

al., 2004; Grant, 1997; Hingson et al., 2005; Johnston et al., 2005; O'Malley & Johnston,

2002; Wechsler et al., 1994). The drinking style of the college population is unique in

comparison to their non-college age mates (Dawson et al., 2004; Jackson, Sher, & Park,

2006). That is, college students drink more per drinking occasion than individuals not in

college and this pattern places this group at high risk for negative outcomes (Jackson,

Sher, & Park, 2006). Among college students in the U.S., 87% report having tried

alcohol and 40% report drinking five or more drinks in a row at least once during the

prior two week period (Johnston, O'Malley, Bachman, & Schulenberg, 2006).

Approximately 30% of college students in the United States currently meet the DSM-IV

criteria for alcohol abuse (briefly defined as alcohol use that causes either physical or

mental damage; APA, 2000) and approximately 6% meet requirements for alcohol

dependence (a chronic disease characterized by a strong craving for and reliance on

alcohol despite adverse consequences) (Knight et al., 2002). Due to the alarming

prevalence rates of college student alcohol consumption, it has been argued that alcohol

poses the greatest risk to the health of university students (Hingson et al., 2002, 2005). In

a study examining alcohol use in college, it was estimated that each year, approximately

2 million students drive after drinking alcohol and more than 3 million ride in motor

vehicles with drivers that have consumed alcohol (Hingson et al., 2002). Several studies over the past 10 years have concluded that the overall prevalence of heavy episodic, or binge, drinking (commonly defined as consuming 5 or more drinks in a row for men and 4 or more drinks in a row for women) among college students has been between 40% and 45% (Centers for Disease Control, 1997; Johnston, O'Malley, & Bachman, 2001,2009; Johnston et al., 2005; Wechsler et al., 2002; Wechsler & Nelson, 2001).

Heavy drinking in college has long been recognized as a contributing factor to many other problems among college students including academic impairment; psychological problems; high-risk sexual behaviors; verbal, physical, and sexual violence; personal injuries or death; property damage; and legal costs (DEPR, 2006; Hawkins, Catalano, & Miller, 1992; Hingson et al., 2005; Larimer, Irvine, Kilmer, & Marlatt, 1997; Read et al., 2002; Sher, Bartholow, & Nanda, 2001; Wechsler, Lee, Kuo, & Lee, 2000; Wechsler et al., 2002). Experienced alcohol-related consequences may range from immediate events, such as drunk driving fatalities, personal injury, or academic probation (DEPR, 2006; US Department of Transportation, 2002), to more long-term problems, such as damage incurred to the liver and endocrine system or alterations in the developing brain (NIAAA, 2006; Spear, 2000). Among American college students, severe and immediate consequences resulting from alcohol use have a high prevalence, including damage to self, others, and institutions (Perkins, 2002). Hingson and colleagues (2005) reported that over 500,000 students in the United States are unintentionally injured each year as a result of their own drinking and over 600,000 are hit or assaulted by other drinking students. In order to inform prevention efforts to reduce alcohol use and associated harm to underage drinkers on college campuses, the

current study predicted student alcohol use and related negative consequences in college using parenting profiles and profiles of student alcohol-related characteristics in high school.

Correlates of College Student Alcohol Use

An understanding of the individual and contextual correlates of college drinking behavior is central to the eventual construction of campus interventions designed to reduce the onset and extent of alcohol use and its associated negative consequences (Carey, 1993; Dishion, Capaldi, &Yoerger, 1999; Hawkins, Catalano, & Miller, 1992; Schulenberg & Maggs, 2002). Substance use among adolescents has long been attributed to an interaction between multiple influences (e.g., Jessor & Jessor, 1977; Newcomb, Chou, Bentler, & Huba, 1988). As such, a wealth of research has examined the correlates of and influences on individual alcohol misuse and related behaviors among college populations (Borsari, Murphy, & Barnett, 2007; Nagoshi, 1999; Wechsler, Dowdall, Davenport, & Castillo, 1995). These correlates of and influences on college student alcohol use include: Age of alcohol use initiation, past alcohol use and experienced consequences, engagement in high-risk alcohol using behaviors, attitudes, beliefs, and cognitions about alcohol use, and normative perceptions of friend alcohol use.

Age of alcohol use initiation. The age of onset of alcohol use, or alcohol use initiation, has been found to predict later use and experienced negative drinking consequences later in life (Chassin, Pitts, & Prost, 2002). Specifically, several studies have found *early* age of onset or initiation to be associated with high-risk drinking and related problems during adolescence, the college years, and beyond (e.g., Chassin et al., 2002; Dawson et al., 2008; Grant & Dawson, 1997; Grant, Stinson & Harford, 2001;

Hingson, Heeren, Jamanka & Howland, 2000; Hingson, Heeren & Winter, 2006; Warner & White, 2003). For example, several studies have concluded that for each year under the age of 21 that an individual initiates alcohol use, the likelihood of experiencing DSM-IV alcohol use disorders increases (Chassin et al., 2002; Dawson et al., 2008; Grant et al., 2001; Hingson et al., 2006). Research also indicates that, even after controlling for family history of alcoholism, personal history of alcohol dependence, frequency of heavy drinking, years of drinking, smoking, and drug use, the earlier one initiates alcohol use, the more likely they are to have been in a physical fight or been injured while drinking alcohol (Hingson et al., 2000; 2001). Further, Hingson and colleagues (2003) found that those individuals who not only initiated alcohol use, but experienced intoxication prior to age 19, were found to be significantly more likely to be alcohol dependent, frequent heavy drinkers, drive after drinking, drive after becoming drunk, ride with a drunk driver, and sustain injuries that required medical attention than those individuals that did not experience their first alcohol intoxication prior to age 19. This study concluded that the younger people are when they first become intoxicated, the greater their likelihood of experiencing negative consequences as a result.

Past alcohol use and experienced negative consequences. A wealth of research has firmly established that alcohol use in high school is predictive of later use in college (Borsari, Murphy, & Barnett, 2007; Larimer, Anderson, Baer, & Marlatt, 2000; Read et al., 2002; Reifman & Watson, 2003; Wechsler et al., 1995; White et al., 2006). Many students enter college with pre-existing patterns of alcohol use which tend to be maintained or increased once in college (Reifman & Watson, 2003; Wood et al., 2004). High levels of alcoholic consumption in high school are predictive of high levels of

alcoholic consumption and experienced negative consequences in college (Larimer et al., 2000; Reifman & Watson, 2003; Wechsler et al., 1995). Perkins (2002) organizes negative consequences of college alcohol use into three primary categories: damage to self (e.g., academic problems, unwanted sexual experiences, physical injury, etc.), damage to other people (e.g., property damage, interpersonal violence/fights, sexual violence, etc), and institutional costs (e.g., financial burden, vandalism, public resource appropriation, etc.). The present study examined consequences that are representative of the first two categories of consequences mentioned above, as measured by the Young Adult Alcohol Problems Screening Test (Hurlbut & Sher, 1992).

In regard to experienced consequences, little work has been done examining their direct impact. To be specific, little research has examined whether previous experienced negative consequences associated with alcohol use (e.g., time $t - 1$) are predictive of future drinking (e.g., time t). However, there are several studies that highlight the potential influence of experienced consequences on future alcohol use among college populations (Barnett et al., 2003; 2006; Patrick & Maggs, 2008; Reis, Harned, & Riley, 2004). For example, Barnett and colleagues (2006) found that of those college students who recently experienced an alcohol-related negative consequence, perceived aversiveness of the consequence predicted motivation to reduce their drinking. In addition, Patrick and Maggs (2008) found that students who experience perceived positive consequences of drinking planned to drink more in the future. The current study examined the extent to which past use and experienced negative consequences, when in the context of other alcohol-related characteristics, are predictive of future alcohol use.

Risky alcohol-related practices. In a study conducted by Wechsler and colleagues in 1995, endorsing a "party-centered" lifestyle was found to be associated with heavy alcohol use and experienced consequences. Since then, several studies have established a positive association between the endorsement of high-risk drinking behaviors, such as participation in drinking games, "pre-gaming" or drinking prior to going out, and drinking to get drunk, and alcohol use and experienced alcohol-related problems among college students (Adams & Nagoshi, 1999; Borsari, 2004; Borsari et al., 2007; Johnson, Wendel, & Hamilton, 1998; Wells, Graham, & Purcell, 2009). In a meta-analysis of drinking motives among adolescent and young adults, Kuntsche and colleagues (2005) found that as an enhancement motive, measures that included an item about drinking to get drunk or high were strong predictors of the average number of drinks consumed by an individual per occasion, the frequency of binge episodes, and the frequency of drinking days compared to those measures of enhancement motives that did not account for drinking to get drunk or high from alcohol. The endorsement of drinking games and pre-gaming has also been linked to student alcohol related behaviors (Adams & Nagoshi, 1999; Borsari et al., 2007; Wells et al., 2009). Throughout the course of a semester, changes in the frequency of an individual's participation in drinking games was found to be predictive of changes in an individual's alcohol consumption (Adams & Nagoshi, 1999). Similarly, pre-gaming or pre-drinking behavior has been linked with greater risk of alcohol-related negative consequences as well as higher estimated blood alcohol content on pre-gaming nights (Borsari et al., 2007; Hughes, Anderson, Morleo, & Bellis, 2007).

Attitudes, beliefs, and self-regulation regarding alcohol use. Cognitive-affective theories of adolescent substance use focus on the contribution of an adolescents' perceived cost/benefit analysis of substance use on individual decisions to engage in substance use and related behaviors (Ajzen, 1985, 1988; Ajzen & Fishbein, 1980). These theories posit that substance-specific evaluations, based on expectations and perceptions, are the primary cause of adolescent engagement in substance use, and that the effects of all other variables (e.g., peer or parent influence, intrapersonal characteristics, environmental characteristics) function through these substance-specific cognitions. The theory of planned behavior (Ajzen, 1985, 1988) is perhaps the most prominent example of cognitive-affective theories of adolescent substance use.

In the theory of planned behavior, intentions are assumed to be the most proximal predictors of behavior (Ajzen, 1985, 1988, 1991, 2002; Ajzen & Fishbein, 1980). This theory asserts that intentions represent one's motivation to engage in a particular behavior. According to the theory of planned behavior, the stronger an adolescents' intention to engage in a particular behavior, the more likely that adolescent is to actually do it (Ajzen, 1985, 1988, 1991, 2002; Ajzen & Fishbein, 1980). Further, the theory of planned behavior hypothesizes that a complex cost/benefit analysis of attitudes and beliefs is what shapes one's intentions, and ultimately, their substance using behavior (Ajzen, 1985, 1988, 1991, 2002; Ajzen & Fishbein, 1980).

The theory of planned behavior posits that college student intentions to use alcohol are influenced by three types of salient beliefs: (1), *behavioral beliefs*, which represent attitudes and beliefs about the probable consequences or other attributes of the particular behavior, (2), *normative beliefs*, which represent an individual's beliefs about

the normative social expectations of close friends concerning the behavior, and (3),

control beliefs, which represent beliefs about the existing environmental and

interpersonal factors that influence one's ability to perform or engage in the behavior

(e.g., availability; Ajzen, 1985, 1988, 1991, 2002). Based on this theoretical framework,

behavioral and normative beliefs about alcohol were included as indicators of college

student profiles.

Empirically, work by Turrisi and colleagues (1999, 2001), has demonstrated an

association between attitudes and beliefs about substance use and actual substance use

behavior. In a correlational study of 250 college students, Turrisi (1999) found that

positive attitudes and beliefs about binge drinking (i.e., 5 or more drinks in one sitting)

were correlated with actual frequency of binge drinking. Building upon this work,

Turrisi and colleagues (2001) created a randomized-trial design providing evidence that a

parent-based intervention targeting parent communications about alcohol to their teens

can be successful at changing student substance specific attitudes and beliefs, and as a

result, influence drinking behavior. Based on semi-structured interactions with parents,

results indicated that adolescents in the treatment condition displayed less positive

attitudes about drinking and drunkenness activities and less drinking (Turrisi et al., 2001).

Alcohol self-regulation was also associated with consequences of drinking in college,

such that the more likely students were to think about their own alcohol use, the less

likely they were to experience alcohol-related negative consequences (Wood et al., 2007).

Normative perceptions of friend alcohol use. The normative beliefs tenet of the

theory of planned behavior (Ajzen, 1985, 1988, 1991, 2002) was represented by students'

normative perceptions of the alcohol use of their closest friends. The inclusion of these

perceptions as indicators of the college student profiles was also guided by social learning theory (SLT) (Bandura, 1977, 1982), which states that adolescents obtain their substance-specific attitudes and beliefs from influential role models such as their parents and peers (Bandura, 1977, 1982).

SLT proposes a four stage process by which role models impact college student drinking. First, students form alcohol-related attitudes and beliefs through observation of role models, such as close friends, socially popular peers, parents, and other influential adults. Second, students then imitate the behaviors that were observed. Third, the imitation of these behaviors is socially reinforced. Finally, as a result of this reinforcement, students develop positive expectations for drinking (Akers et al., 1979; Bandura, 1977; Ennett & Bauman, 1994; Read, Wood, & Capone, 2005). Based on SLT, Scheier and Botvin (1997) suggested that one salient reason students drink is the desire for approval and acceptance by their immediate social peers, given that peers are noted as influential during the high school and college period (Bagozzi & Lee, 2002; Borsari & Carey, 2001; Wood et al., 2001).

There are two distinct categories of social norms that have been identified in the literature which refer to two different types of perceptions (Cialdini, Kallegren, & Reno 1991; Borsari & Carey, 2003; Neighbors, Larimer, & Lewis, 2004). The first type, injunctive norms, refers to one's perceptions of the extent to which others approve or disapprove of a particular behavior (e.g., "How would your closest friends respond if they knew you drank daily?"). Individuals are more likely to engage in a behavior that they perceive is approved of by others (Bourgeois & Bowen, 2001; Caldini et al., 1991; Schroeder & Prentice, 1998). For example, Epstein and colleagues (1995) found that the

perception of friends' positive attitudes toward drinking alcohol was associated with current drinking, drunkenness, and intentions to drink beer or wine in the future. The second type of social norms is descriptive norms. Descriptive norms refer to perceptions of what others actually do (e.g., how much one's closest friends drink). Perceptions of peer drinking have been consistently linked with alcohol use and experienced drinking consequences in college, such that the more individuals' friends drink, the more likely they are to drink, and thereby experience negative consequences (Chassin et al., 2002; Hussong, 2003; Kahler et al., 2003; Read et al., 2002). For example, Wood and colleagues (2001) found that social factors predicted cognitions and alcohol related behaviors such that measures of social influence including modeling and perceived norms were strongly associated with alcohol use and alcohol-related negative consequences.

Parental Influence on College Student Alcohol Use

The importance of the family network in adolescent and college student substance use has been clearly demonstrated (Hawkins et al., 1992; Jaccard & Turrisi, 1999; Read et al., 2005; Reifman et al, 1998; Turner et al., 2000; Wood et al., 2001). Considerable research suggests that parents are quite active in the plans students make as they prepare for school and that they maintain influence across a variety of domains, such as academic, social, emotional, and health after students have moved away to campus (American College Health Association, 2003; Amerikaner et al., 1994; Galotti & Mark, 1994; Kashubeck & Christensen, 1995). For instance, findings from the American College Health Association NCHA (2003) revealed that parents are the primary source of health information for college students. Over the past decade, research on parental influence and college student alcohol use has illustrated a host of mechanisms by which

parents may impact the underage alcohol use and related negative consequences of their

students. For example, various parenting practices, such as being responsive and setting

limits for student behavior, frequent communication, knowing about and monitoring

student behavior, permitting no underage alcohol use, and being involved in the life of

one's student, have been linked with lower levels of student drinking and with the choice

of lower drinking friends in college (Abar, Abar, & Turrisi, 2009; Abar & Turrisi, 2008;

Galambos, Barker, & Almeida, 2003; Patock-Peckham & Morgan-Lopez, 2006; Turrisi et

al., 2000; Wood , Read, Mitchell, & Brand, 2004). Taken together, these studies

underscore the importance of parents in the lives of their children even when they have

reached young adulthood and/or moved away from home. These findings demonstrate

that parental influence continues to be relevant to and salient in decisions made regarding

alcohol use as students enter college. Parenting characteristics that have been found to be

associated with college student alcohol use include: Alcohol use modeling, approval of

underage alcohol use, communication, monitoring and knowledge, parental trust, support,

and access, and parent-teen conflict. These characteristics will be discussed in more

detail below.

Alcohol modeling. Consistent with social learning theory (Bandura, 1977, 1982),

research has indicated that parents serve as influential role models who students may

observe and imitate. As such, parental modeling of alcohol use has long been identified

as a strong predictor of college student alcohol use (Beal, Ausiello, & Perrin, 2001;

Hawkins, Catalano, & Miller, 1992; Hops, Duncan, Duncan, & Stoolmiller, 1996; Jessor

& Jessor, 1977; White, Johnson, & Buyske, 2000). Recently, Abar and colleagues (2009)

found that parental modeling of alcohol use was a risk factor for college use, such that

students who witnessed heavier drinking parents during the past year tended to drink and binge drink more frequently than students who witnessed their parents drinking more moderately or abstaining completely. In addition, maternal and paternal alcohol use has been linked with student experienced negative consequences related to alcohol use, such that the more a student reported witnessing their mothers or fathers current drinking frequency, the greater the amount of negative consequences students experienced in college (Boyle & Boekeloo, 2006). Further, parental alcohol abuse, defined as three or more alcohol-related problems annually or three or more drinks daily (Barnes, Reifman, Farrell, & Dintcheff, 2000), has been identified as a key factor in the development of student alcohol abuse (Barnes et al., 2000; Biderman, Faraone, Monuleaux, & Feighner, 2000; Hawkins, Catalano, & Miller, 1992; White, Johnson, & Buyske, 2000). Barnes and colleagues (2000) found parental alcohol abuse to negatively impact parenting in regard to parental support and monitoring, both characteristics that have been found to be negatively associated with college student alcohol use and abuse (Abar & Turrisi, 2008; Kim, Hetherington, & Reiss, 1999; Wood et al., 2004). While these studies demonstrate a relationship between parent and student alcohol use, there is relatively little known about the ways in which this relationship might be affected by the presence of more protective parenting behaviors like disapproval of underage use and monitoring. The current study seeks to examine the types of parents that exist who engage in various levels of alcohol use in addition to various levels of other parenting behaviors.

Approval of underage alcohol use. Parents endorse different beliefs about the appropriateness of alcohol use by adolescents and young adults. For example, some parents believe that underage use is completely inappropriate while others believe

underage use is fine in controlled situations or at particular ages (Abar, Abar, & Turrisi, 2009). Research examining the role of parent approval or permissiveness of alcohol use suggest that parental approval of underage alcohol use is positively related to college student use and related consequences (Abar, Abar, & Turrisi, 2009; Bogenschneider, Wu, Raffaelli, & Tsay, 1998; Boyle & Boekeloo, 2006; Nash, McQueen, & Bray, 2005; Wood et al., 2004). For example, parental approval of alcohol use was found to be positively associated with alcohol consumption, negative consequences of alcohol use, and the alcohol use of one's closest friends (Nash, McQueen, & Bray, 2005). Findings from Abar and colleagues (2009) echoed these results such that students whose parents expressed complete disapproval of underage alcohol tended to experience the lowest levels of college student weekend drinking, number of drinks consumed on a given occasion, frequency of drunkenness, and experienced negative consequences when compared to their peers with more accepting parents. In addition, Wood and colleagues (2004) found that parental permissibility of alcohol use significantly moderated the effect of heavy using peers on college student alcohol use. This study found that the impact that peers have on individual alcohol use and experienced consequences was lower among adolescents whose parents set more clear and strict limits on underage alcohol use. While these effects of parental approval of underage use have been established univariately or in lower-order interactions, research has yet to illustrate the potential impact of parental approval when in the context of multiple other parenting practices among which higher-order interactions might be present.

Parent-teen communication. Parent-based, randomized trials aimed at decreasing the onset and extent of college drinking have shown that high frequency, high quality

communication between parents and their children is predictive of lower levels of alcohol misuse in college (Ichiyama et al., 2009; Turrisi, Jaccard, Taki, Dunnam, & Grimes, 2001). Communication between mothers and their students about alcohol may help shape the drinking beliefs students hold, which in turn, is predictive of the negative consequences students experience as the result of alcohol use (Turrisi, Wiersma, & Hughes, 2000). Moreover, research by Amerikaner and colleagues (1994) found that college students who reported better communication with their parents had more positive psychological health and were more satisfied with their families than those students who reported poor communication.

   Monitoring and knowledge. Parental monitoring refers to the efforts that parents make to know about the unstructured free-time usage of their child (Dishion & McMahon, 1998). Parental knowledge, on the other hand, refers to the extent to which parents are actually aware of how their child uses his/her free time (Kerr & Stattin, 2000). Each of these constructs is uniquely predictive of college student alcohol use (Abar & Turrisi, 2008; Guo, Hawkins, Hill, & Abbott, 2001; Padilla-Walker, Nelson, Madson, & Barry, 2008; Thomas, Reifman, Barnes, & Farrell, 2000; Wood et al., 2004). For example, Wood and colleagues (2004) discovered that even after accounting for the influence of peers and other parenting characteristics, parental monitoring was negatively associated with heavy episodic drinking and alcohol-related consequences among college students. In a study examining the impact of perceived parental knowledge, Padilla-Walker and colleagues (2008) found that the more students reported their parents knew about their substance using behavior, the less they tended to engage in substance use. Finally, after accounting for previous friend and individual alcohol use, parental

monitoring and knowledge were found to be predictive on college student alcohol use
(Abar & Turrisi, 2008). Parental monitoring was found to directly predict alcohol use in
college, whereas the effect of parental knowledge on college alcohol use was found to be
indirect through the selection of alcohol using peers (Abar & Turrisi, 2008).

Parental trust, support, and access. Several studies have found that quality
family relationships, involving trust, support, and access or responsiveness from parents,
have a positive and protective effect on adolescents and young adults (Barnes et al., 2000;
Kashubeck and Christensen, 1995; Langhinrichsen-Rohling et al., 1997; Simantov et al.,
2000). Langhinrichsen-Rohling and colleagues (1997) observed that adolescents who felt
more of a sense of cohesion with their families had easier transitions in life, such as going
to college and developing new relationships. In addition, students who report a
'connectedness' to their parents are least likely to engage in risky behaviors (Simantov et
al., 2000). In a study examining parenting characteristics, Kashubeck and Christensen
(1995) found that students who experienced a good family relationship (e.g., trust,
support, and responsiveness) reported lower instances of depression and alcohol use and
higher self-esteem than those who were not as satisfied with their family relationships
when making the transition to college. A wealth of research has found a strong
relationship between parenting qualities such as parental support, responsiveness, and
trust, and adolescent/young adult outcomes, such that more support, responsiveness and
trust was associated with fewer problem behaviors (Barnes et al., 2000; Bogenschneider
et al., 1998; Bray, Adams, Getz, & Baer, 2001; Kashubeck and Christensen, 1995).

Parent-teen conflict. A wealth of research has shown that conflict exhibited
between parents and teens is predictive of alcohol use and related behaviors (Cremeens,

Usdan, Brock-Martin, Martin, & Watkins, 2008; Duncan, Duncan, Biglan, & Ary, 1998;

Ennett, Bauman, Foshee, Pemberton, & Hicks, 2001; Turner, Larimer, & Sarason, 2000).

High levels of parent-teen conflict have been shown to be predictive of greater substance

use and association with substance using peers than families with low levels of conflict in

a non-experimental, three-wave longitudinal study (Duncan et al., 1998). Similarly,

Turner and colleagues (2000) found that parent-child conflict at entrance to college

predicted heavier alcohol consumption and negative consequences one year later for

fraternity and sorority members.

As the previously mentioned research has illustrated, parents remain important

influences on their student's alcohol use and experienced consequences as they transition

to college through a multitude of parenting practices. Past etiological research in this

area has examined the main effects and/or lower-order interactions (e.g., 2-way

interactions) of these potentially influential characteristics (e.g., parental alcohol use,

approval of alcohol use, communication, monitoring, knowledge, parental trust, support,

access, and conflict). The current study sought to add to this literature through the

exploration and development of higher-order profiles of parenting constructs which will

serve to more accurately inform parent-based prevention efforts. Specifically, this study

sought to identify profiles of parenting behaviors that, when used in combination, are

more protective against college alcohol use and related risk.

Person-Centered Approaches to Alcohol Use

Person-centered approaches, such as latent profile analysis (LPA) or continuous

latent class analysis, seek to illustrate unobserved heterogeneity in the response patterns

of sub-groups of the target population on a set of theoretically and/or empirically

associated variables. These methods allow researchers to examine a relatively large number of indicators simultaneously given relatively small sample sizes (McLachlan & Peel, 2000). The majority of research in the behavioral sciences to date could be categorized as variable-centered (Muthén & Muthén, 2000), meaning that the research focuses on the associations between a set of variables. A person-centered approach differs, in that the focus of the research is instead on illustrating types of individuals by describing unobserved, or latent, sub-groups of the population that differ on the indicator variables used. Indicator variables, in LPA, are analogous to the manifest variables that are predicted by latent factors in factor analysis/SEM, in that they are the manifest variables by which latent profiles/classes are determined. Indicators are selected based on theory and/or previous empirical work that suggests potential multivariate relationships and the presence of a categorical latent structure (e.g., latent profiles) that might provide insight into a phenomenon that might not be observed in more traditional, variable-centered analyses (e.g., multiple regression, MANOVA, SEM). Person-centered methods (e.g., LPA), tend to provide a more holistic depiction of the individuals being examined (Meehl, 1992). In addition, these methods examine constructs in a way that expands upon univariate methods by allowing researchers to illustrate and easily interpret potential non-linearities, or higher order (3+) interactions, among indicators. For example, it is sometimes the case that the latent classes that one observes in a given study are considered to be ordered, or characterized by low, average, and high conditional means across all of the indicators used. A solution like this can be viewed, from a variable-centered framework, as representing a single underlying factor (Nylund, Bellmore, Nishina, & Graham, 2007). This structure would imply that interactions

between indicators are of little significance. However, it is more often the case that the resulting class structure illustrates classes with high conditional means on certain indicators and low conditional means on others. These sorts of patterns can indicate substantial multidimensionality and potential higher order interactions. Consider the following situation theoretically: Parental support, monitoring, and knowledge are each (when examined separately or in lower-order interactions) associated with less heavy drinking and fewer negative consequences for students in college (Marshall & Chassin, 2000; Turrisi et al., 2000; Wood et al., 2004). However, parents are likely to be communicating many more values and performing many more behaviors than just these three when parenting their child. Traditional analyses would not be able to efficiently examine the potential higher-order interactions that can arise with the inclusion of additional parenting behaviors, such as their own alcohol use, disapproval of underage alcohol use and communications about alcohol in the efficient manner that LPA would. With these advanced analyses and the inclusion of additional parenting characteristics, we may observe a substantially different depiction of parenting and college student characteristics than previously believed. The current study may show that, when examined simultaneously, a group of parents may be trustworthy and accessible, highly knowledgeable of their student's free time usage, and strongly disapproving of underage alcohol use, while also modeling relatively high levels of alcohol use. Findings may reveal that although this group practices four behaviors shown in the literature to decrease student alcohol use and risk, the inclusion of the last behavior, parental modeling of alcohol use, associates this group with more risk than parent groups that did not model heavy alcohol use.

Person-centered approaches have been used successfully with a variety of alcohol related variables (Auerbach & Collins, 2006; Chung & Martin, 2001; Coffman et al., 2007; Lanza, Collins, Lemmon, & Schafer, 2007; Moss, Chen, & Yi, 2007). Latent class models have illustrated unique configurations of DSM-IV alcohol related diagnoses in adolescents (Chung & Martin, 2001) and adults (Moss et al., 2007), motivations for alcohol use among 12th grade students (Coffman et al., 2007), alcohol use in high school (Lanza et al., 2007), and a variety of alcohol use behaviors during the transition to adulthood (Auerbach & Collins, 2006). For example, Coffman and colleagues (2007) found that the self-reported motivations of 12th grade alcohol users could be characterized as consisting of four distinct, unobserved types: students motivated to drink for relaxation; students motivated to drink for thrill seeking reasons; students motivated to drink for relaxation, thrill seeking, problem avoidance, and anger reasons; and students motivated to drink for experimentation reasons. Since several of these studies focused on similar populations to the current sample and identified non-linear latent groupings, similar unordered, non-linear profiles were expected to emerge in the current study. In terms of student characteristics, non-linear profiles were expected due to the natural variability that exists within the population of college students. For example, while early initiation of alcohol use is associated with more frequent binge drinking, other individuals begin drinking early but never engage in binge drinking. Another plausible example might be individuals whose peers drink heavily and whose friends are supportive of alcohol use who do not personally exhibit high levels of weekend and binge drinking. In other words, it is possible to exhibit certain individual risk behaviors while also exhibiting other individual protective behaviors. An understanding of the most

commonly occurring and most risky constellations of student behaviors in the college population is important for researchers and college administrators designing and adapting alcohol related prevention programs. In terms of parenting characteristics, an ordered pattern of profiles (characterized by consistently low, medium, and high conditional means) was also unlikely due to the breadth of parent indicators used in the current study. It is relatively unrealistic to assume that items describing parental alcohol use, approval of underage alcohol use, monitoring and knowledge, and relationship quality with their children will follow a one-factor model. While one profile of parents might emerge with all positive or negative characteristics, it is also likely that several other profiles would emerge with heterogeneous constellations of both positive and negative characteristics. It is important for prevention scientists to understand the relative frequency with which constellations of parenting characteristics are seen so they are aware which types of parents exist within the population and the specific strengths and deficits of these sub-groups. The current study might also assist prevention scientists in targeting at-risk families whose profiles are most risky for college student alcohol related problems. Finally, it is important to explore how these profiles (college student and parent) are associated, as it is currently unknown the extent to which the type of parent one perceives having is predictive of the type of alcohol-related risk behavior one exhibits in college. It is currently unknown whether a uniformly protective profile of parenting practices is required to promote safe student alcohol use, or whether or not specific protective parenting practices, even when in the context of more risky parenting behaviors, can be sufficient for student safety.

Implications for Intervention

The current study sought to enhance current alcohol-focused intervention efforts at the college level by better informing prevention research about potential profiles of college student and perceived parenting characteristics that may be particularly risky or particularly protective in terms of college student alcohol use and experienced negative drinking consequences. Understanding the extent to which known predictors of student alcohol misuse (e.g., parent-teen conflict) remain relevant *when in the context of known protective practices against misuse* (e.g., parental monitoring and knowledge) may help prevention scientists target particularly influential combinations of characteristics found within a given population, which may be useful for either promotion or supplemental intervention efforts. This feature of the current study was key, as it allowed for the examination of practices as they exist within sub-groups of the population (e.g., low parent-teen conflict coupled with high parental monitoring and high parental knowledge), as opposed to traditional, variable-centered analyses that isolate the effect of a specific practice (e.g., the impact of parent-teen conflict when holding parental monitoring and knowledge constant). Parent-based interventions will be able to use this information to a) identify families that are most in need of boosters or supplements (e.g., riskiest profiles) of an intervention, and b) help parents enhance particular characteristics that, in combination, will be the most effective at reducing college student alcohol use and related risk. Finally, the current study sought to explore the nature of the relationship between perceived parenting and college student characteristics (i.e., whether perceived parenting and student profiles are associated and, if so, how). The current research seeks

to advance prevention efforts using parents as vessels of influence by identifying sub-

groups of students more in need of parent-based intervention for alcohol misuse in

college.

The Current Study

The current study sought to accomplish three distinct research aims:

(1) *Identify groups of college students with unique profiles of perceived parenting*

characteristics and compare these profiles on college alcohol use and

experienced negative consequences.

(2) *Identify groups of college students with unique profiles of alcohol-related*

correlates and compare these profiles on college alcohol use and experienced

negative consequences.

(3) *Examine the extent to which profiles of perceived parenting characteristics*

are associated with profiles of college alcohol-related risk.

LPA was utilized for the achievement of each aim. A conceptual model of the current

study is presented in Figure 1.

Aim 1. A set of ten indicators of student perceptions of parenting characteristics

were examined in Phase 1 of the analysis using LPA. The selection of the measures used

was guided by tenets of social learning theory (Bandura 1977, 1982), as well as previous

empirical research. Social learning theory posits that students come to form their

substance-specific attitudes, beliefs, and subsequent behaviors through the observation or

perception of relevant role models. As such, the modeled alcohol-related behaviors of

both mothers and fathers were included in the model, as was general parental approval of

underage alcohol use. In addition, a set of parenting and parent-teen relationship

characteristics were included as indicators. As argued/summarized above, these

characteristics (i.e., monitoring, knowledge, trust and support, parental access, and

conflict) have been shown to be uniquely predictive of student alcohol use (Barnes et al.,

2000; Kashubeck & Christensen, 1995; Langhinrichsen-Rohling et al., 1997; Simantov et

al., 2000; Turrisi et al., 2001; Wood et al., 2004).

LPA (Pastor, Barron, Miller, & Davis, 2007; Wade, Crosby, & Martin, 2006) is

an appropriate exploratory method to accomplish Aim 1, given the interest in identifying

sub-groups of parents underlying a relatively large number of parenting constructs and on

examining the differential risk of these subgroups with respect to alcohol use and

consequences. In Phase 1 of the analyses, profiles were constructed from variables

collected during assessments taken the summer prior to college entrance. In order to

better understand the makeup of the resulting profiles, Phase 1 consisted of an

examination of profile differences in gender, ethnicity, and perceived socioeconomic

status using covariates. The association between profile membership and later college

student drinking and negative consequences was then examined in Phase 1 of the

analyses among a subset of the sample for whom 251 longitudinal cases were available.

It was hypothesized that parenting profiles characterized by heavy alcohol use modeling,

low levels of monitoring and knowledge, and relatively poor relationship quality would

be associated with the highest levels of student alcohol use and experienced negative

consequences in college across profiles.

Aim 2. A set of 10 correlates of college student alcohol use assessed/measured

the summer prior to college entrance was examined using LPA in Phase 2 of the analyses.

The selection of these items was guided by tenets of both social learning theory (Bandura

1977, 1982) and the theory of planned behavior (Ajzen, 1991, 2002), as well as previous

empirical research. The influence of salient models of behavior, synonymous with social

learning theory, was represented in the current study through the use of descriptive and

injunctive norms of one's closest friends. The distal predictors of substance use posited

by the theory of planned behavior are represented by the descriptive norms of one's

closest friends, as well as favorable and non-favorable attitudes and beliefs about alcohol

use. Previous weekend drinking, heavy episodic drinking, and risky alcohol-related

practices and consequences, as well as alcohol self-regulation, were also included as

indicators, as a wealth of research has shown prior alcohol use to be predictive of current

use (e.g., Larose & Boivin, 1998; Read, Wood, & Capone, 2005; Reifman & Watson,

2003) . As was the case for perceived parenting profiles, LPA was an appropriate method

to accomplish this aim considering the relatively large number of alcohol-related

constructs being examined. The analysis proceeded in the same three steps: latent

profiles were constructed from correlates of college student alcohol use, gender,

ethnicity, and perceived socioeconomic status were included as covariates to explore

differences between profiles, and among the control subsample, the association between

profile membership and later college student drinking and negative consequences was

examined. It was hypothesized that individuals in profiles characterized by heavy high

school alcohol use and favorable attitudes/beliefs about alcohol would tend to have the

highest levels of college alcohol use and experienced negative consequences across

profiles.

Aim 3. In Phase 3 of the plan of analysis, the resulting profile solutions from aims

1 and 2 were examined simultaneously. The model predicted the probability of

membership in student alcohol-related profiles based on membership in perceived parenting profiles. It was expected that individuals in the riskiest perceived parenting profiles, as indicated by the pattern of alcohol-related behaviors observed (e.g., potential profile of heavy drinking, low monitoring parents with poor relationships with teens) would have a higher likelihood of being classified as belonging to a student alcohol-related profile characterized by the highest risk, as indicated by the pattern of alcohol-related behaviors observed (e.g., potential profile of students with positive attitudes and beliefs about alcohol, heavy alcohol use in high school, and previous experience with the negative consequences of alcohol use).

Method

Participants

Participants for this study consisted of 1153 students from the baseline assessment of Project ACT, an intervention aimed to reduce the onset and extent of college alcohol use and associated negative consequences. Participants for the larger intervention were randomly selected incoming freshmen (N =1750) at a relatively large, public northeastern university during the early summer prior to college entrance in 2007 and 2008 (for further information about the larger intervention, see Turrisi et al, 2001). Invitation letters explaining the study, procedures, and compensation and containing a URL and Personal Identification Number (PIN) for accessing the survey were mailed to all 1750 potential participants. An emailed invitation to students' university email addresses, as well as email and post card reminders were also sent. Participants were informed that they would receive: $25 for the baseline survey, $20 each for two additional brief surveys (Fall and Spring of the 1st year), and $30 each for two larger follow-up surveys (Winter of the 1st year and Fall of the 2nd year). Participants received a $5 bonus per survey for completion within 48 hours. The follow-up assessments were conducted at approximately 3, 5, 8, and 15 months post baseline. Of the 1750 participants contacted, 1153 consented to participate in the study and completed the web-based baseline assessment yielding a 66% overall response rate, consistent with other studies using a web-based approach (Larimer et al., 2007; McCabe et al., 2002; McCabe et al., 2005; Thombs, et al., 2005).

Participants for the current study: (a) were enrolled at the university as first-time incoming first-year students between the ages of 17 and 23 years-of-age, (b) provided consent to participate in the larger, intervention study, and (c) completed a baseline

assessment during the summer prior to college matriculation. Of the 1153 study participants, the demographic characteristics were as follows: 52% female, and 88% White, Non-Hispanic, 5% Asian, 2% African American, 2% Hispanic, and 3% multi-racial or other. The mean age for the sample was 17.9 years (SD = .39), 84% were 18 years old (range = 17 – 20), and 94% perceived their family to be of average or above average socio-economic status relative to their peers. In addition, 22% of the sample intended to join a fraternity or sorority and 80% intended to participate in some level of athletics (i.e., intramural, club, varsity) when they arrived on campus.

In order to examine the potential effects of latent profile membership over time, the control group ($n = 251$) was also examined at a 5-month follow-up assessment. This subset represents an 89% retention rate within the control condition. Only the control group was examined in the current study at follow-up due to the fact that the variables of interest at the 5 month follow-up (e.g., alcohol use and negative consequences) included those behaviors targeted by the intervention. At the time of the 5-month follow-up, the demographic characteristics of this subset were as follows: 48% female, and 88% White, Non-Hispanic, 4% Asian, 2% African American, 3% Hispanic, and 3% multi-racial or other. The mean age for the sample was 18.3 years (SD = .45), 64% were 18 years old, 88% lived in a residence hall, and 91% perceived their family to be of average or above average socio-economic status relative to their peers. In addition, 14% of the sample intended to join or had already joined a fraternity or sorority and 65% intended to participate or had already participated in some level of athletics (i.e., intramural, club, varsity) when they arrived on campus. In general, it appeared that this subset

approximated the characteristics of the total sample and the total incoming first-year

classes fairly well (i.e., 46% female and 85% White, Non-Hispanic).

Measures

Parent Profile Indicators (Baseline - Summer Prior to Matriculation)

 Maternal/Paternal alcohol modeling. Students provided retrospective data

regarding the alcohol related behaviors of their mothers and fathers. Parent specific items

assessing the frequency and quantity of alcohol use, respectively, were as follows: "In

the past year, how often do you think your mother/father drank alcohol?" (9 point scale; 1

= not at all, 2 = 1 to 5 times a year, 3 = 6-11 times a year, 4 = about once a month, 5 = 2

or 3 times a month, 6 = once or twice a week, 7 = 3 or 4 times a week, 8 = nearly every

day, 9 = everyday) and "In the past year, how many drinks do you think your

mother/father had per drinking occasion?" (9 point scale; 0 = 0 drinks, 1 = 1 drink, 2 = 2

drinks, 3 = 3 drinks, 4 = 4 drinks, 5 = 5 drinks, 6 = 6 drinks, 7 = 7 or 8 drinks, 8 = 9 or

more drinks). These frequency and quantity items were multiplied to obtain an estimated

total of the quantity of alcohol consumed by both mothers and fathers. For example, if an

individual reported drinking three drinks, three to four times a week, his or her total

estimated level of consumption would be 21 (3 x 7). Higher scores thus indicated higher

total levels of drinking (Dawson, 2003). Self-report measures of frequency and quantity

of consumption of alcohol have shown strong predictive validity regarding later alcohol-

related mortality (Rehm, Greenfield, & Rogers, 2001).

 Perceived parent approval of alcohol use. Student perceptions of general parental

approval of student alcohol use were measured with four items (Wood et al., 2004).

Participants were asked to indicate on a 5-point scale from *Strongly disapprove* (1) to

Strongly approve (5) how their parents would respond if students drank one or two drinks, three or four drinks, and five or more drinks on one occasion, and five or more drinks once or twice each weekend. Items were summed to create a general approval composite (Cronbach's α = .86).

    Alcohol communications. Parent-teen alcohol-related communication was assessed at the level of the student using a 13-item scale adapted from Turrisi, Wiersma, and Hughes (2000). Students indicated on a 4-point scale from *Not at all* (1) to *A great deal* (4) the extent that they discussed negative consequences of alcohol use and tips for an alcohol-free healthy lifestyle with their parents at some point during the past several months. For example, possible topics of discussion included: "How difficult it is to make accurate judgments of how drunk you are", "How drinking is bad for your health", and "What my punishment would be if I were caught drinking". Items were summed to create an overall index of the amount of parent-teen alcohol-related communications (Cronbach's *α* =.94).

    Parental monitoring and knowledge. To indicate their level of parental *monitoring*, students responded on a 3 point scale to the question: "How much do your parents try to know what you do during your free time?" (they don't try, they try a little, they try a lot). To describe parental *knowledge*, they were asked "How much do your parents really know what you do with your free time?" (they don't know, they know a little, they know a lot). These measures were modified from those used by Wood and colleagues (2004) where they were shown to be predictive of student binge drinking and experienced negative consequence. The divergent validity of these measures was also

illustrated in this study by the weak associations observed with measures of parental

support and parental permissiveness (Wood et al., 2004).

Parental trust and support. Students reported on the extent to which they trusted

and felt supported by their mothers and fathers using 8 items (4 maternal and 4 paternal)

measured on a 4 point scale from *Disagree* (1) to *Agree* (4). Items were: "I can trust my

mother/father when we talk," "My mother/father is honest with me," "When we talk

about important things, I know my mother/father will support me," and "My

mother/father will be understanding, even if he/she disagrees with me." In order to limit

the number of indicators in the model, the scores for both mothers and fathers were

averaged to create a more global index of parental trust ($r = .47$, $p < .001$) (Cronbach's α

$_{mothers}=.82$; Cronbach's α $_{fathers} =.81$).

Parental access. Students reported on the extent to which they felt both their

mothers and fathers were accessible to them using 4 items (2 maternal and 2 paternal)

measured on a 4 point scale from *Disagree* (1) to *Agree* (4). Items were: "My

mother/father is too busy when I want to talk to her about things" (reverse coded) and

"My mother/father has trouble finding time to talk with me" (reverse coded). In order to

limit the number of indicators in the model, the scores for both mothers and fathers were

averaged to create a more global index of parental access ($r = .39$, $p < .001$) (Cronbach's

α $_{mothers}=.80$; Cronbach's α $_{fathers} =.89$).

Mother/Father-teen conflict. Students reported on the extent to which they

experienced conflict with both their mothers and fathers using 4 items (2 maternal and 2

paternal) measured on a 4 point scale from *Disagree* (1) to *Agree* (4). Items were: "My

mother/father and I and up fighting when we talk" and "No matter what I say when we

talk, my mother/father and I seem to end up arguing," (Cronbach's $\alpha_{mothers}$=.85;

Cronbach's $\alpha_{fathers}$ =.89).

College Student Profile Indicators (Baseline – Summer Prior to Matriculation)

Alcohol use initiation. To index the age at which participants reported beginning

to drink alcohol, students were asked, "How old were you the first time you drank

alcohol (that is, more than a few sips)?" (13 point scale: 1 = age 10 or younger, 2 = age

11, 3 = age 12, 4 = age 13, 5 = age 14, 6 = age 15, 7 = age 16, 8 = age 17, 9 = age 18, 10

= age 19, 11 = age 20, 12 = 21 or older, 13 = I have never drank alcohol,).

Alcohol use. Two indicators of alcohol use were measured. Typical weekend

drinking was measured as the sum of drinks participants indicated they consumed on a

typical Friday and Saturday (*M* Friday drinks + *M* Saturday drinks) within the past 30

days using the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985).

For example, a response of 8 on this measure would mean a participant tends to consume

8 alcoholic drinks from Friday through Saturday. This measure has been used frequently

in the college alcohol literature (for example: Baer et al., 2001; Fromme, Katz, &

D'Amico, 1997; Larimer, Turner, Mallett, & Geisner, 2004; Marlatt et al., 1998). In

addition, self-reports using the DDQ have been validated using measures taken from

collateral reporters, with results showing a strong association between the two sources of

data (Marlatt et al., 1998). Heavy episodic drinking was measured as how often in the

past two weeks participants indicated that they had consumed 4 or more drinks if female,

or 5 or more drinks if male, in a two hour period. This method of measuring heavy

episodic drinking is in accordance with NIAAA guidelines for measuring this construct

(NIAAA, 2007). A standard drink definition was included for all measures (i.e., 12 oz. beer, 10 oz. wine cooler, 4 oz. wine, 1 oz. 100 proof (1 ¼ oz. 80 proof) liquor).

Alcohol-related consequences. Of the 33 items from the Young Adult Alcohol Problems Screening Test (YAAPST, Hurlbut & Sher, 1992), a subset of 26 items pertaining specifically to the experienced negative consequences of one's *own* use was utilized. Participants responded about the frequency of occurrence in the past year of these consequences (0 = never, 1 = yes but not in the past year, 2 = 1 time in the past year, 3 = 2 times, 4 = 3 times, 5 = 4-6 times, 6 = 7-11 times, 7 = 12-20 times, 8 = 21-39 times, 9 = 40 or more times) (e.g., "felt very sick to your stomach or thrown up after drinking"). The 26 items were summed to create a composite score representing total experienced negative consequences (Abar, Abar, & Turrisi, 2009) (Cronbach's α =.85). The theoretical range for this measure was 0 to 234.

Risky alcohol-related practices. Eight items representing high risk behaviors engaged in while drinking were measured. Items were on a 5 point scale from *Never* (0) to *Always* (4) and included the following: "I pre-game (take shots/have other drinks before I go out)", "I play beer pong", "I use beer funnels (beer bongs)", and "I drink with the intention of getting drunk." Items were summed to create a composite with a theoretical range of 0 to 32 (Cronbach's α = .87).

Attitudes and beliefs toward alcohol use. <u>Favorable attitudes and beliefs toward drinking</u> utilized 12 items assessing attitudes and beliefs towards drinking selected from past research (Turrisi, 1999; Turrisi et al., 2001; Turrisi et al., 2000). Participants were asked to indicate how favorable they would feel toward (a) having a few drinks and (b) getting drunk at each of the following activities if they were going to go out to: a school

sponsored sporting event, a party, hang out with friends, or a campus special event. The prompt for these eight items was, "I would feel favorable toward … and (a) or (b)," and the response scale was from *Strongly disagree* (1) to *Strongly agree* (5). They were also asked the extent to which they agreed with the following statements about alcohol: "Having a few drinks is a nice way to celebrate," "Drinking makes me feel good," "A few drinks makes it easier to talk to people," and "Alcohol adds fun and excitement to an otherwise boring life." Response options were on a 5-point scale from *Strongly disagree* (1) to *Strongly agree* (5). These 12 total items were summed to create a composite of attitudes toward drinking activities, with higher scores indicating more favorable attitudes and beliefs toward alcohol. Highly favorable beliefs about alcohol have been shown to be predictive of greater experienced negative consequences of alcohol use in college (Turrisi et al, 2000) (Cronbach's α = .93). Non-favorable attitudes and beliefs toward drinking were indexed by eight items assessing attitudes towards drinking alternatives and non-favorable beliefs about drinking were selected from past research (Turrisi, 1999; Turrisi et al., 2001; Turrisi et al., 2000). Participants were asked to indicate how favorable they would feel toward not drinking at each of the activities listed in the above attitudes toward drinking activities section (i.e., four items), with the prompt being, "I would feel favorable toward … and not drinking." They were also asked the extent to which they agreed with the following statements about alcohol: "All things considered, I have a negative attitude toward drinking alcohol at this time in my life," "I could get myself into trouble if I drank alcohol in sexual situations," "Drinking alcohol can result in negative changes in my personality and make me irritable," and "Drinking alcohol can result in depression." Response options were, again, on a 5-point scale from *Strongly*

disagree (1) to *Strongly agree* (5). Items were summed to create a composite of non-favorable attitudes and beliefs toward drinking with higher scores indicating more non-favorable attitudes and beliefs about alcohol (Cronbach's α = .87). Highly non-favorable beliefs about alcohol have been shown to be predictive of decreased negative alcohol-related consequences in college (Turrisi et al., 2000) (Cronbach's α = .71).

Alcohol self-regulation. Collected and adapted from Wood and colleagues (2007), 10 items were collected describing the extent to which students reported thinking about their alcohol use and its consequences. For example, items included: "I have thought about how much I drink in comparison to other college students", "I have considered some of the negative consequences that have resulted from my drinking", and "I have thought about the amount of time I spend drinking." Participants responded on a 5 point scale from *Not at all* (1) to *Quite a bit* (5). Items were summed to create a composite of alcohol self-regulation, with higher scores indicating greater self-regulation (Cronbach's α = .84).

Peer drinking norms. <u>Descriptive peer norms</u> were assessed with respect to one's closest friends. Participants' perceptions of the typical weekend alcohol consumption of their closest friends were indexed by the total drinks participants indicated they believed their closest friends consumed on a typical Friday and Saturday during the past 30 days using the Daily Drinking Questionnaire, with higher scores indicating higher drinking norms (DDQ; Collins, Parks, & Marlatt, 1985). <u>Injunctive peer norms</u> were assessed with respect to one's closest friends. To assess participants' perceptions of the degree to which their friends approved of the respondent's alcohol use, 4 items were used (Baer, 1994). Participants indicated on a 7-point scale from *Strong disapproval* (1) to *Strong*

approval (7) how their closest friends would respond if the respondent drank alcohol every weekend, drank daily, drove a car after drinking, and drank enough to pass out. The items were summed to create a composite peer injunctive norms variable, with higher scores indicating greater injunctive drinking norms (Cronbach's α = .76).

College Student Outcomes (5 Month Follow-up)

Alcohol use. Several indicators of alcohol use were measured at the 5-month follow-up. Estimated peak blood alcohol content (peak BAC) was calculated using participants' responses to the number of drinks and amount of time spent drinking on the peak occasion within the past 30 days, from the Quantity/Frequency/Peak questionnaire (QFP; Dimeff et al., 1999; Marlatt et al., 1998). A computerized algorithm was used to estimate BACs based on participant gender, weight, and the quantity and rate of drinking consumption (Peak BAC = (number of drinks X .6)(5.14/participant weight)(r) - .015(Hours spent drinking) with r = .73 for men and .66 for women) (Dimeff et al., 1999; Matthews & Miller, 1979). Peak BAC has been shown to be predictive of changes in college student drinking patterns (Baer, 1995; Grossbard et al, 2007; Larimer et al, 2001; Marlatt et al, 1995). Typical weekend drinking was measured, as at baseline, as the sum of drinks participants indicated they consumed on a typical Friday and Saturday within the past 30 days using the DDQ (Collins, Parks, & Marlatt, 1985). Heavy episodic drinking was again measured as how often in the past two weeks participants indicated that they consumed 4 or more drinks if female, or 5 or more drinks if male, in a given two hour period. Frequency of drunkenness was measured using a single item asking students, "During the past 30 days, how many times have you gotten drunk or very high from alcohol?" (0 = never, 1 = 1-2 times, 2 = 3-4 times, 3 = 5-6 times, 4 = 7-8 times, 5 =

9 or more times). A standard drink definition was included for all measures (i.e., 12 oz. beer, 10 oz. wine cooler, 4 oz. wine, 1 oz. 100 proof (1 ¼ oz. 80 proof) liquor). Frequency of drunkenness during adolescence has been shown to be predictive of alcohol abuse during college and young adulthood (Anderrson & Magnusson, 1988).

Alcohol-related consequences. The same 26 item subset of the YAAPST (Hurlbut & Sher, 1992) measured at baseline was surveyed at the 5 month follow-up.

Tobacco and marijuana use. Students were also asked to provide estimates, on a 6 point scale, of how frequently they used tobacco and marijuana in the past 30 days (0 = 0 occasions, 1 = 1-2 occasions, 3 = 3-5 occasions, 4 = 6-9 occasions, 5 = 10-19 occasions, and 6 = 20-39 occasions). Tobacco was labeled as including cigarettes, cigars, snuff, and chewing tobacco/dip, and slang terms for marijuana were provided as recall cues for students (e.g., weed, pot, dope).

Plan of Analysis

The analyses address each Aim in turn, described as three Phases, examining (1) parenting profiles, (2) student profiles, and (3) associations between parenting and student profiles. The analytic plan for Phases 1 and 2 were identical. In the conceptual model presented in Figure 1, Phase 1 of the current project is represented by the left hand side of the figure. Manifest parenting practices are each shown loading onto a categorical latent factor, representing the LPA that was performed. The arrows from the latent profiles of parenting practices to the student alcohol use and experienced negative consequences at the 5-month follow-up represented the assignment to classes and prediction of later outcomes that occurred in the subset of control individuals. Phase 2 is represented in the right hand side of the figure, with manifest correlates of college student

use loading onto latent profiles of college student risk. Similar to Phase 1, the arrows

from the student latent profiles to the outcomes at the 5- month follow-up represent the

assignment to classes and prediction that occurred in the control condition subset.

Finally, Phase 3 is represented by the two-headed arrow connecting parent and student

latent profiles. In this final phase, the association between profiles was examined using

latent transition analysis. The analytic plans for each of these phases are discussed, in

depth, in the sections below.

Phase 1. First, the descriptive characteristics (e.g., means, standard deviations,

and correlations) of each of the indicators were examined to provide overall estimates of

parenting characteristics for the entire sample ($N =1153$) (Phase 1a). The skew and

kurtosis on the profile indicators were provided for further description of the indicator

distributions, but the presence of either or both are not problematic in the current study,

as LPA does not assume normality of indicators (Bauer & Curran, 2004). The

correlations between profile indicators were relevant in so much that it would be

inappropriate and ineffective to use a collection of indicators that are all very highly

correlated with each other (e.g., $r \geq .80$). Given such a pattern of correlations, the latent

profiles seen would likely be highly ordered (e.g., low, medium, and high profiles) and

would imply little presence of higher-order interactions. Situations where indicators are

unrelated would not be cause for concern in LPA, as it remains possible to demonstrate

substantively interesting and useful profiles under these conditions. Second, a series of

latent profile analyses were performed using the set of parenting indicator variables

(Phase 1b). Beginning with a single profile solution, solutions were tested by adding

profiles one at a time until the most optimal profile solution was found. Both statistical

and substantive cues were relied upon when making the decision of the number of profiles to retain. Statistically, the minimum Akaike Information Criteria (AIC; Akaike, 1987) and Bayesian Information Criteria (BIC; Schwartz, 1978) values across solutions were explored, in addition to having examined the adjusted likelihood ratio test (aLRT; Lo, Mendell, & Rubin, 2001). A significant aLRT value indicates an improvement in fit with the inclusion of the additional class. The optimal number of profiles suggested by each of these fit indices is often inconsistent (Nylund, Asparouhov, & Muthén, 2006). Therefore, model selection utilizing a combination of statistical and substantive considerations has been recommended (Lubke & Muthén, 2005). Substantively, considerations included class sizes (i.e., classes smaller than 3-5% are often artifacts of the method), distinguishability of profiles (i.e., it is possible for additional profiles to be negligibly different from profiles in a more parsimonious model), and model interpretability (i.e., a clearly interpretable solution with fewer profiles is more desirable than an unclear solution with more profiles) (Lubke & Muthén, 2005). Each of the resulting profiles were then described relative to the rest of the profiles, such that an "Average" level on a given indicator represented an average conditional mean compared to the other profile conditional means (rather than average relative to the scale of the indicator). Third, once an optimal number of profiles was found, demographic covariates of the solution were explored in order to more fully describe profile differences and similarities (Phase 1c). Fourth, in order to examine profiles longitudinally, a series of LPAs was performed using individuals in only the control condition in order to ensure that the latent profiles seen in the larger sample were the same profiles seen in this subset (Phase 1d). Given acceptable replication of the solution, individuals in the control

condition were then classified into their most likely profiles. In LPA, probabilities of

membership in each profile are estimated for each individual. Control group individuals

were, therefore, placed into the profile in which they had the highest posterior probability

of belonging. This practice of classifying individuals based on most likely membership is

relatively common in developmental and prevention research (Loken, 2004; Pastor,

Barron, Miller, & Davis, 2007) and is acceptable given clearly distinguished profiles

(Clark & Muthén, 2009). Profiles can be considered clearly distinguished if the average

within-profile posterior probabilities are high (e.g., .80+) and the empirical entropy value

is greater than .80 (Celeux & Soromenho, 1996). Fifth, once classified, profile mean

differences in alcohol use and experienced negative consequences at the 5-month follow-

up were examined among the control group subsample using MANOVA and one-way

analysis of variance (ANOVA) follow-ups (Phase 1e).

Phase 2. As mentioned above, the analytic plan for Phase 2 was identical to

Phase 1. First, the descriptive characteristics of the student correlates of alcohol use were

examined (Phase 2a). Second, a series of latent profile analyses were performed, and the

best fitting model was retained (Phase 2b). Once again, each profile was then described

relative to the remaining profiles. Third, covariates of the final student profile solution

were examined to provide greater understanding of the profiles (Phase 2c). Fourth, the

profile solution from the complete sample was replicated in the control group only subset

(Phase 2d). Fifth, individuals were classified into their most likely profiles, and

MANOVA and ANOVAs were used to examine profile mean differences (Phase 2e).

Phase 3. The final phase of the analyses examined the association between the

established parenting profiles and college student profiles. A latent transition model

(LTA; Lanza & Collins, 2008) was used to examine this research question. Typically, latent transition models use the same indicators at two time points to estimate latent status membership at time 1, latent status membership at time 2, and transition probabilities from time 1 to time 2. Latent statuses are directly analogous to latent classes or latent profiles, with the exception that latent statuses are typically time dependent (e.g., membership in profile 1 at time 1). The model that was employed instead used the parenting profiles as the pseudo initial latent states and the student profiles as the second set of latent states. As such, parenting profiles functioned as the rows in the contingency table, and student profiles served as the columns. Rather than demonstrating the probabilities of transitioning from one profile to another over time, the current model provided probabilities of being a member in each of the student risk profiles given membership in the parenting profiles. This analysis was relatively novel, as it was capable of explicitly relating the unobserved type of parent one perceives having with the unobserved pattern of alcohol-related behaviors one displays, rather than other analyses which would focus on individual alcohol-related outcomes sequentially. This method examined the relationship between parenting and alcohol use across the transition to college in a more natural, holistic manner than has been typical, as both perceived parenting and teen alcohol-related behavior were modeled as multivariate, multi-component constructs that are best represented as distinct groups of individuals.

Results

Phase 1: Perceived Parenting Profiles

  Phase 1a: Preliminary analyses for perceived parenting profiles. Descriptive statistics of the parenting profile indicators are presented in Table 1. First, results indicated that students reported higher levels of modeling of alcohol use by their fathers than by their mothers, paired *t* test = 14.57, *p* < .001. Second, parent approval of student alcohol use, on average, was relatively minimal, with 76% of students reporting their parents were strongly disapproving or disapproving of underage alcohol use (scale values between 4 and 8). Third, student perceptions of the extent to which their parents attempted to know and actually knew about what they chose to do with their free time were relatively high (i.e., $M_{monitoring}$ = 2.67, $M_{approval}$ = 2.51: Midway between trying to know/knowing "a little" = 2 and "a lot" = 3). Fourth, in describing their relationships with their parents, students tended to report high levels of trust in and support from parents (*M* between slightly agree and agree to all items regarding trust and support), as well as access to parents (*M* between slightly agree and agree). Finally, student reports of parent-teen communications about alcohol use (*M* approximately at "a little" discussion of alcohol-related topics), mother-teen conflict (*M* between disagree and slightly disagree to conflict items), and father-teen conflict (*M* between disagree and slightly disagree) were relatively low. Across parenting indicators, missing data was modest, never reaching more than 8% on any one indicator.

  Correlations among parenting indicators are presented in Table 2. In general, the associations among variables were within the small to moderate range. Maternal alcohol modeling, paternal alcohol modeling, and approval of student alcohol use were all

positively related (r's $\geq$ .23, p's $<$ .01). Higher levels of alcohol communications were

associated with greater parental trust and support (r = .21, p < .01) and parental access (r

= .16, p < .01) and with lower mother-teen and father-teen conflict, r $\leq$ -.06, p < .05.

Parental monitoring and knowledge were also positively related, such that the more

parents tried to know about what their students did with their free time, the more their

students reported they actually knew about their free time usage, r = .33, p < .01.

Parental monitoring was also negatively associated with parental approval of student

alcohol use, r = -.16, p < .01. As was expected, the parenting dimension of trust and

support was positively related with parental access (r = .43, p < .01). Both of these

dimensions were negatively associated with student reports of conflict with mothers and

with fathers (r's $\leq$ -.27, p's $<$ .01), which were moderately inter-correlated (r = .27, p <

.01).

 Phase 1b: Perceived parenting profile construction. Results from the series of

latent profile analyses indicated that the four profile model provided the best fit to the

data. As indicated by the adjusted likelihood ratio test (aLRT), the four profile model

provided a significantly better fit than the three profile model, while the five profile

model did not provide a better fit than the four profile model (see Table 3 for perceived

parenting profile fit statistics). The Akaike Information Criteria (AIC) and the Bayesian

Information Criteria (BIC) each showed large decreases in their values up to the four

profile model, indicating that the one, two, and three profile models did not fit the data as

well as the four profile model. The AIC and BIC values did continue to decrease slightly

with the addition of the fifth profile; however, there were several reasons why the four

profile model was ultimately chosen (Lubke & Muthén, 2005). First, as mentioned

above, the aLRT supported the retention of the four profile model and not the five profile model. Second, the four profile model was shown to have more distinct profiles, in terms of conditional means, than the five profile model according to measures of entropy (entropy$_4$ = .88; entropy$_5$ = .85). Entropy values approaching 1.0 indicate little profile overlap (Celeux & Soromenho, 1996). Third, the four profile model was more parsimonious in terms of the number of parameters estimated. The inclusion of the fifth profile required the estimation of 21 additional parameters (10 conditional means, 10 conditional variances, 1 group probability) and resulted in only marginal improvement in fit according to the AIC and BIC (no improvement according to the aLRT). Based on the combined consideration of these multiple criteria, the four profile model was retained. Profile group probabilities, conditional means with 95% confidence intervals, and standard deviations are presented in Table 4 in the original scales of measurement. Figures 2 and 3 provide graphical representations of the four profile model with standardized conditional mean values.

Profile 1, representing approximately 19% of the sample, was labeled the *High Quality*; *Average Modeling and Approval* Profile. Students in this profile reported the highest levels of parental trust and support, parental access, and alcohol communications, as well as the lowest levels of mother-teen and father-teen conflict, across profiles. In addition, these students reported average levels of parental alcohol use modeling (both maternal and paternal), approval of alcohol use, monitoring and knowledge. Thus the dominant or unique characteristic of this profile was its highest quality affective relationships with parents, with levels of the other parenting indicators falling nearer to sample means.

Profile 2, representing approximately 31% of the sample, was labeled the *Low Approval; Average Modeling and Quality* Profile. Compared to other groups, students in this profile reported that their parents engaged in the highest levels of monitoring and had the most knowledge about how they spent their free time. To a lesser extent, parents were perceived as exhibiting relatively lower levels of approval of student drinking and relatively higher communication about alcohol. Perceptions of maternal and paternal alcohol use modeling, trust and support, parental access, and conflict were similar to sample averages.

Profile 3, representing approximately 30% of the sample, was labeled the *Low Modeling, Approval, and Quality* Profile. Students in this profile perceived their parents to have the lowest levels of maternal and paternal alcohol modeling, as well as the lowest mean levels of parental approval of alcohol use, across profiles. Parental monitoring, knowledge, trust and support, parental access, and communications relating to alcohol were also perceived at the lowest levels by members of this profile, along with high levels of perceived mother-teen and father-teen conflict. In summary, the quality of parent-teen relationships was reported as relatively poor and protective behaviors of asking, knowing, and communicating about alcohol were at low levels, but the risk factor of parental modeling of alcohol use was lower than in other profiles.

The fourth and final profile, accounting for the remaining 21% of the sample, was labeled the *High Modeling and Approval; Low Quality* Profile. Students in this profile perceived their parents to model the heaviest maternal and paternal alcohol use across profiles, with average levels more than one standard deviation unit greater than the nearest profile means. These students also perceived the highest levels of parental

approval of alcohol use and parent-teen conflict (both mother-teen and father-teen) across profiles. Students in this profile also reported relatively low levels of perceived parental monitoring, knowledge, and trust and support, and levels of parental access and alcohol-related communications were near the sample means. Overall, Profile 4 therefore evidenced a pattern that could be characterized as most risky (or least protective).

The distinctness of the four profile groups, and their subsequent naming or labeling, was supported by the non-overlap of confidence intervals between profiles on variables on which the labels were dissimilar (e.g., High Modeling vs. Low Modeling) and overlap of confidence intervals between profiles where labels had a similar element (e.g., Low Quality). For example, when examining perceived maternal alcohol modeling, the confidence interval for maternal modeling in the *High Quality: Average Modeling and Approval* profile was 4.74 – 6.43, whereas the confidence interval for approval in the *Low Modeling, Approval, and Quality* profile was 2.75 – 4.29. In addition, those with partially overlapping labels tended to have largely overlapping confidence intervals. For example, when examining trust and support (indicator of quality), the confidence interval for trust and support in the *Low Modeling, Approval, and Quality* profile was 11.91 – 12.63 and the confidence interval for trust and support in the *High Modeling and Approval; Low Quality* profile was 11.95 – 12.85.

To summarize, regarding the substantive interpretation of the profiles, Profile 4, the *High Modeling and Approval; Low Quality* group, appeared to be the riskiest perceived parenting profile, in terms of overall pattern of risky characteristics (e.g., highest levels of maternal/paternal modeling and approval of underage alcohol use, low levels of relationship quality, monitoring, and knowledge). In contrast, the patterns in

each of the remaining three profiles exhibited at least a single characteristic expected to

protect against teen alcohol use and consequences. Students in Profile 1, *High Quality;*

Average Modeling and Approval, tended to have the best perceived relationships with

their parents across profiles. Students in Profile 2, *Low Approval; Average Modeling and*

Quality, tended to report their parents monitored and knew about their behavior more

than students in other profiles, and these students also felt their parents were very

disapproving of alcohol. This same disapproval of alcohol use was perceived by students

in Profile 3, *Low Modeling, Approval, and Quality*.

In the following sections, the numeric labels (Profiles 1 through 4) are used to

simplify the text and facilitate comparisons across groups for the reader. The labels are

as follows: Profile 1 = *High Quality; Average Modeling and Approval,* Profile 2 = *Low*

Approval; Average Modeling and Quality, Profile 3 = *Low Modeling, Approval, and*

Quality, and Profile 4 = *High Modeling and Approval; Low Quality.*

Phase 1c: Demographic covariate analyses for perceived parenting profiles. In

order to explore the demographic composition of the four perceived parenting profiles

described above, gender, ethnicity (coded as White/non-White), and perceived

socioeconomic status were included in the model as covariates predicting profile

membership. Profile 4 served as the reference profile, as it was expected to be the

riskiest profile, in terms of student alcohol use outcomes, and its pattern of indicator

levels was very distinct from those of the remaining profiles. Results indicated that

profile membership was significantly predicted by each covariate examined. Compared

to the odds of being in Profile 4, females had 1.93 times greater odds of being in Profile 2

(Wald = .66, $p < .01$), non-White students had 2.10 times greater odds of being in Profile

3 (Wald = .74, $p < .05$), and students with higher perceived socioeconomic status had

1.49 times greater odds of being in Profile 1 (Wald = .30, p < .05) for every unit increase

in SES.

Phase 1d: Perceived parenting profile replication in the control group only.

Given that the data used to create the discussed latent profiles come from the baseline

(i.e. pre-treatment phase) of a randomized control trial aimed at preventing college

alcohol misuse and associated negative consequences, only profiles of individuals in the

control group were examined longitudinally to avoid the potential for the intervention to

influence profile comparisons. The latent profiles illustrated at baseline in the full sample

required replication at baseline in the smaller subset of the sample to allow for

appropriate examination of the longitudinal associations between perceived parenting

profiles and college student outcomes at the 5-month follow-up. There were three criteria

for establishing sufficient subsample replication: (a) the best fitting solution must contain

the same number of profiles; (b) the profile size distribution must be very similar; and (c)

the conditional means across profiles must exhibit a very similar pattern.

First, the results of the LPA in the subset indicated that, as in the complete

sample, the four profile model provided the best fit to the data. Table 6 presents the

control group perceived parenting profile fit indices. Statistically, both the BIC and the

aLRT supported the choice of the four profile model. The minimum value of the BIC

was observed at the four profile solution, with values increasing with the inclusion of

additional profiles. The aLRT, again, indicated that the four profile model provided

significantly improved fit to the data over the three profile model, while the five profile

model did not significantly provide a better fit than the four profile model. In addition,

the four profile model was shown to have marginally more distinct profiles than the five profile model (entropy$_4$ = .92; entropy$_5$ = .91) and was, again, more parsimonious in the number of parameters estimated.

Second, in order to determine whether corresponding profile solutions were found, the distributions of group probabilities were compared (see Table 7). Results indicated that the distribution of group probabilities was very similar in the complete sample (i.e., 19%, 31%, 30%, and 21%) and the control group subset (14%, 34%, 31%, and 21%).

Third, the substantive interpretation of the perceived parenting profiles, based on their patterns of conditional means, was compared. In general, the patterns of conditional means in the control group subset were nearly identical to the patterns of means in the profiles from the complete sample (see Table 7). Therefore the same profile names are used in both the full and longitudinal-control group. Profile 1 (*High Quality; Average Modeling and Approval)*, again, demonstrated relatively high levels of indicators tapping parent-teen relationship quality (i.e., high trust and support, parental access, and alcohol communications, and low parent-teen conflict), coupled with average levels of perceived parental modeling and approval of alcohol use. As in the complete sample, Profile 2 (*Low Approval; Average Modeling and Quality*) in the control group demonstrated the highest levels of parental monitoring and knowledge, low levels of perceived parental approval, and average levels of modeling and indicators of parent-teen relationship quality. One difference in the control group only, compared to the full sample, is that Profile 2 exhibited high, rather than average, mother-teen conflict. Profile 3 (*Low Modeling, Approval, and Quality*), was also well identified in the control group sample.

This profile, again, exhibited low levels of perceived parental modeling, monitoring, knowledge, and relationship quality. One difference in this profile between the control group and complete sample was that perceived parental approval of teen drinking was average as opposed to low. However, this difference was relatively small (i.e., M_{complete} = 6.22, M_{control} = 6.82) and was the only difference of note on traits used to name the profiles, so the name of the profile was retained. Finally, the pattern of conditional means in Profile 4 (*High Modeling and Approval; Low Quality*) was nearly identical in the complete sample and control sample. In the control group, this profile also exhibited high levels of perceived parental modeling and approval of alcohol use, as well as low levels on the parent-teen relationship quality indicators. Two differences were observed compared to the full sample: mother-teen conflict was average rather than high, and alcohol communications were high rather than average.

Overall, in terms of substantive interpretation, the profiles from the complete sample were deemed to be well replicated in the control group sample. That is, Profile 4 evidenced the highest levels of the risk behaviors of parental alcohol modeling and approval of student drinking, coupled with relatively low levels of relationship quality, monitoring, and knowledge. On the other hand, Profiles 1, 2, and 3 each evidenced the highest levels of specific protective behaviors. Profile 1 was characterized by high affective quality in the parent-adolescent relationship, Profile 2 reported the highest monitoring and knowledge, and Profile 3 exhibited the lowest levels of parental alcohol modeling.

Phase 1e: Perceived parenting profile subset and college outcomes at the 5-month follow-up. The next stage of the analyses sought to predict student outcomes later

in college using the perceived parenting latent profiles. Because the perceived parenting

profiles from the complete sample were sufficiently replicated in the control group

subset, the relationship between perceived parenting profiles and college student

outcomes at the 5-month follow-up were examined using the control group profiles. As

described in the plan of analyses, individuals were classified into their most likely profile

based on their posterior probabilities. Results of the control group LPA indicated that

these classifications were relatively definite, such that the average posterior probabilities

for students' most likely profiles were greater than .93 for all profiles (i.e., .99, .97, .94,

and .96). For example, for individuals whose most likely profile was Profile 1, the

average posterior probability of membership was .96.

A multivariate analysis of variance was performed with latent profiles functioning

as a four-level between-subject factor and the seven indicators of alcohol use, alcohol-

related consequences, and other substance use at the 5-month follow-up functioning as

the multiple dependent variables. There was a significant effect of profile, Pillai's F (7,

241) = 46.20, $p < .001$. Next, a series of one-way ANOVAs was performed, and

significant effects were probed using Tukey post-hoc tests. This strategy maintained the

theoretical Type I error rate at 5% despite the use of multiple correlated dependent

variables.

Results indicated that there were significant mean differences across profiles on

each outcome measured (see Table 8). Tukey post-hoc tests showed that for all

dependent variables, students in Profile 4 engaged in the most alcohol use and reported

the most consequences. That is, students whose parenting profile was characterized by

High Modeling and Approval and Low Quality had significantly higher Peak BAC ($F_{3,}$

$_{281} = 5.06$, $p < .01$), typical weekend drinking ($F_{3, 281} = 11.68$, $p < .001$), frequency of drunkenness ($F_{3, 281} = 7.96$, $p < .001$), and alcohol-related negative consequences ($F_{3, 281} = 10.35$, $p < .001$), compared to Profiles 1, 2 and 3; these latter three profiles did not differ from each other on these variables. In addition, Profile 4 had higher heavy episodic drinking ($F_{3, 281} = 5.85$, $p < .01$), tobacco use ($F_{3, 247} = 5.72$, $p < .01$) and marijuana use ($F_{3, 247} = 5.97$, $p < .01$), compared to Profiles 1 and 2, which did not differ from each other.

Phase 2: Student Alcohol-Related Profiles

Phase 2a: Preliminary analyses for student alcohol-related profiles. Descriptive statistics of the student profile indicators are presented in Table 9. First, approximately 20% of students reported that they had not yet initiated alcohol use in the summer prior to college matriculation. Among those who had initiated alcohol use, on average, these students tended to report initiating alcohol use around the age of 16, with a range from before the age of 10 to 19. Second, in terms of self-reported alcohol use at the population level, on average students reported consuming approximately 3 drinks over the course of a typical Friday and Saturday and averaging .68 heavy episodic drinking episodes in the past 2 weeks, which is equivalent to about twice in 6 weeks. Third, the average student experienced few negative consequences (i.e., the majority of negative consequences measured were not experienced by the majority of students) and engaged in high-risk alcohol-related practices relatively infrequently (*M* between never and rarely engaged in these practices). Fourth, the averages of the favorable attitudes and beliefs about alcohol (*M* approximately at neither agree nor disagree) and non-favorable attitudes and beliefs about alcohol (*M* between neither agree nor disagree and slightly agree) indicators were

relatively neutral. Fifth, at the population level, students reported relatively average levels of alcohol self-regulation, with composite scores hovering around the scale midpoint of 25. Finally, on average, students reported that their closest friends consumed approximately 5.6 drinks on a typical weekend (Friday and Saturday combined) and that their friends showed mild disapproval of alcohol use. Across student indicators, missing data was mild to moderate, with 8 indicators missing less than 1% and 2 missing roughly 17%.

Correlations among college student indicators are presented in Table 10. With respect to alcohol use initiation, the earlier students began drinking alcohol, the more they reported weekend drinking, heavy episodic drinking, risky alcohol-related practices, and experienced negative consequences associated with alcohol use ($r's \geq -.31$, $p's < .01$). As was expected, those individuals who reported high levels of weekend drinking tended to report high levels of heavy episodic drinking, high descriptive peer norms, high injunctive peer norms, and favorable attitudes and beliefs about alcohol ($r's > .45$, $p's < .01$). High descriptive peer norms were positively associated with high injunctive peer norms, $r = .56$, $p < .01$, and favorable attitudes and beliefs about alcohol were positively related to measures of alcohol use, descriptive norms, injunctive norms, and risky alcohol-related practices, $r = .45$, $p < .01$. Again, as was expected, highly non-favorable attitudes and beliefs about alcohol were associated with low levels of student reported drinking, normative beliefs, and experienced negative consequences ($r's < -.37$, $p's < .01$). Interestingly, those individuals that reported the highest levels of alcohol self-regulation tended to report high levels of drinking and normative beliefs ($r's > .19$, $p's < .01$). Finally, on average, students that reported high levels of weekend and heavy

episodic drinking, descriptive and injunctive peer norms and favorable beliefs about alcohol tended to experience greater amount of alcohol-related negative consequences ($r's > .44$, $p's < .01$).

      Phase 2b: Student alcohol-related profile construction. Results from the series of latent profile analyses indicated that the five profile model provided the best fit to the data. Statistically, the aLRT indicated that the five profile model provided significantly better fit than the four profile model (see Table 11). In addition, the AIC and BIC each showed large decreases in their values until the five profile model indicating that this number of profiles fit the data better than the one, two, three, and four profile models. In this set of analyses, the aLRT indicated that the addition of a sixth class significantly improved model fit, and the values of the AIC and BIC did continue to decrease minimally with the addition of the sixth profile. However, there were several reasons why the five profile model was ultimately chosen (Lubke & Muthén, 2005). First, the additional profile seen in the six profile model was very small (< 2% of the sample), and it appeared to be minimally different from one of the profiles modeled in the five profile model. A second, and related reason, was that the five profile model had marginally more distinct profiles, in terms of conditional means, than the six profile model according to measures of entropy ($entropy_5 = .96$; $entropy_6 = .95$). Third, the five profile model was more parsimonious in terms of the number of parameters estimated than the six profile model, and this level of parsimony made the five profile model more easily interpreted than the six profile model. Based on the combined consideration of these multiple criteria, the five profile model was retained. Profile group probabilities, conditional means with 95% confidence intervals, and standard deviations are presented in Table 12

in the original scales of measurement. Figures 4 and 5 provide graphical representations of the five profile model with standardized conditional mean values.

The first latent profile, representing approximately 30% of the sample, was labeled the *Abstainer* Profile. Individuals in this class reported no typical weekend drinking, heavy episodic drinking, alcohol-related consequences, or risky alcohol-related practices (e.g., beer pong). These individuals had a greater tendency to have *never* initiated alcohol use than all other profiles (65%) and tended to express the least favorable attitudes and beliefs toward drinking, as well as the most non-favorable attitudes and beliefs toward drinking. In addition, students in the *Abstainer* profile perceived their friends to drink the least and to approve of drinking the least across profiles. Finally, these individuals reported thinking about their own alcohol use (i.e., alcohol self-regulation) less than the other profiles. In general, these individuals tended to have little to no experience with or interest in using alcohol.

The second profile, representing approximately 26% of the sample, was labeled the *Past Drinker* Profile. These individuals were very similar to the *Abstainers*, in that they reported no typical weekend drinking and no heavy episodic drinking. However, students in the *Past Drinker* profile reported having initiated alcohol use much earlier than the *Abstainers* ($M \sim$ 16-17 years-of-age) and had experienced low levels of alcohol-related consequences and risky alcohol-related practices during their lifetime. They also reported low levels of favorable attitudes and beliefs toward drinking, alcohol self-regulation, and peer norms (both descriptive and injunctive). Finally, these individuals also reported relatively high non-favorable attitudes and beliefs toward drinking.

The third profile, representing approximately 15% of the sample, was labeled the *Light Drinker* Profile. *Light Drinkers* were characterized by similar average age of initiation (*M* ~ 16-17 years-of-age) of alcohol use to the *Past Drinker* profile, but individuals in the *Light Drinkers* profile were currently engaged in relatively low levels of weekend (~2.5 drinks) and binge drinking (little more than once a month) . These individuals tended to report experiencing relatively low levels of alcohol-related negative consequences and reported engaging in relative low levels of risky alcohol-related practices. They also reported relatively average levels of (1) favorable attitudes and beliefs toward drinking, (2) non-favorable attitudes and beliefs toward drinking, and (3) alcohol self-regulation. Finally, students in this profile tended to report relatively average perceptions of descriptive peer norms and relatively low levels of injunctive peer norms.

The fourth profile, representing approximately 22% of the sample, was labeled the *Moderate Drinkers* Profile. These individuals reported having initiated alcohol use at an average age of 15 or 16, and were currently engaged in average levels of typical weekend drinking (~ 7 drinks) and binge drinking (~ 3 times a month). The level of experienced negative consequences associated with alcohol for students in the *Moderate Drinkers* profile was much greater than those experienced by each of the first three alcohol-related profiles discussed, with means separated by at least a standard deviation unit. To describe the average score of 21.43, this might represent having experienced seven consequences (e.g., trouble at work/school, became very sick/threw up) each twice in the prior year. *Moderate Drinkers* reported average-to-high levels of risky alcohol-related practices ("rarely" to "sometimes" engaging in these practices), favorable attitudes and beliefs toward drinking (greater than neutral), and perceived descriptive

norms (friends consume approximately 10 drinks on a typical weekend). In terms of injunctive norms, while students in this profile perceived their friends as mildly disapproving of alcohol use (based on the absolute value of the conditional mean), this mean was relatively high, when compared to the first three profiles discussed. Students in this class indicated that they thought about their own alcohol use relatively frequently and held relatively low levels of non-favorable attitudes and beliefs toward alcohol use (~ neutral favorability).

The fifth and final profile, accounting for the remaining 6% of the sample, was labeled the *High Risk Drinker* Profile. These individuals had initiated alcohol use at the youngest average ages (M ~ 14 to 15 years-of-age) and were currently engaged in the highest levels of weekend drinking and heavy episodic drinking across profiles. Their reported average number of drinks on a given Friday (or/and) Saturday was approximately 17, and they binge drank on average more than 4 times in the prior 2 weeks; both levels are almost two standard deviations higher than those of the first three profiles. *High Risk Drinkers* reported experiencing over a standard deviation unit more alcohol-related consequences than the *Moderate Drinker* profile. To describe the average score of 38.22, this might represent having experienced eight consequences roughly four to six times in the prior year. Students in the *High Risk Drinker* also reported the highest levels of risky alcohol-related practices ("sometimes" engage in these practices), favorable attitudes and beliefs toward drinking (greater than neutral favorability), alcohol self-regulation, descriptive peer norms (friends perceived to consume ~ 15 drinks on a typical weekend), and injunctive peer norms. These students also reported the least non-favorable attitudes and beliefs toward drinking (less than neutral favorability).

The construction of student alcohol-related profile labels for the current study was supported by the presence of very little overlap among the confidence intervals of indicators for adjacent profiles and the general lack of overlap among non-adjacent profiles. For example, the confidence intervals of the *Light Drinker* profile showed some overlap with the confidence intervals of the *Moderate Drinker* profile (e.g., *Light* heavy episodic drinking = .28 - .98, *Moderate* heavy episodic drinking = .85 – 1.51) and little or no overlap with the non-adjacent *High Risk Drinker* profile (e.g., *High Risk* heavy episodic drinking = 4.11 – 6.64). The distinctiveness of the profile solution was supported by the fact that, even in adjacent profiles, the majority of conditional means showed little or no confidence interval overlap (e.g., *Light* weekend drinking = 1.38 – 3.68, *Moderate* weekend drinking = 6.26 – 8.25).

To summarize, regarding the substantive interpretation of the profiles, the *Abstainer* and *Past Drinker* profiles (accounting for over half of the students examined) are characterized as having very low risk patterns of alcohol-related characteristics (i.e., little to no current use, relatively unfavorable attitudes and beliefs about alcohol use). The remaining three profiles display patterns of escalating risk, with the *High Risk Drinker* profile exhibiting the most dangerous pattern of behavior, by far.

Considering the specificity of these profile names, no numeric labels were required to clarify the following sections for the reader. As such, the actual profile names were used when discussing Phases 2b and 2c.

Phase 2c: Demographic covariate analyses for student alcohol-related profiles. In order to explore the composition of the five student alcohol-related profiles described above, teen gender, ethnicity (coded as White/non-White), and perceived socioeconomic

status were included in the model as covariates predicting profile membership. The

Abstainer profile served as the reference profile, as its pattern of alcohol-related

behaviors was relatively distinct from the other profiles and its relative size (~30%)

provided enhanced statistical power for comparisons over the use of the riskiest profile

(i.e., High Risk Drinkers ~6%). Results indicated that each covariate included

significantly predicted student profile membership. Compared to the odds of being in the

Abstainer profile, females had .31 times lower odds of being in the *High Risk Drinker*

profile than males (Wald = -1.18, $p < .001$), non-White students had .26 times lower odds

of being in the Light Drinker profile than White students (Wald = -1.33, $p < .001$), and

students with higher perceived socioeconomic status were at increased odds of being in

the *Light Drinker* (Wald = .37, $p < .01$), *Moderate Drinker* (Wald = .44, $p < .01$), and

High Risk Drinker (Wald = .56, $p < .05$) profiles. For every unit increase in perceived

socioeconomic status, the odds of being in the *Light Drinker* profile increased by a factor

of 1.44, the odds of being in the *Moderate Drinker* profile increased by a factor of 1.55,

and the odds of being in the *High Risk Drinker* profile increased by a factor of 1.76. In

general, *Abstainers* appeared to be more common in families with lower perceived

socioeconomic status.

   Phase 2d: Student alcohol-related profile replication in the control group only.

As with the perceived parenting profiles, the profiles from the full sample required

replication in the control group subset of the sample in order to appropriately examine the

longitudinal associations between student alcohol-related profiles and college outcomes

at the 5-month follow-up. Therefore, the same three criteria used in the preceding section

on perceived parenting profiles were used for establishing sufficient replication of

student-alcohol related profiles (i.e., same number of profiles in the best fitting solution, same or very similar profile size distribution, and same or very similar pattern of conditional means across profiles).

First, as in the complete sample, the five profile model provided the best fit to the data (see Table 14). Statistically, the aLRT supported the choice of the five profile model over the four profile model, and the AIC and BIC indicated the five profile model provided better fit than the one, two, three, and four profile models. As in the complete sample, the aLRT in the control group subset indicated that the six profile model provided moderately improved fit over the five profile model, and the inclusion of the sixth profile resulted in very small improvements in the AIC and BIC. However, the same reasons for selecting the five profile model in the complete sample hold for the five profile model in the control group subset, namely the very small and minimally different sixth profile and a more parsimonious and interpretable five profile model than the six profile model.

Second, group probabilities and patterns of conditional means were compared to determine whether corresponding profile solutions were found (see Table 15). Results indicated that the distribution of group probabilities was very similar in the complete sample (i.e., 30%, 26%, 15%, 22%, and 6%) and the control group subset (31%, 24%, 18%, 22%, and 5%).

Third, regarding the substantive interpretation of the profiles, the patterns of conditional means in the control group subset were nearly identical (in terms of profile rank-order) to the patterns of conditional means in the complete sample, which, again, resulted in the use of the same profile names in both analyses (see Table 15). Only two

rank-order differences were observed across all the indicators on all of the profiles. First, in the control group subset, the average age of initiation for the *Past Drinker* profile was slightly higher than for the *Light Drinker* profile (7.04 and 6.92, respectively), whereas, in the complete sample, the average age of initiation for the *Light Drinker* profile was slightly higher than for the *Past Drinker* profile (7.38 and 7.27, respectively). Second, in the control group subset, the *Moderate Drinker* profile exhibited marginally higher alcohol self-regulation than the *High Risk Drinker* profile (27.52 and 24.39, respectively), whereas in the complete sample, the *High Risk Drinker* profile exhibited marginally higher alcohol self-regulation than the *Moderate Drinker* profile (27.85 and 26.74, respectively). Given that the vast majority of the conditional mean patterns are identical, it appears that the student alcohol-related profiles from the complete sample were well replicated in the control group sample.

Phase 2e: Student alcohol-related profile subset and college outcomes at the 5-month follow-up. The next stage of the analyses aimed to explore the predictive validity of the student alcohol-related profiles on substance use outcomes in the first year of college. Because the student alcohol-related profiles from the complete sample were sufficiently replicated in the control group subset, the relationship between student alcohol-related profiles and student outcomes in college at the 5-month follow-up were examined using the control group profiles. Once again, individuals were classified into their most likely profile based on their posterior probabilities. Results indicated that these classifications could be assigned with a high degree of certainty, such that the average posterior probabilities for students' most likely profiles were greater than .93 for all profiles (i.e., .99, 1.00, .95, .93, and .98).

A multivariate analysis of variance was performed with latent profiles functioning as a five level between-subject factor and the seven indicators of alcohol use, alcohol-related consequences, and other substance use at the 5-month follow-up functioning as the multiple dependent variables. There was a significant effect of student alcohol-related profile, Pillai's F (7, 240) = 133.70, $p < .001$. Next, a series of one-way ANOVAs was performed, and significant effects were probed using Tukey post-hoc tests. Again, as with the perceived parenting profiles, this analytic strategy limited the experiment-wise Type I error rate to 5% despite the use of multiple correlated dependent variables.

Similar to the findings from the perceived parenting profiles, results indicated that there were significant mean differences across profiles on each outcome measured (see Table 16). Tukey post-hoc tests showed that for all dependent variables examined, students in the *High Risk Drinker* profile engaged in the greatest amount of alcohol and other substance use, as well experienced the highest level of negative consequences associated with alcohol use. To be specific, High Risk Drinkers had the highest peak BAC episode ($F_{4, 280} = 34.13$, $p < .001$), engaged most frequently in heavy episodic drinking ($F_{4, 280} = 31.37$, $p < .001$), and used tobacco ($F_{4, 246} = 10.62$, $p < .001$) and marijuana ($F_{4, 246} = 20.47$, $p < .001$) more often than each of the remaining four profiles. A similar pattern of results were observed for typical weekend drinking ($F_{4, 280} = 39.58$, $p < .001$), frequency of drunkenness ($F_{4, 280} = 37.15$, $p < .001$), and alcohol-related negative consequences ($F_{4, 280} = 42.94$, $p < .001$), such that the *High Risk Drinker* profile had higher means on these three outcomes than the other student alcohol-related profiles, with the exception of the *Moderate Drinker* profile.

The *Abstainer* profile reported significantly lower levels of peak BAC, typical weekend alcohol consumption, frequency of drunkenness, and alcohol-related negative consequences than all other profiles. *Abstainers* and *Past Drinkers* had a similar pattern of heavy episodic drinking, tobacco use, and marijuana use, with the *Abstainers* having had significantly lower levels than the other three profiles. Across the *Past*, *Light*, and *Moderate* profiles, there were relatively inconsistent patterns of significant comparisons, but there was a consistent trend in increasing risk behavior from the *Past* through the *Moderate* profiles. Overall, there appeared to be a very ordered pattern of results across substance use outcomes later in college, with *Abstainers* and *Past Drinkers* engaging in the least risky behaviors.

Phase 3: Examining Associations between Profiles using Latent Transition Analysis

In order to examine the extent to which perceived parenting profiles were associated with student alcohol-related profiles, latent transition analysis was used (Lanza & Collins, 2008). As mentioned in the plan of analysis, the perceived parenting profiles observed/identified in the complete sample functioned as the pseudo time 1 states and the student alcohol-related profiles found in the complete sample functioned as the pseudo time 2 states, such that the probabilities in the resulting transition matrix indicated the probability of being in each of the student alcohol-related profiles given membership in each of the perceived parenting profiles.

Results indicated that the probabilities of membership in each of the student alcohol-related profiles differed across perceived parenting profiles (see Table 17). The probability of being in the *Abstainer* student alcohol-related profile was three or more times higher in Profile 1 (*High Quality; Average Modeling and Approval*; $p = .40$),

Profile 2 (*Low Approval; Average Modeling and Quality*; $p = .36$), and Profile 3 (*Low Modeling, Approval, and Quality*; $p = .36$) than in the Profile 4 (*High Modeling and Approval; Low Quality*; $p = .12$).

In terms of the *Past Drinker* and *Light Drinker* student alcohol-related profiles, the probability of membership in these profiles was higher in Profile 1 (*p*'s = .25 and .19, respectively), Profile 2 (*p's* = .30 and .15, respectively), and Profile 3 (*p's* = .30 and .17, respectively) than in Profile 4 (*p's* = .18 and .11, respectively).

The probability of being in the *Moderate Drinker* student alcohol-related profile was approximately three times as great in Profile 4 ($p = .43$) as in the Profile 1 ($p = .13$), Profile 2 ($p = .16$), and Profile 3 ($p = .14$).

Students were more than eight times as likely to be in the *High Risk Drinker* profile if they were members of perceived parenting Profile 4 ($p = .17$) than if they were members of Profile 1 or Profile 2 (*p's* = .02). The probability of being in the *High Risk Drinker* profile was also four times higher in Profile 4 than in Profile 3 ($p = .04$). Further, this probability of belonging in the *High Risk Drinker* profile given membership in Profile 3, while small, is twice as large as the probability given membership in Profiles 1 and 2.

Finally, results indicated that the most likely student alcohol-related profile for perceived parenting Profiles 1, 2, and 3 was the *Abstainer* profile. The most likely student alcohol-related profile for perceived parenting Profile 4 was the *Moderate Drinker* profile.

In order to provide statistical validation for the relationship between perceived parenting profiles and student alcohol-related profiles, a 4×5 chi-square test of

independence was performed. Participants were classified into their most likely profiles based on their posterior probabilities (i.e., same procedure used in Phases 1e and 2e). Results of this analysis indicated that there was a statistically strong relationship between the two sets of profiles, $\chi^2(12) = 232.83$, $p < .001$.

Discussion

A growing body of literature has demonstrated that parents maintain influence on the alcohol and other substance using behaviors of their children, even as late as college (e.g., Abar, Abar & Turrisi, 2009; Boyle & Boekeloo, 2006; Chen, Grube, Nygaard, & Miller, 2008; Patock-Peckham & Morgan Lopez, 2006; Turrisi, Wiersma, & Hughes, 2000; Walls et al., 2009; Windle et al., 2008; Wood et al., 2009). Across these studies, a plethora of parenting characteristics has been linked with college student alcohol use. When examined all together, these studies illustrate what parents have known since the beginning of time: parenting is complicated. Previous, variable-centered work has been beneficial for applied researchers in the area of parenting by identifying a host of behaviors that have been shown to be predictive of negative outcomes, while holding other parenting characteristics constant. The use of a person-centered approach in the current study provided a different, more holistic, lens by which to examine parenting, capable of identifying potentially *influential* combinations of behaviors. Models were examined in which relatively broad sets of manifest indicator variables were utilized to illustrate distinct, unobserved profiles of both perceived parenting and student alcohol-related correlates. The relationship between the resulting latent profiles was then examined, in an attempt to explore the extent to which the type of parent one perceives having is associated with the type of alcohol-related profile one demonstrates. The data used in the current study came from a relatively large number of students and represented a much broader spectrum of parenting characteristics than have typically been examined in a single dataset. These indicators included both measures of general parenting characteristics (e.g., monitoring, quality) and measures of alcohol-specific parenting

behaviors (e.g., modeling, approval), making these data especially appropriate for the examination of these types of questions.

Several findings have important implications relevant for researchers, interested parents, and prevention scientists. For example, the construct of parenting was shown to follow a categorical latent structure, which may be informative for future research on parental influence. Parents may benefit from this study's conclusion that, in addition to alcohol-specific parenting characteristics (e.g,, approval, monitoring, modeling), elements associated with parent-teen relationship quality were also potentially influential in the prevention of college alcohol misuse. Finally, the population of parents and teens in this study evidenced important complexity in observed configurations of parenting and alcohol behaviors, to a point that at least some profiles could be argued to have qualitatively distinct characteristics. These unique profiles suggest that a targeted approach reflecting the profiles found in the current study might greatly enhance prevention program efficacy. These implications, as well as a more detailed summary of this study's conclusions, will be discussed below.

Summary of Findings

Perceived parenting. The current study found four distinct profiles of perceived parenting across the transition to college. The analytic approach used to illustrate these profiles of parents was relatively novel when compared with the majority of person-centered research examining sub-groups of parents of adolescents/emerging adults (e.g., Jones & Houts, 1992; Miller-Day, 2008). Whereas previous research has often relied upon the use of median splits and/or cluster analysis to demonstrate different types of parents, the current study employed a model-based approach (latent profile analysis) to

the exploration of parenting types, such that the fit of competing models with different

numbers of profiles could be compared using relative fit statistics. This type of modeling

helps limit (but often not eliminate) the subjectivity associated with creating sub-groups

(Pastor et al., 2007; Whiteman & Loken, 2006).

The first, smallest, and most optimal (in terms of student outcomes) profile found

was the *High Quality; Average Modeling and Approval* profile (Profile 1). This profile

was unique in that its members reported having the highest quality relationships with

their parents. The second and largest profile, the *Low Approval; Average Modeling and*

Quality profile (Profile 2), was distinguished by low levels of parental approval and very

high levels of monitoring and knowledge. Every student in Profile 2 reported that their

parents attempted to monitor their behavior "a lot" and knew "a lot" about how they

spent their free time. It was not surprising to find such high levels of parental knowledge

in this profile, given these families' high levels of perceived parental monitoring and

communication. Stattin and Kerr (2000) found that parental knowledge of teen behavior

comes from two primary sources: active parental surveillance and teen disclosure.

Monitoring represents the tracking of and attention paid to adolescent and emerging adult

activities (Dishion & MacMahon, 1998; Kerr & Stattin, 2000). Frequent communication

(coupled with average trust and support) can be considered a good proxy for the teen

disclosure portion of parental knowledge. Without either of these aspects, the very high

degree of parental knowledge seen in this profile would be very unlikely.

The third profile was the *Low Modeling, Approval, and Quality* profile (Profile 3).

Students in this profile perceived their parents as modeling and permitting relatively little

alcohol use. However, these typically protective behaviors (e.g., Boyle & Boekeloo,

2006; Wood et al., 2004) were occurring in the context of several typically risky

parenting characteristics (Padilla-Walker et al., 2008; Turner, Larimer, & Sarason, 2000).

The final perceived parenting profile was the *High Modeling and Approval; Low Quality*

profile (Profile 4). The behaviors characterized by membership in Profile 4 seemed to be

universally negative for adolescent substance use, and this expectation was confirmed

when Profile 4 was shown to have the riskiest pattern of alcohol and other substance use

later in college.

    Student alcohol-related correlates. Five distinct profiles of student alcohol-

related correlates were observed. While previous person-centered research has examined

student alcohol-related risk using mixture models (e.g., Coffman et al., 2007; Lanza et al.,

2007), the current study was relatively novel in that previous work has either clustered

individuals based on cognitions (Coffman et al., 2007) *or* behaviors (Lanza et al., 2007),

whereas the current study examined both. The current study was also relatively unique in

that it employed a person-centered approach to the study of underage alcohol use on a

sample of individuals across the transition to college. This transition has been shown to

represent an important and dynamic period in the development of alcohol misuse (Collins

& Steinberg, 2006; Dawson, Grant, Stinson, & Chou, 2004; Schulenberg et al., 1996) that

warrants further investigation from divergent theoretical and analytical perspectives.

    Approximately 56% of participants were members of the *Abstainer* or *Past*

Drinker profiles. None of the students in these two profiles demonstrated any recent

weekend or binge drinking. It must be noted that it was possible that some students in the

Past Drinker did use alcohol occasionally, though no use was reported in the prior month.

Light Drinkers were so named because, while engaging in some weekend drinking, their

consumption rarely reached levels consistent with heavy episodic drinking in the past two weeks. *Moderate Drinkers* reported earlier initiation, greater weekend drinking, and more frequent binge drinking than students in any of the first three profiles. Finally, students in the *High Risk Drinkers* profile reported heavy episodic drinking more than twice a week and consumption of approximately 17 drinks on a typical weekend, levels much higher than any of the other four profiles.

Covariate analyses found that members of the *Abstainer* profile tended to report lower SES relative to the other profiles. This may have been the result of higher SES students having more money to spend on alcohol and other substances than lower SES students. *Abstainers* were also more likely to be female than *High Risk Drinkers*, which corresponded well with previous, variable-centered research showing that male students tend to engage in riskier drinking behaviors (Borsari & Carey, 2001). Finally, non-White students were more likely to be in the *Abstainer* profile than White students, which was also supportive of previous variable-centered work that has found White college students to engage in more risky alcohol consumption than non-White students (Johnston et al., 2009; Wechsler et al., 2000).

A strong, auto-regressive and highly ordered pattern of results was found when examining profile differences in substance use later in college (e.g., *Abstainers* were least risky; *High Risk Drinkers* were most risky). These ordered patterns of student outcomes in college correspond to previous variable-centered work showing high rank-order stability in alcohol use across the transition to college (Read, Wood, & Capone, 2005; Reifman & Watson, 2003).

Perceived parenting and student alcohol-related correlates. The final analysis explored the extent to which the type of parent students perceived was associated with the pattern of alcohol-related behaviors students exhibited. By employing this type of approach, a new understanding and new estimates of student risk were able to be established, in terms of probabilities of student risk given the presence of certain patterns of protective/risky parenting characteristics. This approach also facilitated an intuitive, multivariate exploration of "good enough parenting" (Scarr, 1992; discussed in depth below) at this crucial period of development.

The results of the latent transition analysis supported the longitudinal analyses performed, in that each indicated a clear association between the two sets of profiles. The most risky student alcohol-related profiles were most commonly observed among students who perceived their parents as portraying the most risky set of behaviors. More specifically, the *High Risk Drinker* and *Moderate Drinker* profiles were most frequently observed among students who perceived their parents as belonging to Profile 4 (*High Modeling and Approval; Low Quality*). The perceived parenting profile most associated with positive student outcomes later in the first year of college, the *High Quality; Average Modeling and Approval* profile (Profile 1), was also shown to be most associated with student membership in the least risky alcohol-related profiles (i.e., *Abstainers and Past Drinkers*). Both the cross-sectional and longitudinal results from this study are in accordance with the findings from a recent review of the literature on parental influence on underage drinking (Windle et al., 2008). Researchers found that a high quality parent-teen relationship, high levels of parental monitoring, frequent parent-teen communication, and time spent together, or parental access, were consistently linked with

delayed or reduced alcohol-related behaviors and problems for students. Students in

Profile 1 perceived their parents as demonstrating the majority of these desirable parental

qualities. To the author's knowledge, this study represented the first exploration of how

these parenting characteristics may tend to cluster together within sub-groups of the

parents of college bound youth.

Perceived Parenting as a Latent Construct

The results of the current study provide further support for the position that

parenting is complex and heterogeneous. As mentioned above, this necessitates

analytical techniques capable of portraying this complexity in interpretable ways. Using

one such method, the unordered perceived parenting profiles found in the current study

point to the categorical nature of the higher-order latent variable of parenting. The

current study shows that a host of parenting characteristics that would be represented by

multiple continuous latent variables can be appropriately represented by a single

categorical latent factor (i.e., four latent profiles). A wealth of research on parenting in

childhood and earlier adolescence has recognized this fact and employed person-

centered, typological paradigms (e.g., Baumrind, 1971, 1999; Darling & Steinberg, 1993;

Maccoby & Martin, 1983).

Beyond parenting styles. The most recognizable and enduring of these paradigms

involves the examination of the parental warmth and control circumplex (Baumrind,

1971; Maccoby & Martin, 1983). Parental warmth encompasses behaviors associated

with responsiveness to child needs and acceptance of child autonomy. Parental control

encompasses the limit setting and consequences of child transgressions of these limits.

Parents high in both warmth and control have been characterized as *authoritative*, and

this style of parenting tends to result in the most optimal development (e.g., Gray &

Steinberg, 1999). Parents high in control and low in warmth are described as

authoritarian, whereas those parents high in warmth and low in control have been

described as *permissive* or *indulgent*. The final style, labeled *neglectful* or *uninvolved*,

incorporates little warmth or control. This classification scheme has been shown to be

predictive of a variety of child and adolescent outcomes (e.g., Adalbjarnarddottir &

Hafsteinsson, 2001; Gray & Steinberg, 1999; Lanborn, Mounts, Steinberg, & Dornbusch,

1991).

While the Baumrind typologies (1971, 1999) are an appealing and established,

four group classification scheme, there are several reasons why the profiles observed in

the current study are not interpreted as corresponding to this paradigm. First, the

indicators of parental behaviors used in the current study go well beyond the two

dimensions of warmth and control. For example, the current study includes an

examination of alcohol-related behaviors of parents and alcohol-related communications,

neither of which could be well placed in the warmth/control circumplex. In addition,

measures of parent-teen conflict have been shown to be important for student alcohol use

(Duncan et al., 1998), but conflict does not specifically tap either dimension. A related

second reason the Baumrind styles were not sufficient involves the developmental

advances of individuals transitioning to college that require domain specificity of

messages. As mentioned above, the transition to college is associated with rapid

contextual changes and rapid increases in alcohol use (Dawson, Grant, Stinson, & Chou,

2004; Schulenberg et al., 1996). The current study does, to some degree, examine the

limit setting aspect of parental control, but these limits are focused on alcohol use (i.e.,

parental approval of alcohol use). While a general pattern of warmth and control might

be sufficient for fostering appropriate outcomes during childhood and early adolescence,

the developing autonomy (Beck, Taylor, & Robbins, 2003; Larose & Boivin, 1998) and

diversification of contexts (Collins & Steinberg, 2006; Schulenberg et al., 2000)

associated with the transition to college appears to necessitate a more specific

examination of parenting. Finally, a wealth of person-centered research has highlighted

the importance of the non-warmth or control indicators used in predicting college alcohol

misuse and negative consequences (e.g., Biderman et al., 2000; Boyle & Boekeloo, 2006;

Hawkins, Catalano, & Miller, 1992; White, Johnson, & Buyske, 2000). This expanding

literature required attention in the discussion to potential unobserved parenting profiles

across this period.

  Associations with other person-centered parenting research. In general, the four

profiles found in the current study are supported by and show some similarity to those

found in a study by Jones and Houts (1992). In this study, researchers created parent sub-

groups by dividing the sample based on responses to a single composite variable of

parental problem drinking. Profile 4 (*High Modeling and Approval; Low Quality*) found

in the current study has some resemblance in terms of relative size (~21% of the sample)

and substantive content to the combination of the regular problem drinking (10%) and

occasional problem drinking (10%) sub-groups of parents described by Jones and Houts

(1992). Jones and Houts (1992) found that college students who perceived their parents

to be regular problem or occasional problem drinkers had the least positive regard and

positive expressions of feelings toward their parents across groups. These associations

were similar to the findings from the current study showing that Profile 4 demonstrated

relatively poor relationship quality. The remaining two groups of parents found by Jones

and Houts (1992) were labeled minor problem drinkers (19%) and non-problem drinkers

(61%), which made them moderately similar to the remaining three profiles found in the

current study. As with the parenting style literature, the current study expanded upon this

previous person-centered research by using a broader and more representative set of

parenting characteristics and a more analytically rigorous approach to selecting profiles.

In addition, Jones and Houts (1992) did not examine the association between their

parenting sub-groups and student outcomes, while the current study used perceived

parenting profiles to predict cross-sectionally and longitudinally.

Student Alcohol-Related Correlates as a Latent Construct

The current study added to existing literature examining student alcohol use and

associated behaviors using a person-centered approach (e.g., Auerbach & Collins, 2006;

Lanza et al., 2007; Lanza & Collins, 2008; Muthén & Muthén, 2000; Power, Stewart,

Hughes, & Arbona, 2005). Across these studies, one relatively consistent finding that

was also illustrated in the current study was the presence of a highly-ordered set of

student groups. These current findings, when coupled with previous work, suggest that

student-alcohol related behaviors represent a single, continuous underlying factor. The

current study presents some of the strongest evidence for this interpretation, given that

both behaviors and cognitions were examined using person-centered analysis.

Utility of a categorical approach with a potentially continuous construct. Despite

the resulting ordered pattern of profiles representing a potentially continuous latent

structure, there are several important conclusions that could be drawn from the current

study. As pointed out by Muthén (2001), one advantage that an ordered pattern of

profiles has over a continuous factor is that the person-centered, mixture modeling approach helps identify relatively homogeneous sets of individuals, which can be difficult in factor analytic approaches including structural equation modeling. This aspect of the analytic plan provided for two important insights with regard to the student alcohol-related profiles. First, the majority of individuals transitioning to college were not currently engaging in risky alcohol use (i.e., *Abstainers* and *Past Drinkers*). A variable-centered approach describing mean levels of student-alcohol related behaviors (e.g., typical weekend drinking, heavy episodic drinking) would misrepresent the normative alcohol use trends in the sample. This may have implications for feedback based interventions in that using normative trends could potentially have iatrogenic effects on those individuals currently abstaining from alcohol use or drinking alcohol at levels below the trend. In addition, the presence of this high percentage of students displaying minimal risk may be negatively impacting efficacy estimates for universal, college-based prevention programs due to floor effects. Specifically, over half of students in this sample begin college displaying no typical alcohol use, which leaves no risk for intervention programs to reduce or eliminate. A program showing modest effects, when examined at the sample level, may have relatively stronger effects for students who are currently engaging in risky alcohol-related behaviors (e.g., *Moderate* and *High Risk Drinker* profiles). Second, the current study found that only six percent of the sample was engaging in the type of high risk drinking that is characterized in popular media (e.g., "Animal House"). This is encouraging, when examined from a public health or college administrator perspective, such that efforts to eliminate these patterns of behaviors need only focus on a relatively small sub-set of the student population. However, it is

important to remember that a small group like the one illustrated is capable of creating a host of problems for themselves, their peers, and the university, as a whole. The pattern of frequent and extensive binge drinking espoused by this profile puts them most at risk for mortality and morbidity as the result of alcohol use (Hingson et al., 2005). In addition, approximately 13% of students report having been pushed, shoved, or assaulted (Hingson et al., 2005) and 27% have been insulted/humiliated as the result of the alcohol use of another college student (Wechsler, Moeykens, Davenport, Castillo, & Hansen, 1995). Finally, over 50% of college administrators at schools with high levels of alcohol use (similar to the setting of the current study) report campus property damage as a "moderate" or "major" problem (Wechsler et al., 1995).

Another unique finding from the current study was that the level of student risk shown across profiles seemed to indicate that, when examining student alcohol-related characteristics in a person-centered framework, relative risk is not a linear function, but rather may instead be exponential. For example, the level of alcohol use and alcohol-related experienced negative consequences show fairly slow increases across the first three profiles (*Abstainer*, *Past Drinker*, and *Light Drinker* profiles), followed by rapid escalation of alcohol-related characteristics means. To be more specific, the conditional means in the *Moderate Drinker* profile were more than double the conditional means in the *Light Drinker* profile, and the alcohol use conditional means in the *High Risk Drinker* profile were more than double the conditional means in the *Moderate Drinker* profile.

Disentangling Parental Influence Across the Transition to College

In addition to the construct of parenting being complex and difficult to study, the influences of this construct are also complex, in their own respect. Many parental

characteristics have been shown to have direct effects on behaviors or outcomes (e.g.,

Abar & Turrisi, 2008; Nash, McQueen, & Bray, 2005), while other exert indirect

influences (e.g., Abar & Turrisi, 2008; Barnes et al., 2000; Wood et al., 2004). In

addition, some parenting behaviors likely have primarily contemporaneous effects (e.g.,

parental approval/limits in high school), whereas other characteristics are likely fostered

earlier and have longer lasting impacts (e.g., parental access, trust, and support). The

current study sought to explore these empirical and theoretical complexities by

examining the influence of parental behaviors when in the context of other behaviors.

This exploration led to several interesting findings.

Beyond alcohol use. It was not surprising to find that the High Modeling and

Approval; Low Quality profile (Profile 4) demonstrated the most risky pattern of

substance using behaviors across profiles. Previous variable-centered work has shown

that high levels of parental alcohol use modeling (Beal, Ausiello, & Perrin, 2001; White,

Johnson, & Buyske, 2000), low levels of parental monitoring and knowledge (Barnes,

Reifman, Farrell, & Dintcheff, 2000; White et al., 2006), a permissive parental attitude

toward underage alcohol use (Abar, Abar, & Turrisi, 2009; Wood et al., 2004), and poor

parent-teen relationship quality (Larose & Boivin, 1998; Turner, Larimer, & Sarason,

2000) were predictive of heavier use and experienced consequences in college. It was

interesting, however, that this profile also displayed the highest levels of marijuana and

tobacco use, particularly considering the fact that these profiles were constructed largely

using alcohol-related characteristics. These cross-substance findings are in support of a

plethora of work on common influences on substance use, delinquency, and related

problem behaviors, such as Jessor's (1987) Problem Behavior Theory, which states that

risky behaviors that are in opposition to legal and/or social norms are expected to covary. With regard to parenting influence, alcohol, tobacco, and marijuana use likely have common correlates (e.g., low monitoring, poor relationship quality). As such, students who have been influenced toward alcohol use would be more likely to use other substances, as well.

Profile 1, the *High Quality; Average Modeling and Approval* profile, displayed the most optimal levels of alcohol-related outcomes, which may indicate a need to move beyond a focus on more traditional, alcohol-related parental influences. Although it appears that aspects of relationship quality play an important role in classifying this profile, this finding was surprising considering that measures of parent-teen relationship quality are not often central in the discussion of parental influence on college alcohol misuse. There are several potential reasons for this. The first reason is practical: Relationship quality is a multi-dimensional construct fostered and maintained across the lifespan. Behaviors such as limit setting, monitoring, and modeling of alcohol use are likely more easily modifiable, from a prevention standpoint, making them more attractive targets to applied researchers. The second reason is methodological: It is possible that indices of relationship quality have not received as much attention in the area of preventing college alcohol misuse because, in variable-centered research, it does not tend to have a main effect on student outcomes. However, in person-centered work where higher-order interactions can be illustrated, relationship quality may emerge as a primary contributing factor to profile differences. Future variable-centered work should examine this hypothesis (a) by examining the same set of parenting behaviors using a continuous latent variable framework (SEM) and (b) by examining the impact of more commonly

examined parenting characteristics (e.g., modeling, monitoring) when in the context of high and low relationship quality (e.g., multiplicative effects).

Equifinality in parenting? One finding that was somewhat surprising was the general lack of significant differences in substance use outcomes between the remaining three perceived parenting profiles. These null findings may be due to the fact that these profiles displayed differential combinations of both potentially risky and potentially protective characteristics (e.g., high/low relationship quality, high/low approval, high/low modeling). To extrapolate further, this preponderance of similarities in outcomes across Profiles 1 (*High Quality; Average Modeling and Approval*), 2 (*Low Approval; Average Modeling and Quality*), and 3 (*Low Modeling, Approval, and Quality*) highlights the notion of "good enough parenting" (Scarr, 1992). This framework states that children and adolescents tend to develop in a relatively normal fashion given minimally acceptable parenting characteristics such as those displayed in each of these three profiles. In addition, the relatively similar outcomes observed across these three perceived parenting profiles also highlight the related notion of equifinality (Cicchetti & Rogosch, 1996), meaning that similar developmental outcomes can occur as the result of differing patterns of antecedents. Yet another potential justification for these similar profile outcomes is that the most integral aspects of parenting across the transition to college were represented in each of these three profiles. For example, Profile 4 was distinguished from Profiles 1, 2, and 3 by its high levels of modeling and approval of use. It is possible that it is only the presence of these characteristics that is driving the profile differences and similarities observed. One piece of evidence against this particular

hypothesis is that Profile 3, which is characterized by the lowest levels of modeling and

approval, did not show the lowest levels of alcohol and other substance use.

    Challenges in monitoring. Another interesting finding regarding parental

influence was that the *Low Approval; Average Modeling and Quality* profile (Profile 2)

was *not* associated with the most protective alcohol-related outcomes (neither

concurrently nor prospectively). This was somewhat surprising considering that this

perceived parenting profile endorsed the highest levels of protective characteristics, with

the exception of relationship quality on which they were only average. Given the

presence of both the highest levels of parental monitoring across all profiles and an

average level of conflict, one potential explanation may be that these parents were

perceived by their late adolescent children to be "helicopter parents" (Lum, 2006). In

general, this term refers to parents that constantly "hover over" and smother their college-

bound teens, and it is possible that these parental efforts at surveillance are the cause of

the relatively average levels of conflict in the context of above-average trust and support

seen in this profile. While these parents may be actively monitoring and soliciting

information from their teens, this weakening of the parent-teen relationship could be

resulting in students engaging in more risky drinking behaviors (Kerr & Stattin, 2000).

Information regarding students' affective perceptions of parental monitoring behaviors

would be necessary to confirm this possibility. Another potential explanation for these

findings may be that the high levels of monitoring and average levels of conflict found in

this perceived parenting profile reflect child effects rather than parent effects (Lytton,

1990). That is, if students engage in higher levels of risky behaviors, parent monitoring

attempts and conflict may increase as parents attempt to influence their children toward

safer behaviors. It is possible that this is the underlying difference between the *Low Approval; Average Modeling and Quality* profile (Profile 2) and the *High Quality; Average Modeling and Approval* profile (Profile 1). Parents in Profile 2 might have been more reactive due to alcohol-related behaviors that their teens have already displayed, and parents in Profile 1 might represent more proactive parents of teens who do not yet drink. In order to investigate this explanation, additional information would be required regarding parental *motivations* for their monitoring behaviors.

Bi-directionality. The issue of adolescent and parent effects (Steinberg, 2001) extends beyond the issue of monitoring in the current study. For example, the high quality parent-teen relationships seen in Profile 1 could be attributed to safe and acceptable behavior on the part of the teen (e.g., few conflicts because the teen behaves well in the eyes of the parents rather than the teen behaves well because of few conflicts). This bi-directional, "chicken and the egg" relationship is in no way unique to the examination of parental influences on college alcohol use (see Cook & Kenny, 2005). It would be possible to design a randomized, control group design where the treatment group received an intervention aimed at reducing parent-teen conflict and enhancing other aspects of relationship quality. Any post-test differences could be attributed to differences in quality, lending support for the causal path from parents to teens. Another way to begin disentangling this relationship would be through the use of cross-lag longitudinal analyses. A stronger cross-lag relationship from previous parenting to student alcohol use could provide support for the primacy of parental behaviors. An appropriate person-centered approach that could potentially provide even more complete evidence of a lead/lag relationship is known as associative latent transition analysis

(aLTA: Flaherty, 2008). These models were specifically designed to examine the effects of stability and change in one categorical process (e.g., perceived parenting profiles over time) on a different categorical process occurring at the same time (e.g., changes/stabilities in student alcohol-related profiles). Another potential approach to this problem would be to collect qualitative data on parental motivations or goals of their behaviors. More specifically, mixed models where parents quantitatively report on their behaviors and qualitatively report on motivations/goals for these behaviors could go far toward the disentanglement of parent and teen effects across the transition to college.

Implications

    Implications for research. The current study added to the existing literature highlighting the utility of examining parenting and college drinking using a person-centered approach (Auerbach & Collins, 2006; Lanza et al., 2007; Lanza & Collins, 2008; Muthén & Muthén, 2000; Power et al., 2005). Results appeared to indicate that the construct of parenting across the transition to college followed a categorical, latent structure, whereas the latent construct of student alcohol-related risk appeared to be more continuous in nature. This suggests that person-centered approaches may be more appropriate for the examination of parenting whereas a variable-centered approach may be more appropriate when dealing with student alcohol-related risk behaviors. Issues of "good enough parenting" (Scarr, 1992) and equifinality (Cicchetti & Rogosch, 1996) were also raised in regard to the influence of parental behaviors on alcohol and other substance use across the transition to college, which should be examined in greater depth in future studies.

Implications for parents. The vast majority of parents can be considered "amateur prevention scientists" who utilize their personal knowledge and skills to try to protect their children to the best of their abilities. Regrettably, there are no simple answers to the challenge of promoting healthy transitions to college and preventing college alcohol misuse and associated negative consequences. However, the current study did provide some applicable information for parents interested in limiting their college bound teen's risk for negative consequences associated with alcohol use. First, relationship quality was shown to potentially play an important role in limiting college risk. It is possible that by focusing on establishing trust, displaying support, and being accessible to their teens, parents might enhance student receptiveness to anti-alcohol messages. In other words, a quality parent-teen relationship might represent a sound base from which to develop more alcohol-related protective messages and behaviors. Second, it appeared that the most successful parents tended to model little alcohol use, while maintaining a high degree of knowledge about their adolescent's behavior. Whether the operative mechanisms for this observed relationship operate through shared values (e.g., healthy lifestyle, religious beliefs), credibility gained through non-hypocritical messages to teens (i.e., in contract to, "do as I say, not as I do"), or some other indirect process remains to be explored in future research. Finally, appropriate domain specific limits and communications (e.g., alcohol-related) were common in profiles characterized by relatively low alcohol use across the transition to college.

Implications for prevention. The results of the current study could be useful to prevention scientists through the use of profile membership as a screening tool for programs designed to reduce the onset or extent of college substance use. Researchers

and practitioners seeking to improve program efficacy and efficiency might benefit from identifying, prior to college entry, parent profiles and tailoring intervention materials to coincide with the specific strengths and deficits associated with each profile. For example, with parents classified as belonging to Profile 3 (*Low Modeling, Approval, and Quality*), researchers might choose to focus their time and resources on decreasing parent-teen conflict and increasing parental trust and support. Interventionists would most likely focus on decreasing parental approval of underage alcohol use while simultaneously enhancing relationship quality for members of Profile 4 (*High Modeling and Approval; Low Quality*). Similarly, student alcohol-related profile membership could be used as a screening tool to identify which students appear to be more at risk for alcohol misuse. For example, students in the *Abstainer* and *Past Drinker* profiles are already avoiding alcohol use. These students would show little benefit from programs aiming to decrease alcohol use and would potentially benefit from prevention programs aimed at maintaining this level of abstinence and/or safe use. In contrast, students in the *High Risk Drinker* profile might require enhanced program dosage (e.g., booster materials) to show observable benefits. For example, brief motivational feedback interventions utilizing the BASICS protocol (Larimer et al., 2007), which is primarily individual and peer focused, typically pre-screen for high risk drinkers requiring additional sessions. These programs could benefit from also screening for perceived parenting characteristics that may indicate a need for an additional, parent-based intervention module. Targeted/tailored interventions like these have the potential to show greater benefits for participants and be less expensive than universal/one-size-fits-all designs (Offord, 2000).

One potentially inconvenient finding from the current study for prevention scientists focused solely on the college years was the apparent importance of parent-teen relationship quality in predicting negative outcomes. As mentioned above, parent-teen relationships are fostered and maintained over the lifespan and may require substantial investment to modify. This could potentially limit the efficacy of *brief*, parent-based prevention efforts and, as such, calls for more intensive, long-term prevention strategies that entail greater time, money, and effort to implement and sustain.

Limitations

There were several limitations to the current study that should be noted. First, the measures of perceived parenting practices and student alcohol-related characteristics used in the current study were obtained exclusively from the student participants. This reliance on student self-report data may raise concerns about the validity of these perceptions of parenting and the accuracy of retrospective alcohol use measures. Although literature exists documenting that adolescents can accurately and reliably report on their parents' practices (Golden, 1969; Moscowitz & Schwartz, 1982) and on their own substance use behaviors (Burleson & Kaminer, 2006; Sobell & Sobell, 1997), future studies might be further strengthened by the incorporation of multiple methods of data collection (e.g., self-reports, biological markers, direct observation) and/or multiple reporters (e.g., student, parent, collateral reporters).

Second, the measurement of several indicators of the perceived parenting profiles was relatively crude. For example, possible responses on the parental monitoring and parental knowledge indicators were limited to 1 to 3. This may have limited the ability of the current study to more thoroughly describe profile distinctions on these variables due to

ceiling/floor effects. While the measurement of these parental characteristics was not optimal, these variables did demonstrate a degree of predictive validity, as each measure was found to be bivariately associated with student alcohol use characteristics. Future research should seek to use more expansive indicators of monitoring and knowledge that allow for more variability in participant responses.

Third, many of the indicators of the perceived parenting profiles represented aggregate measurement across mothers and fathers (i.e., monitoring, knowledge, approval of alcohol use, trust and support, parental access, and alcohol communications). These more global measures of perceived parenting characteristics were used in lieu of more parent specific measures in order to limit the number of indicators used to estimate latent profiles. By limiting the number of indicators, both the estimation and interpretation of the profiles were improved (i.e., easier model convergence and more parsimonious profiles). However, it is possible that using parent specific measures on each indicator might have resulted in different profiles being observed. Future research with a larger sample should seek to examine the potential impact of both mothers' and fathers' characteristics on latent profile construction and membership.

Fourth, results from the current study seemed to imply that the *a priori* interpretation of the alcohol self-regulation measure was incorrect. It was expected that this measure would index the extent to which students were introspective and reflective about their use of alcohol, and that high levels were expected to be more protective against student risk than low levels. However, an opposite pattern of results was observed, with students who reported the most alcohol use and experienced consequences also reporting the highest alcohol self-regulation. It appeared that those students who

reported little or no alcohol use did not often think about their own use relative to their peers. Future research using this measure might benefit from conceptualizing it as an index of relative preoccupation with alcohol use.

Fifth, the prospective portions of the current study (i.e., predicting student outcomes using profile memberships) were limited to a subset of the total sample (approximately ¼ of the total sample) due to the data coming from a four condition randomized trial aimed at improving student alcohol-related outcomes. This limitation reduced the statistical power associated with these profile comparisons. Future work seeking to replicate the longitudinal findings from the current study should use a larger sample or a sample from an etiological study that would not require sub-setting.

Finally, the complete sample used in the current study was relatively homogeneous in terms of ethnicity, with the vast majority of students being non-Hispanic White. While representative of many large universities in the Northeast and Midwest United States, the demographic composition of the current sample is not representative of the overarching population of college students across the country. A somewhat related concern is that the current study focused exclusively on students transitioning to college. In order to better understand the influence of parenting profiles on the transition to adulthood, a more representative sample of the college population should be examined, as should a sample of non-college bound youth.

Future Directions

There are a variety of directions for future research that are highlighted by the findings from the current study, beyond those accounting for the above mentioned limitations. One potentially illuminating direction for research that is a direct extension

of the current study involves the longitudinal examination of perceived parenting profiles. The current study found four distinct profiles of perceived parenting assessed just prior to college entrance. It would be interesting to understand the extent to which membership in these profiles is stable across the transition to adulthood, as well as the extent and direction of transitions between profiles. For example, researchers might find that membership in the *High Modeling and Approval; Low Quality* profile is highly stable across the transition to college but that members of the *High Quality; Average Modeling and Approval, Low Approval; Average Modeling and Quality*, and *Low Modeling, Approval, and Quality* profiles transition to other profiles more frequently. These stabilities and transitions could also be examined as outcomes of interventions aimed at enhancing parenting (i.e., treatment students demonstrate greater transitions into the most optimal parenting profile than controls).

Another way in which the person-centered results from the current study could be extended would be to examine how perceived parenting profiles are associated with profiles created using parental reports. As mentioned above, research exists showing students are capable of accurately describing parental characteristics (Golden, 1969; Moscowitz & Schwartz, 1982). However, it remains possible that a different set of parenting profiles would be seen with the use of parental reports of their own behaviors. It is also possible that discrepancies in profile membership depending on the source of the data (e.g., parents believe themselves to be less risky than students perceive them to be) could be predictive of increased risk, as this type of discrepancy is likely due to a disconnect in the messages parents are trying to convey and the messages students are internalizing.

Finally, the cross-sectional and prospective associations between perceived parenting characteristics and student alcohol-related characteristics shown in the current study highlight the need for research designs capable of implying causal relationships between these variables. Although it would be nonsensical and unethical to randomly assign participants to experimental conditions based on many of the parenting characteristics discussed (i.e., randomly assign students to high or low alcohol modeling parents), a high degree of causality can be established through the use of advanced methods, like propensity score matching (Dehejia & Wahba, 2002). These methods seek to identify all the possible influences on a particular variable (e.g., all influences on parental monitoring), match participants on these characteristics to create equivalent groups (i.e., identical groups with the exception of low vs high levels of parental monitoring), and then estimate the impact of the variable in question on outcomes using these matched groups. These types of designs offer real opportunities for researchers to establish causal relationships in the absence of randomization. A related future direction of research in the area of parental influence on student alcohol use is the incorporation of factorial experimental designs as a way to examine the efficacy of interventions being conducted (Collins, Murphy, & Strecher, 2007). The current study supported the notion that parenting is a multi-dimensional concept, and many interventions utilizing parents acknowledge this by attempting to influence a variety of parenting characteristics through multiple modules or lessons. By using factorial designs, the causal impact of the individual modules could be evaluated, which would allow researchers to make their programs more efficient by eliminating or refining ineffective pieces while maintaining the most efficacious sections. This process would also provide valuable data on which

parental characteristics are most amenable to change, which would further enhance efficiency by focusing resources toward modifiable parental behaviors and/or cognitions.

Conclusion

Perhaps the most important lesson to be learned from the current study is that parenting is complicated and should be examined as such. Latent profile and latent transition analyses represent person-centered, holistic methods suitable for this type of examination. The methodological approach employed in the current study was shown to be well suited to this task, as parenting was found to follow a categorical latent structure consisting of four unobserved patterns of behaviors. Results also revealed that, in addition to alcohol-specific parenting behaviors, which have already been highlighted in previous work, a focus on enhancing elements of parent-teen relationship quality (i.e., trust, support, access, and conflict) may also play an influential role in preventing college alcohol misuse. Finally, the current study found that there are distinct, unobserved types of parents and students, such that the use of a person-centered approach in the screening phase of prevention research may allow for more efficient and efficacious targeted programming.

Figure 1

Conceptual model
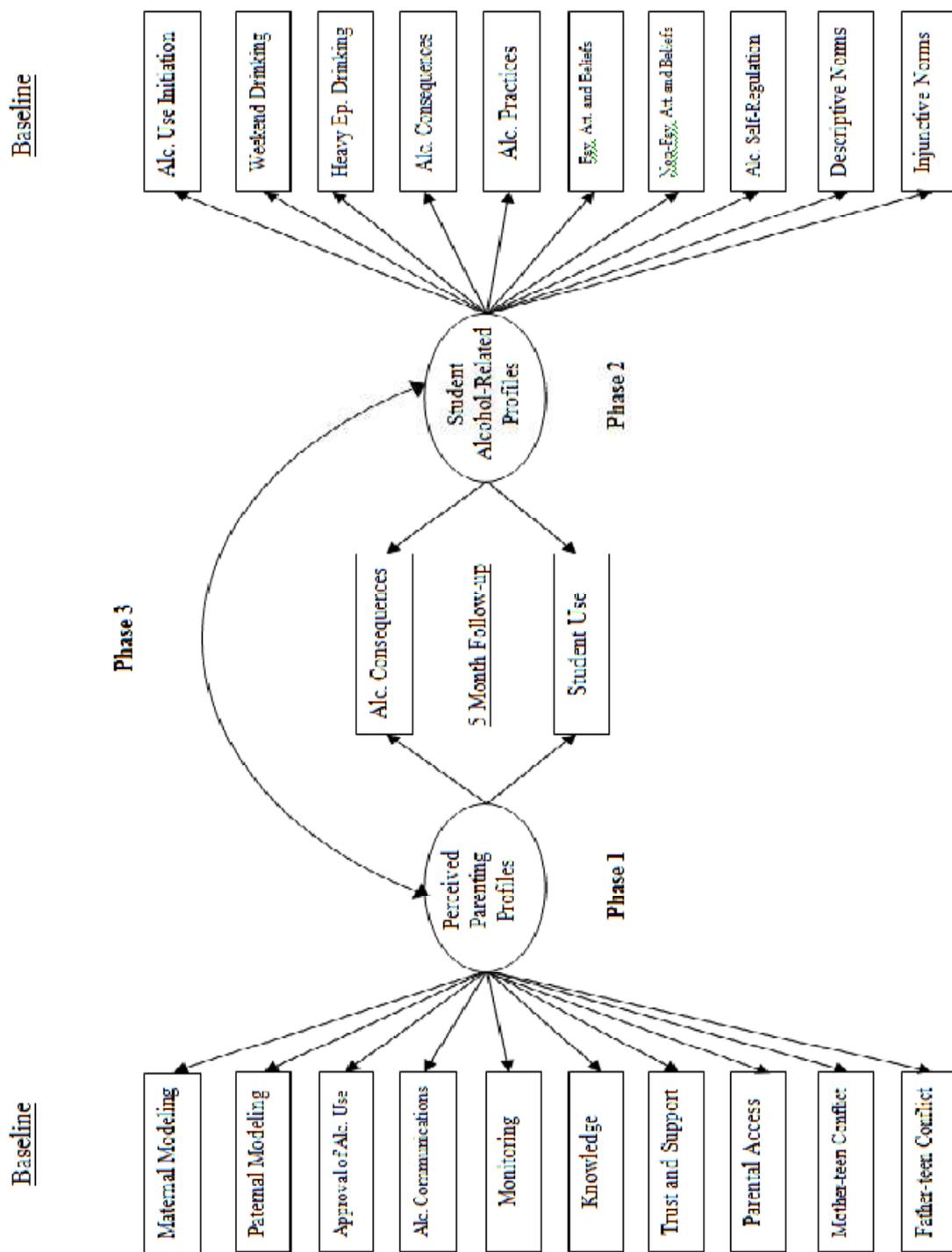
Figure 2

Perceived parenting profile standardized conditional means by indicator
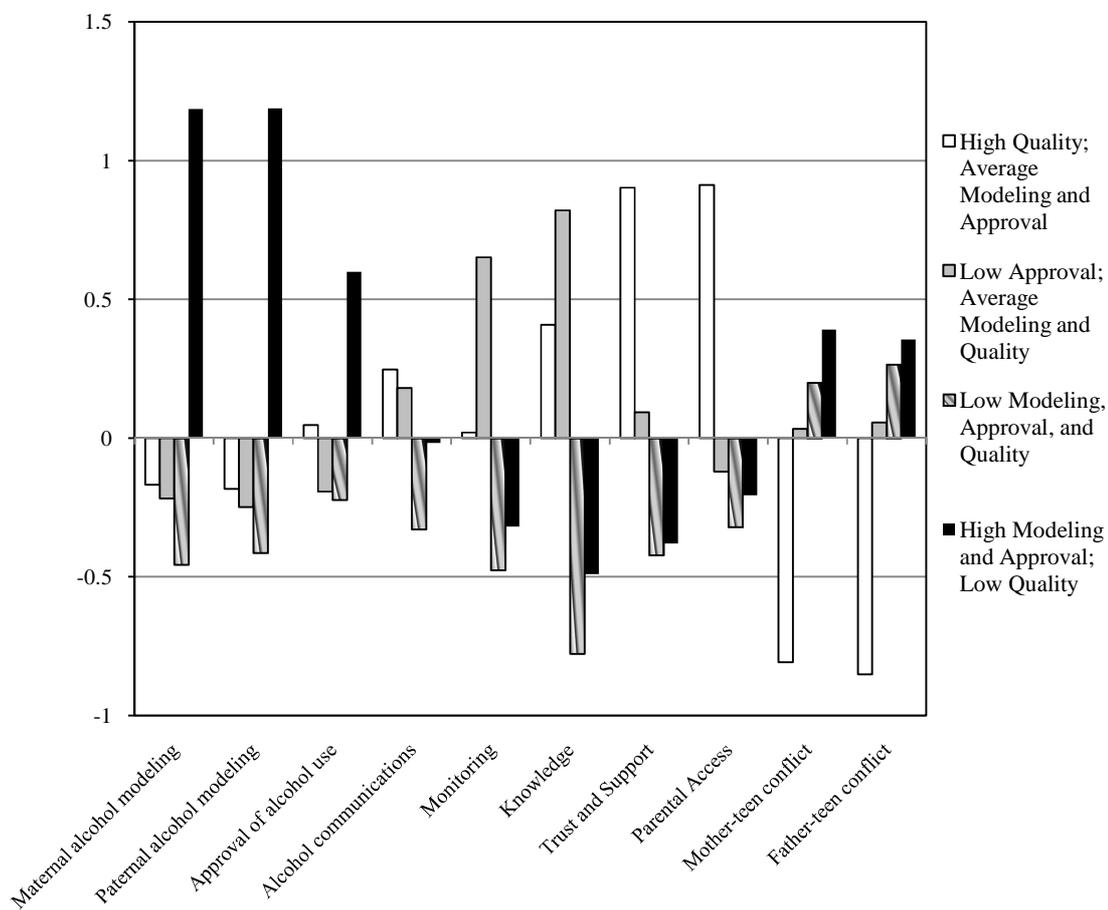
Figure 3

Perceived parenting profile standardized conditional means by profile
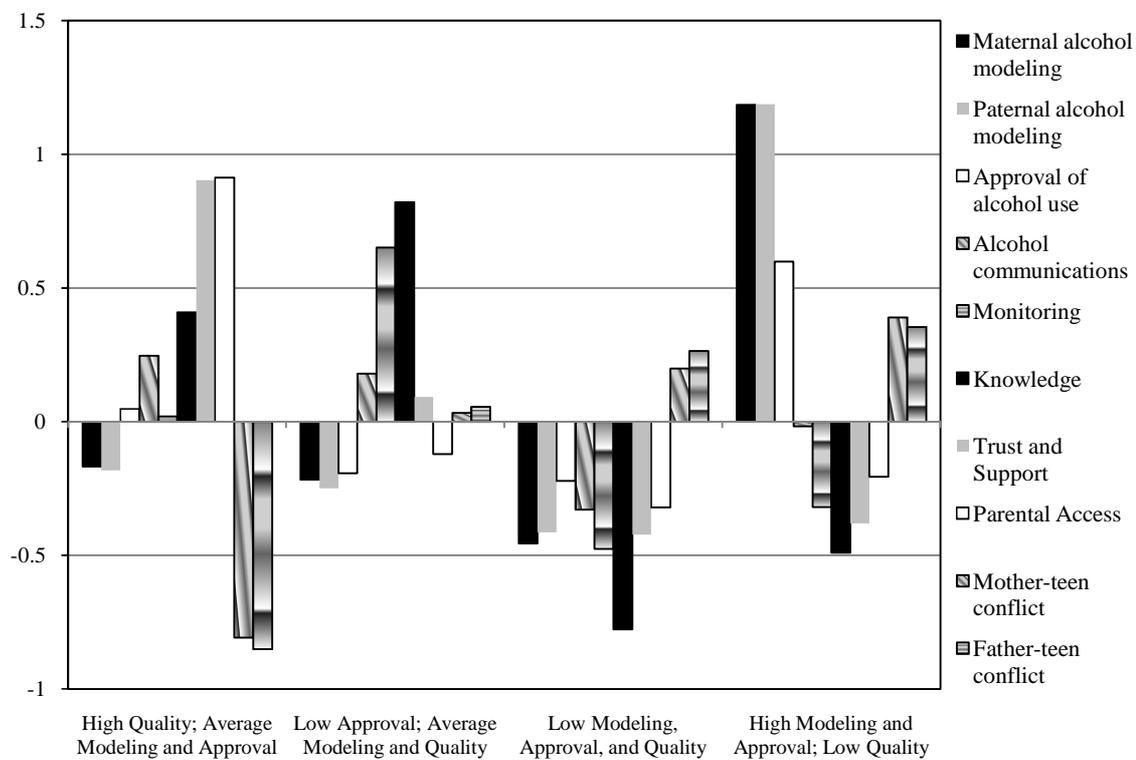
Figure 4

Student alcohol-related profile standardized conditional means by indicator
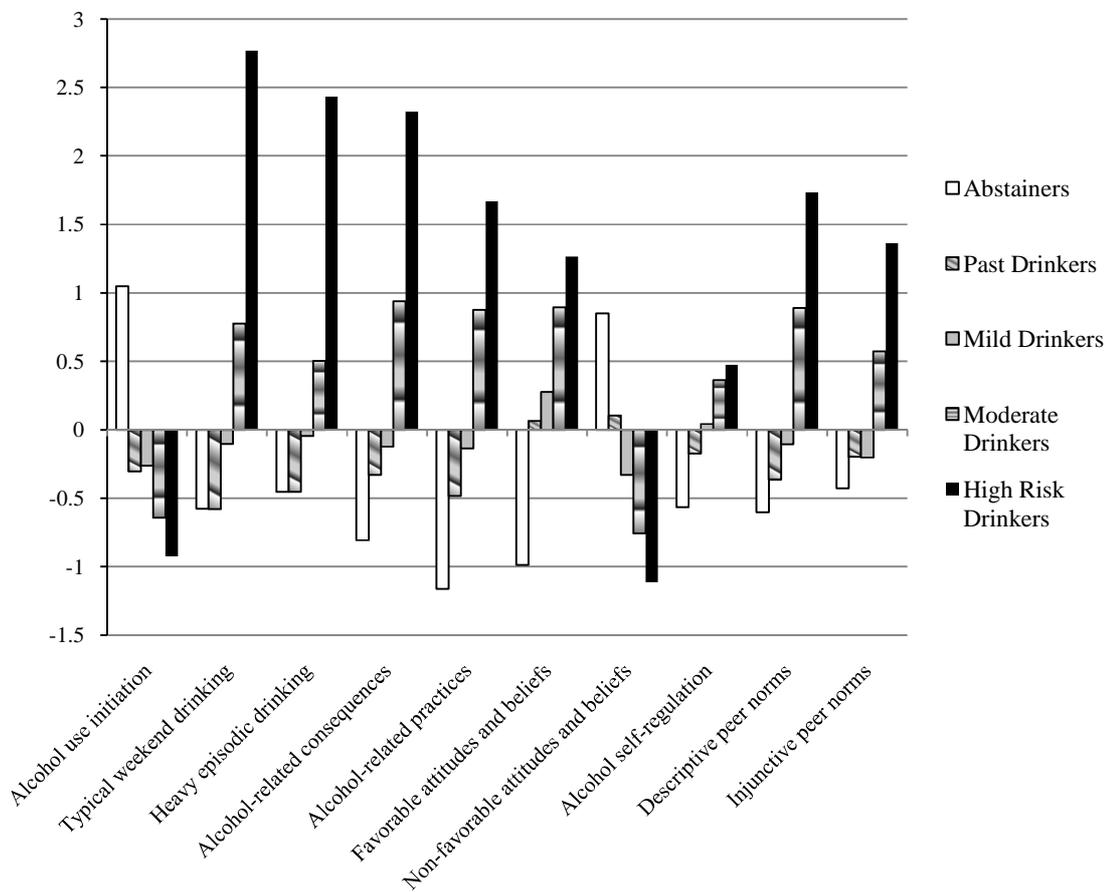
Figure 5

Student alcohol-related profile standardized conditional means by profile
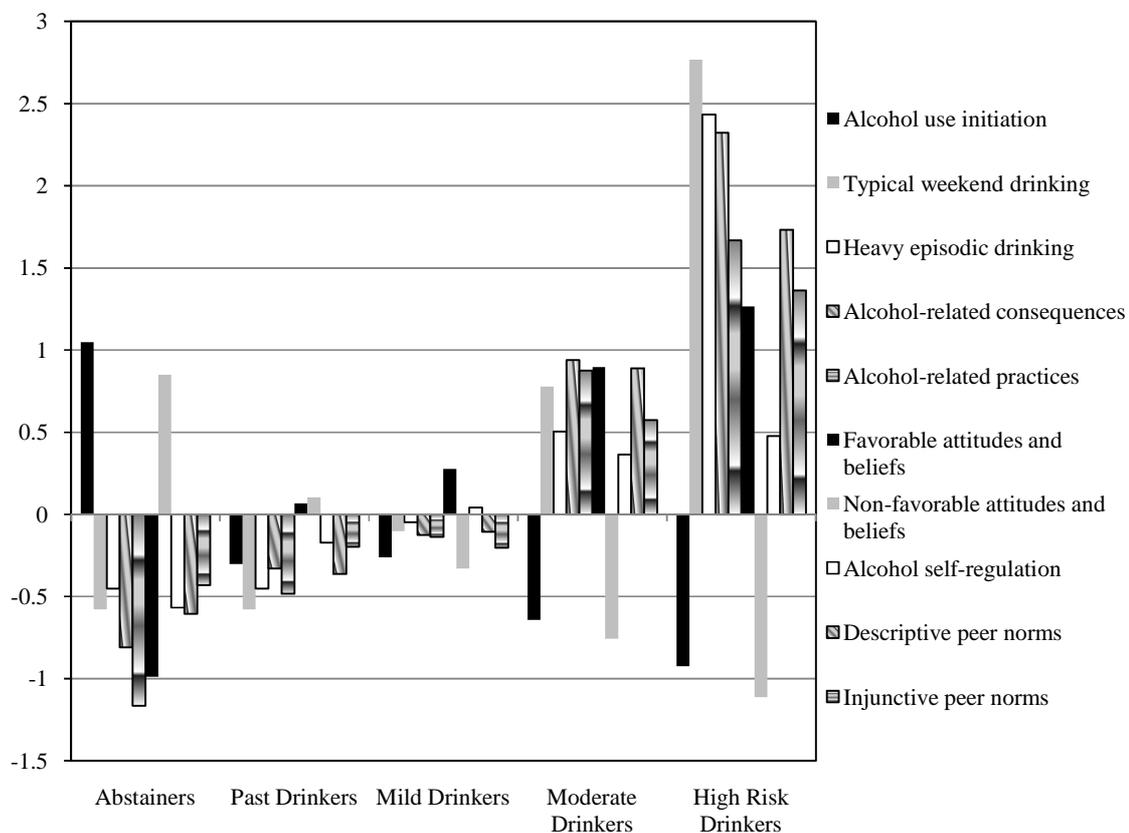
Table 1

Phase 1a: Descriptive statistics of perceived parenting profile indicators summer prior to college

(complete sample)

Indicator Variable	Mean	SD	Skew	Kurtosis	Range	% Missing
Maternal alcohol modeling	6.73	7.03	2.27	8.83	0 - 63	2 %
Paternal alcohol modeling	10.55	9.99	1.81	4.62	0 - 72	8 %
Approval of alcohol use	6.82	2.64	1.38	2.75	4 - 20	< 1 %
Alcohol communications	26.30	10.23	.58	-.61	13 - 52	< 1 %
Monitoring	2.67	.51	-1.12	.11	1 - 3	< 1 %
Knowledge	2.51	.60	-.79	-.36	1 - 3	< 1 %
Trust and Support	13.24	2.23	-.83	.43	4 - 16	7 %
Parental Access	6.82	1.28	-.97	.35	2 - 8	7 %
Mother-teen conflict	3.73	1.70	.84	-.12	2 - 8	< 1 %
Father-teen conflict	3.41	1.65	1.06	.31	2-8	6%

Table 2

Phase 1a: Correlation table of perceived parenting profile indicators (complete sample)

Parenting Indicators	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Maternal alcohol modeling	1									
2. Paternal alcohol modeling	.52**	1								
3. Approval of alcohol use	.25**	.23**	1							
4. Alcohol communications	.01	.03	.05	1						
5. Monitoring	-.04	-.02	-.16**	.22**	1					
6. Knowledge	-.07*	-.09**	.00	.21**	.33**	1				
7. Trust and support	-.04	-.08**	.04	.21**	.13**	.33**	1			
8. Parental Access	.01	-.05	.05	.16**	.09**	.19**	.43**	1		
9. Mother-teen conflict	.12**	.08**	-.03	-.08**	-.04	-.23**	-.44**	-.27**	1	
10. Father-teen conflict	.01	.08**	.03	-.21**	-.05	-.21**	-.43**	-.34**	.27**	1

*$p < .05$, **$p < .01$.

Table 3

Phase 1b: Perceived parenting profile fit indices (complete sample)

	LL	AIC	BIC	aLRT
1 Profile	-25204	50448	50549	---
2 Profiles	-23957	47992	48189	*p* < .001
3 Profiles	-23436	46990	47288	*p* = .08
4 Profiles	-22682	45506	45864	***p* < .001**
5 Profiles	-22530	45240	45409	*p* = .39

Table 4

Phase 1b: Conditional means, (standard deviations), and 95% CIs for perceived parenting profiles

(complete sample)

	High Quality; Average Modeling and Approval 19%	Low Approval; Average Modeling and Quality 31%	Low Modeling, Approval, and Quality 30%	High Modeling and Approval; Low Quality 21%
Maternal alcohol modeling	5.58 (4.80) 4.74 – 6.43	5.18 (4.28) 4.44 – 5.91	*3.53* (3.04) 2.75 – 4.29	**14.38** (9.75) 12.36 – 16.39
Paternal alcohol modeling	8.45 (7.83) 7.44 – 10.24	8.08 (6.60) 6.97 – 9.20	*6.36* (4.85) 5.39 – 7.34	**21.53** (12.89) 18.57 – 24.50
Approval of alcohol use	6.99 (.62) 6.54 – 7.43	*6.28* (2.27) 5.87 – 6.68	*6.22* (1.94) 5.76 – 6.68	**8.32** (3.25) 7.78 – 8.85
Alcohol communications	**28.78** (10.70) 27.27 – 30.29	**28.38** (10.83) 27.17 – 29.60	*22.91* (8.85) 21.61 – 24.21	25.85 (9.28) 24.32 – 27.38
Monitoring	2.68 (.54) 2.61 – 2.75	**3.00** (.14) 3.00 – 3.00	*2.44* (.54) 2.38 – 2.51	*2.50* (.54) 2.42 – 2.59
Knowledge	2.75 (.53) 2.69 – 2.82	**3.00** (.14) 3.00 – 3.00	*2.07* (.53) 2.00 – 2.13	*2.21* (.53) 2.10 – 2.32
Trust and Support	**15.27**	13.48	*12.27*	*12.42*

	(.81)	(1.86)	(2.21)	(2.32)
	15.12 – 15.42	13.22 – 13.74	11.91 – 12.63	11.95 – 12.85
Access	**8.00**	6.70	*6.39*	*6.54*
	(.14)	(1.16)	(1.34)	(1.31)
	8.00 – 8.00	6.55 – 6.86	6.19 – 6.57	6.32 – 6.76
Mother-teen	*2.37*	3.78	4.11	**4.32**
conflict	(.62)	(1.62)	(1.73)	(1.74)
	2.22 – 2.51	3.59 – 3.96	3.88 – 4.34	4.03 – 4.61
Father-teen	*2.00*	3.47	**3.90**	**3.95**
conflict	(.14)	(1.53)	(1.75)	(1.68)
	2.00 – 2.00	3.25 – 3.68	3.64 – 4.15	3.66 – 4.25

Note: **Bolded** values indicate High conditional means, relative to other profiles.

Italicized values indicate Low conditional means, relative to other profiles.

Table 5

Phase 1c: Covariate odds ratios for perceived parenting profiles (complete sample)

	(1) High Quality; Average Modeling and Approval	(2) Low Approval; Average Modeling and Quality	(3) Low Modeling, Approval, and Quality
Female	.86	1.93**	.99
Non-White	.93	1.03	2.10*
Higher perceived socioeconomic status	1.49*	1.05	.88

Note: Reference category = (4) High Modeling and Approval; Low Quality.

* $p < .05$, **$p < .01$.

Table 6

Phase 1d: Perceived parenting profile fit indices (control sample)

	LL	AIC	BIC	aLRT
1 Profile	-6273	12586	12659	---
2 Profiles	-6149	12377	12519	$p < .01$
3 Profiles	-5807	11732	11947	$p < .05$
4 Profiles	**-5566**	**11270**	**11522**	**$p < .05$**
5 Profiles	-5513	11206	11535	$p = .47$

Table 7

Phase 1d: Conditional means and standard deviations for control group perceived parenting profiles (control sample)

	(1)	(2)	(3)	(4)
	High Quality; Average Modeling and Approval	Low Approval; Average Modeling and Quality	Low Modeling, Approval, and Quality	High Modeling and Approval; Low Quality
	19%	31%	30%	21%
Maternal alcohol modeling	*4.07*	5.07	*4.03*	**16.97**
	(3.93)	(4.26)	(3.17)	(9.33)
Paternal alcohol modeling	7.80	7.88	7.13	**24.27**
	(6.24)	(6.54)	(5.21)	(13.65)
Approval of alcohol use	6.37	6.15	6.82	**8.27**
	(2.43)	(1.93)	(2.68)	(2.43)
Alcohol communications	**28.24**	27.02	21.69	**28.26**
	(10.87)	(10.83)	(8.13)	(9.43)
Monitoring	2.69	**3.00**	2.36	2.55
	(.56)	(.14)	(.57)	(.56)
Knowledge	2.79	**3.00**	1.98	2.38
	(.51)	(.14)	(.51)	(.51)
Trust and Support	**15.46**	13.70	12.40	12.93
	(.66)	(1.85)	(2.44)	(2.17)
Access	**8.00**	6.72	6.35	6.88
	(.14)	(1.27)	(1.41)	(1.26)
Mother-teen conflict	2.00	**4.18**	3.99	3.87
	(.14)	(1.78)	(1.77)	(1.46)

Father-teen conflict	2.00	3.36	**3.58**	**3.51**
	(.14)	(1.49)	(1.67)	(1.73)

Note: **Bolded** values indicate High conditional means, relative to other profiles.

Italicized values indicate Low conditional means, relative to other profiles.

Table 8

Phase 1e: Differences on college outcomes for perceived parenting profiles (control sample)

	(1) High Quality; Average Modeling and Approval	(2) Low Approval; Average Modeling and Quality	(3) Low Modeling, Approval, and Quality	(4) High Modeling and Approval; Low Quality
Peak BAC	.06[c]	.07[b]	.08[a]	.12[abc]
	(.08)	(.09)	(.10)	(.10)
Typical weekend drinking	3.74[c]	4.05[b]	5.27[a]	9.50[abc]
	(4.52)	(4.94)	(5.90)	(8.03)
Heavy episodic drinking	.41[b]	.55[a]	.86	1.38[ab]
	(.94)	(1.26)	(1.49)	(1.41)
Frequency of drunkenness	.77[c]	.83[b]	1.12[a]	1.86[abc]
	(1.20)	(1.20)	(1.36)	(1.67)
Alcohol-related consequences	7.31[c]	10.26[b]	12.08[a]	20.91[abc]
	(8.14)	(11.89)	(14.94)	(15.68)
Tobacco Use	.26[b]	.25[a]	.61	1.00[ab]
	(.64)	(.65)	(1.27)	(1.63)
Marijuana Use	.21[b]	.22[a]	.60	.82[ab]
	(.62)	(.68)	(1.14)	(1.09)

Note: Corresponding letters (i.e., [a], [b], or [c]) indicate significant Tukey post-hoc differences, $p < .05$

Table 9

Phase 2a: Descriptive statistics of student alcohol-related indicators summer prior to college entrance

(complete sample)

Indicator Variable	Mean	SD	Skew	Kurtosis	Range	% Missing
Alcohol use initiation (see p. 31)	8.11	2.81	.55	.07	1 - 13	< 1 %
Typical weekend drinking (p. 31)	2.94	5.09	2.37	6.87	0 - 35	< 1 %
Heavy episodic drinking (p. 32)	.68	1.51	3.00	10.29	0 - 10	< 1 %
Alcohol-related consequences (p. 32)	9.93	12.29	1.53	2.31	0 - 67	< 1 %
Risky alcohol-related practices (p. 33)	6.93	5.95	.58	-.38	0 - 29	17 %
Favorable attitudes and beliefs toward drinking (p. 33)	33.36	11.02	-.26	-.81	12-59	< 1 %
Non-favorable attitudes and beliefs toward drinking (p. 33)	28.92	6.31	-.01	-.68	8 - 40	< 1 %
Alcohol self-regulation (p. 34)	23.97	7.83	.46	-.08	10 - 50	17 %
Descriptive peer norms (p. 34)	5.63	5.53	.67	-.67	0 - 18	< 1 %
Injunctive peer norms (p. 35)	8.62	3.73	.89	.73	4 - 26	< 1 %

Table 10

Phase 2a: Correlation table of student alcohol-related profile indicators (complete sample)

College Student Indicators	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Alcohol use initiation	1									
2. Typical weekend drinking	-.40**	1								
3. Heavy episodic drinking	-.31**	.67**	1							
4. Alcohol-related consequences	-.52**	.78**	.63**	1						
5. Risky alcohol-related practices	-.39**	.73**	.57**	.78**	1					
6. Favorable attitudes and beliefs toward drinking	-.57**	.55**	.45**	.66**	.70**	1				
7. Non-favorable attitudes and beliefs toward drinking	.51**	-.48**	-.39**	-.54**	-.58**	-.68**	1			
8. Alcohol self-regulation	-.14**	.28**	.19**	.30**	.33**	.23**	-.05	1		
9. Descriptive peer norms	-.38**	.69**	.46**	.63**	.62**	.49**	-.39**	.28**	1	
10. Injunctive peer norms	-.31**	.45**	.34**	.45**	.46**	.45**	-.37**	.14**	.56**	1

*p < .05; **p < .01

Table 11

Phase 2b: Student alcohol-related profile fit indices (complete sample)

	LL	AIC	BIC	aLRT
1 Profile	-34218	68476	68577	---
2 Profiles	-31539	63152	63339	$p < .001$
3 Profiles	-28486	57076	57339	$p < .001$
4 Profiles	-26092	52321	52670	$p < .001$
5 Profiles	-25823	51822	**52266**	***p < .001***
6 Profiles	-25726	51665	52206	$p < .001$

Table 12

Phase 2b: Conditional means (standard deviations), and 95% CI's for student alcohol-related profiles

(complete sample)

	Abstainers	Past Drinkers	Light Drinkers	Moderate Drinkers	High Risk Drinkers
	30%	26%	15%	22%	6%
Alcohol use initiation	11.07	7.27	7.38	6.30	5.53
	(2.78)	(1.78)	(1.15)	(1.33)	(1.19)
	10.38 – 11.53	6.69 – 7.40	6.52 – 7.32	5.66 – 6.62	3.96 – 5.54
Typical weekend drinking	.00	.00	2.48	6.82	16.94
	(.14)	(.14)	(3.50)	(3.50)	(3.50)
	.00 - .00	.00 - .00	1.38 – 3.68	6.26 – 8.25	13.08 – 20.78
Heavy episodic drinking	.00	.00	.61	1.43	4.35
	(.14)	(.14)	(1.55)	(1.55)	(1.55)
	.00 - .00	.00 - .00	.28 - .98	.85 – 1.51	4.11 – 6.64
Alcohol-related consequences	.00	5.81	8.57	21.43	38.22
	(.14)	(5.46)	(5.60)	(8.43)	(11.97)
	.00 - .00	4.67 – 7.05	7.14 – 13.45	18.61 – 25.14	25.62 – 41.45
Risky alcohol-related practices	.00	4.01	6.19	12.11	16.84
	(.14)	(3.57)	(3.20)	(3.46)	(4.30)
	.00 - .00	2.92 -4.54	5.34 – 8.52	11.08 – 13.60	12.46 – 16.99
Favorable attitudes and beliefs toward drinking	22.46	32.60	36.48	43.28	47.01
	(8.17)	(8.10)	(5.90)	(5.32)	(4.72)
	20.30 – 23.65	31.56 – 35.09	34.95 – 38.77	41.11 – 44.97	43.52 – 48.48
Non-favorable attitudes and beliefs	34.29	29.60	26.82	24.20	21.89
	(5.03)	(4.98)	(4.58)	(4.10)	(4.40)

toward drinking	33.11 – 35.12	27.87 – 30.42	25.02 – 27.58	22.61 – 25.31	20.28 – 24.76
Alcohol self-regulation	19.75	22.60	24.36	26.74	27.85
	(8.08)	(7.73)	(7.23)	(6.64)	(7.35)
	16.79 – 21.52	21.09 – 25.07	21.43 – 26.62	21.07 – 27.72	25.71 – 29.32
Descriptive peer norms	2.29	3.62	5.11	10.25	15.19
	(3.77)	(4.30)	(3.89)	(4.10)	(2.73)
	1.67 - 3.03	2.40 – 4.27	3.11 – 6.22	9.21 – 11.78	12.92 – 15.93
Injunctive peer norms	7.02	7.88	7.90	10.74	13.68
	(3.46)	(3.43)	(2.33)	(3.01)	(3.58)
	6.57 – 8.03	7.09 – 8.65	7.53 – 9.24	10.09 – 12.01	10.74 – 14.01

Table 13

Phase 2c: Covariate odds ratios for student alcohol-related profiles (complete sample)

	Past Drinkers	Light Drinkers	Moderate Drinkers	High Risk Drinkers
Female	1.12	.92	1.18	.31**
Non-White	1.08	.26**	.72	1.03
Higher perceived socioeconomic status	1.16	1.44**	1.55**	1.76*

Note: Reference category = Abstainer profile.

$* p < .05, **p < .01.$

Table 14

Phase 2d: Student alcohol-related profile fit indices (control sample)

	LL	AIC	BIC	aLRT
1 Profile	-8411	16861	16934	---
2 Profiles	-7007	14088	14223	*p < .001*
3 Profiles	-6795	13707	13919	*p < .001*
4 Profiles	-6383	12904	13156	*p < .001*
5 Profiles	-6320	12815	**13137**	***p < .001***
6 Profiles	-6293	12740	13131	*p < .05*

Table 15

Phase 2d: Conditional means and (standard deviations) for student alcohol-related profiles (control sample)

	Abstainers	Past Drinkers	Light Drinkers	Moderate Drinkers	High Risk Drinkers
	31%	24%	18%	22%	5%
Alcohol use initiation	10.95	7.04	6.92	6.14	4.75
	(2.76)	(1.48)	(1.25)	(1.47)	(1.53)
Typical weekend drinking	.00	.00	2.53	7.26	16.93
	(.14)	(.14)	(3.15)	(3.15)	(3.15)
Heavy episodic drinking	.00	.00	.63	1.18	5.37
	(.14)	(.14)	(1.24)	(1.24)	(1.24)
Alcohol-related consequences	.00	5.86	10.29	21.87	33.54
	(.14)	(4.78)	(6.54)	(10.37)	(13.08)
Risky alcohol-related practices	.00	3.73	6.93	12.34	14.73
	(.14)	(3.31)	(3.75)	(3.67)	(3.75)
Favorable attitudes and beliefs toward drinking	21.98	33.32	36.86	43.04	46.00
	(8.03)	(7.27)	(5.72)	(5.69)	(4.43)
Non-favorable attitudes and beliefs toward drinking	34.11	29.15	26.30	23.96	22.51
	(4.79)	(5.25)	(4.22)	(4.01)	(4.32)
Alcohol self-regulation	19.16	23.08	24.03	27.52	24.39
	(7.49)	(8.24)	(6.41)	(6.55)	(7.11)
Descriptive peer norms	2.35	3.34	4.67	10.49	14.42
	(3.26)	(3.89)	(3.18)	(3.75)	(2.78)
Injunctive peer norms	7.30	7.87	8.38	11.05	12.38
	(3.51)	(3.25)	(2.44)	(3.06)	(3.19)

Table 16

Phase 2e: Differences in college outcomes for student alcohol-related profiles (control sample)

	Abstainers	Past Drinkers	Light Drinkers	Moderate Drinkers	High Risk Drinkers
Peak BAC	.02[aefg]	.07[beh]	.08[cfi]	.15[dghi]	.21[abcd]
	(.05)	(.08)	(.08)	(.10)	(.14)
Typical weekend drinking	1.13[adef]	4.29[bdgh]	6.90[cegi]	10.02[fhi]	13.07[abc]
	(2.38)	(5.02)	(5.68)	(6.32)	(7.79)
Heavy episodic drinking	.06[aef]	.54[bg]	.94[ce]	1.41[dfg]	3.20[abcd]
	(.31)	(.87)	(1.35)	(1.35)	(2.73)
Frequency of drunkenness	.16[adef]	.91[bdg]	1.33[ceh]	2.16[fgh]	2.73[abc]
	(.47)	(1.13)	(1.28)	(1.50)	(1.71)
Alcohol-related consequences	2.40[adef]	10.84[bdg]	14.69[ceh]	22.82[fgh]	30.93[abc]
	(5.83)	(10.74)	(10.37)	(14.40)	(20.28)
Tobacco Use	.08[aef]	.51[b]	.62[ce]	.74[df]	2.08[abcd]
	(.35)	(1.14)	(1.01)	(1.36)	(2.15)
Marijuana Use	.03[aef]	.20[bg]	.58[ce]	1.02[dfg]	1.75[abcd]
	(.22)	(.48)	(1.03)	(1.26)	(1.42)

Note: Corresponding letters (i.e., [a], [b], [c], [d], [e], [f], [g], [h], or [i]) indicate significant Tukey post-hoc differences, $p < .05$

Table 17

Phase 3: Probabilities of student alcohol-related profile membership given perceived parenting profiles (complete sample)

	Abstainers	Past Drinkers	Light Drinkers	Moderate Drinkers	High Risk Drinkers	*Marginal n[1]*
(1) High Quality; Average Modeling and Approval	.40	.25	.19	.13	.02	214
(2) Low Approval; Average Modeling and Quality	.36	.30	.15	.16	.02	353
(3) Low Modeling, Approval, and Quality	.36	.30	.17	.14	.04	296
(4) High Modeling and Approval; Low Quality	.12	.18	.11	.43	.17	290
Marginal n[1]	351	300	176	254	72	

[1] Marginal n's based on classification into most likely profile.

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Awards
2009-2010	NIAAA funded Ruth L. Kirschstein National Research Service Award: F31 grant
2007-2009	NIDA funded Prevention and Methodology Training Fellowship: T32 grant
2009	Society for Prevention Research Early Career Prevention Network Scholarship
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2008	Penn State Grace Henderson Scholarship for Outstanding Graduate Student
2006-2007	Penn State Prevention Research Center Fellowship
2006, 07, 08	NIAAA funded Research Society on Alcohol Student Merit Award
2005	The Pennsylvania State University Graduate Award
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Selected Research Experience
2004 – 2005	Research Assistant, *University Life Study* (PI: Dr. Jennifer Maggs)
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