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PARENTAL INFLUENCES ON COLLEGE STUDENT DRINKING:
PRELIMINARY TEST OF A SOCIAL-COGNITIVE MODEL

by

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ABSTRACT OF THE DISSERTATION

Parental Influences on College Student Drinking:

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Problematic drinking in college students is a serious public health problem. Although parental influence wanes during the college years, research suggests that parental behaviors in high school, including monitoring, alcohol-specific control (i.e., rules or communication), and problematic modeling of drinking, continue to predict their children's drinking even into college. This dissertation tests a model, developed by the author, that posits prospective associations between the parental behaviors discussed above and college student problematic drinking, mediated by student alcohol-related cognitions, namely, self-efficacy to avoid alcohol, negative alcohol expectancies, and peer drinking norms. Tests were conducted of the following main hypotheses: (1) parental behaviors in the senior year of high school are associated with a number of college freshmen's drinking outcomes, including heavy drinking, alcohol problems, and male and female binge drinking, after statistically controlling for significant covariates, such as gender, race, and past student drinking, and (2) each of the student alcohol-related cognitions mediates the relationships between parental behaviors and student drinking. Data to test these hypotheses were collected at one time point from an undergraduate population at a large, public university, and data on all measures was

provided by student self-report (N = 292). Multiple regression analyses indicated that, for the most part, results were consistent with predictions. Greater maternal drinking was significantly and directly associated with greater student heavy drinking, and greater paternal drinking was significantly and directly associated with greater alcohol problems. Greater parental alcohol-specific monitoring was significantly and directly associated with lower heavy drinking and alcohol problems, while greater alcohol-specific rules was significantly and directly associated with lower heavy drinking and male binge drinking. Unexpectedly, greater alcohol-specific communication was significantly and directly associated with greater, not lower, student heavy drinking and alcohol problems and female binge drinking. Mediation analyses revealed that all three of the student alcohol-related cognitions mediated several relationships between parental behaviors and student drinking outcomes. Surprisingly, greater paternal drinking was significantly and indirectly associated with lower, not greater, student heavy drinking, as mediated by greater student negative alcohol expectancies. Methodological limitations notwithstanding, this study is one of the first to test a comprehensive mediated model of parental behaviors, student alcohol-related cognitions, and student drinking.

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Overview

Problematic drinking in college students is a serious problem facing university campuses.

Recent theoretical and empirical research has indicated that parental behaviors, such as modeling of problematic drinking or alcohol-related control, prior to students' entering college may predict student problematic drinking during their transition to college.

Research also indicates that student alcohol-related cognitions, such as self-efficacy to avoid alcohol, peer drinking norms, and alcohol expectancies, are robust and reliable predictors of college student drinking. This thesis tests a new model, developed by the author, which proposes that the relationships between parental behaviors and college student drinking are mediated by alcohol-related cognitions. Surprisingly, this dissertation represents one of the few studies to test a mediated model of parental behaviors and student drinking, and one of the first to test for associations controlling for past student problematic drinking.

Chapter 1

Introduction and Background

College Student Problematic Drinking

Alcohol abuse represents a serious public health problem in that it has been linked to preventable mortality and physical and psychological morbidity (Johnston, O' Malley, & Bachman, 2000; McGinnis & Foege, 1993; Sutocky, Shultz, & Kizer, 1993). Alcohol abuse or problematic drinking is a significant health problem in young adults, with adults aged 18- 24 years having the highest rates of problematic drinking (U. S. Department of Health and Human Services, 1997). Alcohol abuse is especially problematic for college students, with students at higher risk for problematic drinking than their peers who do not attend college (Johnston et al., 2000; O' Malley & Johnston, 2002). For many young adults, the transition to college often means an increase in problematic drinking (Baer, Kivlahan, & Marlatt, 1995). Many researchers (Baer et al., 1995; Turrisi, Wiersma, & Hughes, 2000; Wechsler, Dowdall, Davenport, & Castillo, 1995) attribute this increase in problematic drinking to the weakening of parental support and control, as students leave home and experience both psychological and physical distance from their parents.

Although data from large-scale studies indicate that there has been some reduction in problematic drinking in college students in the last decade, there is evidence that alcohol abuse continues to be a problem in this group of adults (O'Malley & Johnston, 2002; Wechsler, Dowdall, Maenner, Gledhill-Hoyt, & Lee, 1998). Problematic drinking is typically conceptualized and assessed in terms of the quantity and frequency of alcohol consumed. With regard to quantity, alcohol use may be assessed as overall weekly intake (i.e., *heavy drinking*) or number of drinks consumed on a particular occasion (i.e., *heavy*

episodic drinking). Heavy episodic drinking or binge drinking is defined by many researchers as having 5 drinks or more in a row for males and 4 drinks or more in a row for females (O' Malley & Johnston, 2002; Wechsler et al., 1998). In addition to alcohol intake, problematic drinking is also conceptualized and measured in terms of the number of alcohol-related problems that are experienced. Researchers (e.g., White & Labouvie, 1989) suggest that consequences of or problems associated with alcohol use may even be a better indicator of problematic drinking in college students.

National studies indicate that 2 in 5 students are binge drinkers (O' Malley & Johnston, 2002; Wechsler et al., 1998). With regard to heavy drinking, college students consume more alcohol than the established standards of safe drinking, with 31% of college men consuming greater than 21 drinks per week and 19% of college women consuming greater than 14 drinks per week (U. S. Department of Health and Human Services, 1990). Although much of the problematic drinking observed in college student populations cannot be classified as alcoholism, many students do meet the diagnostic criteria for alcohol abuse and dependence. A recent study conducted with undergraduate psychology students (Clements, 1999) indicated that a significant number of students already have serious problems with alcohol abuse, with 13.1% of students meeting the DSM-IV (American Psychiatric Association, 1994) criteria for alcohol abuse and 11.4% for alcohol dependence within the last 12 months.

Although many students transition to normal drinking after leaving college, some students go on to have significant alcohol problems (Weingardt, Baer, Kivlahan, Roberts, Miller, & Marlatt, 1998). Even if alcohol abuse and alcohol-related problems did not persist beyond college, however, the consequences for students while in college would be

serious enough to warrant attention. Several studies (Wechsler et al., 1998; Wechsler, Molnar, Davenport, & Baer, 1999) indicate that the results of student drinking range from minor to serious and cover a number of domains, including psychological, physical, social, and academic. Studies have revealed that increased problematic drinking in college students is associated with poorer academic performance and lower involvement in college activities (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). In addition, problematic drinking can result in minor and serious injury from accidents and assault (Hingston, Hereen, Zakocs, Kopstein, & Wechsler, 2001; Testa & Parks, 1996). In terms of health concerns, problematic drinking in college students has been associated with poorer health as a result of compromised immune system functioning (Engs & Aldobenson, 1995), and a greater frequency of sexually transmitted diseases due to the increased likelihood of unsafe sex and sexual assault while intoxicated (Hingston et al., 2001; Wechsler et al., 1994). Problematic drinking may also have serious consequences for others. Several studies have found an increase in physical and sexual assault, property damage, and car accidents in intoxicated students (Hingston et al., 2001; Wechsler et al., 1994).

Although problematic drinking is a significant problem among college students, the majority of students do not display any problems as a result of alcohol use. Indeed, most problematic drinking and alcohol-related problems are seen in a small subset of students (Baer, 2002). Therefore, identifying individual-level and social contextual differences that are predictive of alcohol abuse in this subset of students is an important task. To date, theoretical and empirical research has identified a number of social, psychological, and biological predictors of student drinking, although many studies have

downplayed the importance of biological influences in problematic patterns of student drinking. In terms of psychological predictors, recent reviews (Baer, 2002; Ham & Hope, 2003) have focused on drinking-related cognitions or motives, affective states, and personality traits as intrapersonal predictors of student problematic drinking. Social-environmental influences of student drinking have also been identified and include social context, activity involvement, living situation, stress, and peer and parental influences (Baer, 2002; Ham & Hope, 2003; Turrisi et al., 2000).

Most of the research on interpersonal influences has focused on the impact of same-aged peers on student drinking (Baer & Carey, 1993; Borsari & Carey, 2001). This may be largely due to the perception that the influence of parents wanes in late adolescence and early adulthood because of a growing independence from the family (Windle, Mun, & Windle, 2005; Wood, Read, Palfai, & Stevenson, 2001). While it is true that college represents a period of individuation from parents, a growing body of literature (Barnes, Reifman, Farrell, & Dintcheff, 2000; Reifman, Barnes, Dintcheff, Farrell, & Uhteg, 1998; Wood, Read, Mitchell, & Brand, 2004) suggests that parental factors continue to affect alcohol use and other important outcomes in the lives of late adolescents and, in particular, college students. Recent reviews (Baer, 2002; Brennan, Walfish, & AuBuchon, 1986b; Ham & Hope, 2003) have identified parental behaviors that contribute independently to problematic student drinking and that moderate the impact of peer influences. This research provides great hope to parents who would like to successfully intervene and help their college-student children curb problematic drinking patterns.

Although empirical research into parental influences on student drinking has been guided by theory, most of the theories on parental influences on adolescent drinking (Barnes et al., 2000; Patock-Peckham, Cheon, Balhorn, & Nagoshi, 2001; Weiss & Schwartz, 1996) emphasize developmental processes, which involve constructs pertaining to parent/child relationships and parenting styles. The research into parental influences on college student drinking could clearly benefit from an examination of constructs from interpersonal, social-psychological theories that have been demonstrated to reliably predict health-enhancing and health-compromising behaviors. In addition, an exploration of parental influences on college-student drinking could also benefit from an integration of intrapersonal and interpersonal theories of student drinking, in order to identify relationships between individual-level and parental-level factors.

Intrapersonal Cognitive Theories of College Student Drinking

Alcohol researchers (Baer, 2002; Ham & Hope, 2003) have proposed that individual-level, alcohol-related cognitions are major predictors of student drinking. More specifically, a majority of studies into college student drinking have investigated constructs from two major theories of health behavior, the *Theory of Planned Behavior* (TPB; Ajzen, 1991) and *Social Cognitive Theory* (SCT; Bandura, 1991).

Theory of planned behavior. The Theory of Planned Behavior (TPB) is a general model of social behavior that has been used to explain adult and college student drinking. The TPB is considered a complete model of all the proximate determinants of behavior, with other influences operating through these predictors. According to TPB, the most proximal determinant of behavior is *intention* or the motivation to perform the behavior. Intention is influenced by three cognitions or beliefs: 1) *behavioral beliefs*,

beliefs about the consequences or other aspects of the behavior, 2) *normative beliefs*, beliefs about whether others think the individual should engage in the behavior, and 3) *control beliefs*, beliefs about how much control the individual has over the behavior.

These three beliefs are the basis for the three major components of the TPB, respectively:

1) *attitudes*- overall evaluation of the behavior, 2) *subjective norms*- perceptions of others' views of the acceptability or typicality of the behavior, and 3) *perceived behavioral control*- degree to which the individual views the behavior as under his/her control.

A review of studies investigating TPB and a number of health behaviors (Connor & Sparks, 1996) found that the TPB has good predictive power for a variety of health behaviors. A number of studies of college student drinking (Budd & Spencer, 1984; Norman, Bennett, & Lewis, 1998; Trafimow, 1996) have also found that the TPB, and, in particular, subjective or perceived norms, are predictive of drinking patterns, including binge drinking. Studies of perceived norms and drinking in college students are consistent with a number of studies conducted with adolescents in middle or high school that found that perceived drinking norms predicted alcohol use and abuse (Barnes & Welte, 1986; Welte, Barnes, Hoffman, & Dintcheff, 1999; Wood et al., 2004). Most of this research, however, has focused on perceived drinking norms of peers, rather than parents.

Social-cognitive theory. Social Cognitive Theory (SCT) is another general health behavior theory that has been used to predict and explain college student drinking. Because the Theory of Planned Behavior and Social Cognitive Theory are derived from

the same learning principles regarding behavior, the two theories emphasize many of the same individual-level cognitive predictors of behavior.

Like TPB, SCT proposes that behavior is influenced by beliefs about expected outcomes of performing the behavior. In the case of SCT, *outcome expectancies*, beliefs about the anticipated consequences of a particular behavior, are a major predictor of health behavior. Brown and colleagues (Brown, Christiansen, & Goldman, 1987; Brown, Goldman, Inn, & Anderson, 1980) have investigated a number of drinking-related or *alcohol (outcome) expectancies* that predict drinking in college students. This research has focused on a number of different types of alcohol expectancies, such as *social facilitation*, the belief that alcohol will result in better performance or more assertiveness in social situations, or *cognitive/motor functioning*, the belief that alcohol will result in impaired or improved functioning. In addition, studies (Fromme, Stroot, & Kaplan, 1993; Lewis & O'Neill, 2000) have grouped alcohol expectancies into positive and negative expectancies and have reported that heavy drinkers endorse greater positive expectancies and lower negative expectancies than normal drinkers.

Another major predictor of health behavior according to SCT is *self-efficacy*, the confidence that one can perform the behaviors or tasks necessary to achieve a particular goal or outcome. Individuals who have greater confidence that they can carry out the behaviors or tasks necessary to achieve their goal will be more likely to engage in these behaviors. In the alcohol literature, self-efficacy has most often been studied as *self-efficacy to avoid drinking*. A number of studies have found that self-efficacy to avoid drinking (Evans & Dunn, 1995; Oei & Burrow, 2000) is a significant predictor of college student drinking. SCT studies that have investigated both self-efficacy to avoid drinking

and alcohol expectancies (Moraskwa & Oei, 2001; Young, Connor, Ricciardelli, & Saunders, 2006) have found alcohol expectancies, of the two, to be the more potent predictor of student drinking.

In summary, the TPB and SCT emphasize three alcohol-related cognitions that are important predictors of alcohol use and activities. These include 1) *alcohol expectancies* or beliefs about the outcomes of alcohol use or alcohol-related activities, 2) *self-efficacy to avoid alcohol* or the belief that one can successfully avoid drinking and drinking related-activities, and 3) *drinking norms* or beliefs about the typicality or acceptability of alcohol use or activities.

Unlike TPB, SCT goes a step further to identify the source of those alcohol-specific cognitions. Consistent with SCT propositions, alcohol researchers have proposed that *modeling* of alcohol-related behavior by others (e.g., engaging in alcohol-related behavior that is observable to the individual) and 2) *social encouragement or support* of an individual's alcohol-related behavior (i.e., positive appraisals of or encouragement that one can perform the alcohol-related behavior) influence student drinking. For the most part, alcohol researchers have examined these behaviors of significant others independently of one another and have not explored how these behaviors may impact drinking via individual-level drinking cognitions.

SCT (Bandura, 2001) proposes that interpersonal behaviors, such as modeling, impact an individual's behavior by influencing an individual's behavioral self-efficacy. In addition, according to SCT, modeling increases the likelihood that a particular behavior will be performed because of both learning and reinforcement mechanisms. Individuals not only learn how to perform a particular behavior, but also learn what

consequences they can expect from performing a particular behavior, just by watching others' engage in that behavior. Significant relationships between parental modeling of drinking and children's alcohol expectancies have been reported in the alcohol literature (Wood et al., 2001; Zucker, Fitzgerald, Reffior, Pallas, & Ellis, 2000). Finally, modeling of health-related behaviors by parents or peers may influence the likelihood that a behavior is performed because it signals to the observer that the behavior is acceptable (Boyle & Boekeloo, 2006; Wood et al., 2004). Therefore, although not specifically discussed by proponents of a SCT approach to drinking, modeling may impact student drinking via all of the alcohol-specific cognitions discussed above, namely, 1) self-efficacy to avoid alcohol, 2) peer drinking norms, and 3) alcohol expectancies.

It is important to note, however, that significant others may not always model appropriate drinking behavior. Indeed, theoretical and empirical research (Borsari & Carey, 2001) has discussed how peers often model problematic drinking patterns. By doing so, peers may actually undermine an individual's self-efficacy to avoid drinking. Recent studies have begun to investigate the potentially negative impact that parental behaviors, such as modeling of problematic drinking, can have on adolescent drinking. With regard to modeling, a number of studies (Boyle & Boekeloo, 2006; Fischer, Forthun, Pidcock, & Dowd, 2007; Jung, 1995; Standing & Nicholson, 1989) have found that parental modeling of drinking is associated with college student drinking, with more problematic drinking seen in students whose parents also drink heavily or have alcohol problems. Although this evidence may be interpreted as indicative of a genetic influence, a recent review by Baer (2002) noted that college student drinking patterns are different from other adult drinking patterns and may not be as susceptible to genetic influences.

Therefore, it is possible that, as predicted by SCT, parental modeling of drinking behavior impacts student drinking by influencing students' drinking-related cognitions, such as self-efficacy to avoid alcohol.

Interpersonal Theories of College Student Drinking

Although SCT does suggest ways in which significant others' attitudes or behaviors may influence student drinking (e.g., modeling, behavior-specific support), SCT does not begin to explore all of the ways that significant others may impact an individual's drinking. Other interpersonal constructs and theories are necessary in order to articulate and explain the many ways that others may influence drinking patterns in college students. Early social interaction theorists (House, Landis, & Umberson, 1988) have emphasized both the regulatory and supportive nature of social ties. Social support is defined as the interpersonal provision of aid that is given in response to the perception of need in an individual (Cohen, 1998), whereas direct social control is defined as attempts by network members to influence, regulate, or correct an individual's behavior (Umberson, 1992). Both social control and social support have been implicated by alcohol researchers (Barnes & Farrell, 1992; Fischer et al., 2007; Wood et al., 2004) as important interpersonal behaviors that influence adolescent and student drinking.

Social support. With regard to parental social support, alcohol researchers have (Barnes & Farrell, 1992; Fischer et al., 2007) proposed that greater parental support leads to decreased drinking, because of its reduction of psychological distress and enhancement of better emotional regulation and coping. Social support is believed to enhance coping and alleviate distress because of its ability to convey a sense of caring for and availability to the individual and because of the provision of important resources, skills, and

knowledge (Berkman, 1984; Cohen, 1988). Social support frameworks of health behavior also suggest that support may result in better health behaviors by acting as a buffer against stress (Cohen & McKay, 1984). Thus, social support may also reduce problematic drinking by moderating the effects of life stressors on individuals.

Studies with adolescents in middle- or high-school (Barnes and Farrell, 1992; Reifman et al., 1998; Simons- Morton, 2001; Wills, Resko, Ainette, & Mendoza, 2004) have indicated that greater parental support is cross-sectionally and prospectively linked to lower alcohol use and alcohol-related problems. Reports from two recent studies of the effects of general parental support on college student drinking (Fischer et al., 2007; Wetherill & Fromme, 2007) are consistent with these findings. Both studies found that greater parental support predicted lower college student drinking. The findings from these studies are also consistent with other adult studies (Brennan & Moos, 1990; Groh, Jason, Davis, Olson, & Ferrari, 2007) indicating a protective influence of general family support on problematic drinking. Studies involving adolescents, students, and adults (Barnes & Farrell, 1992; Brennan & Moos, 1990; Fischer et al., 2007) have all reported that the negative relationship between family support and problematic drinking is mediated by greater psychological well-being and better emotional regulation.

Results regarding the effects of support on college student drinking have not been entirely consistent (Barnes & Farrell, 1992; Berkowitz & Perkins, 1986; Wood et al., 2004), with some studies reporting null findings. These null findings may be due to the fact that parental support seems to operate through primarily affective means. More specifically, the effects of parental support on adolescents' or college students' drinking seem to operate through the reduction of negative affective states, namely, depression or

social anxiety (Barnes & Farrell, 1992; Fischer et al., 2007). Although negative affect has been linked to student drinking (Camatta & Nagoshi, 1995; Kushner, Sher, & Erickson, 1999), comprehensive reviews of predictors of college student drinking (Baer, 2002; Brennan et al., 1986a) suggest that the effects of negative affect are moderated by gender and ethnicity. Several studies (Brennan et al., 1986b) have found that negative affect predicts heavy drinking more strongly in females and non-white students. Therefore, parental support may only be a robust predictor of drinking in a subset of students who are particularly susceptible to the influence of negative affect on drinking (i.e., females and non-white students).

Social control. Social control theory posits that social networks or their members may influence an individual's behavior by indirect or direct regulation (Hughes & Gove, 1981; Umberson, 1992). Indirect social control operates when an individual behaves in a particular way because of the sense of responsibility or accountability he or she feels toward others. Direct social control, on the other hand, consists of actual actions or communications by network members aimed at trying to regulate or correct an individual's behavior. The key feature of both of these types of control is that they operate to make the individual's behavior less deviant and more in line with societal norms regarding "correct" behavior. For this reason, theorists discussing the effects of direct social control on health behavior (Hughes & Gove, 1981; Umberson, 1987) have proposed that social control results in less health-compromising and more health-enhancing behaviors because of the promotion of "correct" health behaviors by social network members.

Early empirical research (Hughes and Gove, 1981; Umberson, 1987) indicated that greater direct social control was prospectively and positively associated with psychological distress, leading researchers to propose a *dual-effects model of social control*. This model proposed that direct social control promotes more positive behavior, but at the expense of creating psychological distress. The ability of social control to elicit affective distress has led some researchers to posit that control can produce the opposite effect in its target, in that it leads her or him to engage in health-compromising behaviors. This theory of *psychological reactance* (Brehm & Brehm, 1981) proposes that the restriction of a person's perceived behavioral freedom may cause the person to act in ways to try to restore that freedom. Endorsing one's behaviors more adamantly or resisting changes to behavior represent ways of restoring freedom. Health-related control, with its emphasis on the restriction of an individual's behavioral choice regarding health behaviors, may produce psychological reactance, which, in turn, may cause poorer, not better, health behavior.

The negative effects of control on health behavior via psychological reactance have been largely unexplored. One reason that the effects of reactance may have been overlooked is that Brehm and Brehm (1981) described reactance as an intervening variable that can only be inferred from its behavioral effects. As a result of this description, reactance has largely been treated as indefinable and not measurable. However, researchers in a number of literatures (Dillard & Shen, 2005; Tucker & Mueller, 2000), as of late, have attempted to operationalize psychological reactance both as a psychological state, characterized by intense anger toward the controlling agent

and/or cognitive resistance to the “corrective behavior”, and as a behavioral state that is observed as doing the opposite of the controlling agent’s attempts.

Although the dual-effects model of control predicts that control is capable of producing psychological distress, it does not mention the specific experience of anger or the cognitive resistance associated with reactance. Moreover, it does not propose that this negative response to control may produce indirect and negative effects on health behavior. As Brehm and Brehm (1981) suggest, however, control need not always produce psychological reactance. An important determinant of the degree of reactance may be the severity or quantity of the control, with more extreme control associated with poorer health behavior. Both health behavior researchers (Lewis & Butterfield, 2005; Tucker & Mueller, 2000) and alcohol researchers (Fischer et al., 2007; Patock-Peckham et al., 2001) have also pointed to the importance of the quality of control in determining the effects of control on health behavior and drinking. These researchers have distinguished between the effects of *inductive or positive control*, which is characterized by cooperation, persuasion, and support, and *coercive or negative control*, which relies on strategies that are demanding, unilateral, and punitive. Thus, social control may result in either positive or negative effects on alcohol use depending on how it is administered (i.e., whether it is positive or negative). *Positive control* may be characterized as moderate in quantity or positive in quality, while *negative control* may be defined as extreme in quantity or negative in quality.

Theories of direct social control suggest, then, that control may exert direct and positive pressure on behavior by correcting the behavior in the direction that the arbiter of the control intends. This may be referred to as *externalized control*, in which threats of

reward and punishment associated with regulatory actions or control modify the behavior in the desired direction. Control theories also suggest, however, a number of indirect pathways from control to behavior, with control enacting both positive and negative outcomes. As discussed above, negative outcomes can be attributed to the ability of control to induce psychological and, subsequently, behavioral reactance. Control may also indirectly and positively influence behavior by altering the target's cognitions regarding the behavior (Lewis & Butterfield, 2005; Tucker & Mueller, 2000). In this case, the control is *internalized* in that the target begins to believe that the corrective health behavior is desirable and appropriate. Therefore, although relatively unexplored by alcohol researchers, parental control around drinking may influence college student drinking by altering important student alcohol-related cognitions, such as student perceived drinking norms. Findings from a recent study by Turrissi et al. (2000) support this proposition, with a number of alcohol beliefs mediating the relationship between alcohol-specific control (i.e., communication) and student drinking.

In addition to the distinctions between positive and negative control discussed above, direct social control can be also conceptualized as either *general social control*, regulation that is aimed at behaviors in a number of areas in an individual's life, or *behavior-specific control*, regulation that is aimed at a certain type of behavior (e.g., exercise, alcohol use). Whereas researchers in the general health behavior literature have looked primarily at behavior-specific control or health-related control, alcohol researchers (Barner & Farrell, 1992; Fischer et al., 2007; Reifman et al., 1998) have examined the effects of both general and alcohol-specific parental control. *Parental monitoring*, a particular type of general control that involves tracking a child's behaviors,

activities, and associations, is hypothesized to be a particularly important predictor of adolescent drinking (Reifman et al., 1998; Simons-Morton, 2001). Although monitoring involves tracking a number of behaviors in a child's life, monitoring is more alcohol-specific than other types of general parental control in that many of the activities and associations tracked by parents are those that are directly related to alcohol use (e. g., attendance at parties, affiliation with alcohol-using peers). This may be the reason that monitoring is particularly effective. *Alcohol-specific control*, control that is targeted specifically at alcohol use and activities, has also been explored, although not as much as parental general control. Alcohol-specific control has largely been explored in terms of alcohol-related communication or alcohol-specific rules (Turrisi, Jaccard, Taki, Dunnam, & Grimes, 2001; Van der Vorst, Engels, Meeus, Dekovic, & Van Leeuwe, 2005).

Studies of general parental control have revealed consistent relationships between general parental control and college student alcohol use (Fischer et al., 2007; Patock-Peckham & Morgan-Lopez, 2007), with positive or negative general parental control while growing up linked to lower and greater alcohol use in college students, respectively. With regard to parental monitoring, specifically, studies with college students (Abar & Turrisi, 2008; Wetherill & Fromme, 2007; White, McMorris, Catalano, Fleming, Haggerty, & Abbott, 2006; Wood et al., 2004) have revealed that monitoring is especially effective in reducing problematic drinking in students. Greater parental monitoring, both just prior to coming to college and while at college, has been linked to lower student drinking.

Although less frequently studied, alcohol-specific parental control has been explored in a few studies examining drinking in adolescents or college students. Studies

with middle- and high- school adolescents (Jackson, Henrikson, & Dickinson, 1999; van der Vorst et al., 2005) suggest that greater alcohol-specific control, operationalized as parental rules and consequences for alcohol use and alcohol-related activities, results in lower adolescent drinking. In addition, recent studies with college students (Turrise, Mastroleo, Mallett, Larimer, & Kilmer, 2007; Turrise et al., 2001) have indicated that greater parental communication about alcohol use both prior to and during college is significantly associated with lower student drinking. These studies on alcohol-specific control suggest that alcohol-specific parental control has protective effects on adolescent/student drinking. Interestingly, however, one type of parental control, namely, alcohol-related communication, has been associated with greater student drinking. A recent study with college athletes by Turrise et al. (2007) reported both positive and negative relationships between parental alcohol-related communication and college student drinking, with greater communication about the legal and social risks of drinking associated with lower student drinking and greater communication about physical risks associated with greater student drinking. These findings suggest a more complex relationship between this particular type of alcohol-related control and student drinking, with the content of the communication acting as a potential moderator.

Social learning theory. Another inherently interpersonal theory of alcohol use is the social learning theory models of problematic drinking (Abrams & Niaura, 1987; Maisto, Carey, & Bradizza, 1999). These models suggest that behaviors by significant others, such as modeling and social encouragement, and other socioenvironmental factors, such as stress, influence alcohol use through their development and reinforcement of alcohol-related beliefs, such as self-efficacy to avoid alcohol and

alcohol expectancies. This model is similar to SCT in proposing mediated effects of modeling via self-efficacy; however, unlike SCT, SLT models propose that a variety of interpersonal behaviors influence alcohol use through a number of different alcohol-related cognitions. Only a few studies (Brown, Creamer, & Stetson, 1987; Turrissi et al., 2001; Wood et al., 2001) have tested these mediational propositions with regard to parental behaviors and student drinking, and, for the most part, they have focused on alcohol expectancies alone.

An Integrated Model of College Student Drinking

Theoretical and empirical research suggests that drinking in college students is driven at a more distal level by environmental influences, such as the behaviors of others. Although parental behaviors have largely been deemphasized because of the prediction by developmental theories that peer groups, and not parents, are the important referents for drinking behavior, there is growing empirical evidence to suggest that parental behaviors are influential in student drinking even into adulthood and college. Both Social Cognitive Theory and social control theories suggest that parental modeling of drinking behavior and parental control, respectively, may have protective and deleterious effects on student drinking, depending on the type of behavior they are promoting and the nature of their administration. Moreover, these theories suggest that parental behaviors influence drinking patterns by helping to develop, encourage, and reinforce more proximal, cognitive determinants of drinking.

Despite theoretical and empirical connections between intrapersonal and interpersonal variables, very little research has been devoted to exploring relationships between parental behaviors and student alcohol-related cognitions. Most of the research

(Ham & Hope, 2003; Wood et al., 2001) investigating both intrapersonal and interpersonal predictors points to the independent and unique predictive power of both of these types of variables. However, despite evidence of independent effects, it is still possible that these sets of predictors interact with one another in meaningful ways. Indeed, parental behaviors may influence student drinking by shaping and modifying student alcohol-related cognitions.

Outcomes. This proposal will focus on student problematic drinking as the alcohol-related outcome. Problematic drinking will be conceptualized in terms of both alcohol consumption and alcohol-related problems. With regard to alcohol consumption, both heavy drinking and heavy episodic drinking, or binge drinking, will be assessed.

Predictors. Three predictors or parental behaviors will be assessed in this thesis: 1) parental modeling of problematic drinking, 2) parental alcohol-specific control, and 3) parental monitoring. The first two behaviors are *alcohol-specific parental behaviors*, in that they directly concern alcohol use and activities. Parental monitoring is a *general parental behavior*, in that it targets a variety of behaviors.

Parental modeling of problematic drinking. As discussed above, Social Cognitive Theory suggests that modeling of health behavior by others is an important determinant of an individual's health behavior. *Parental modeling of drinking* is defined in this thesis as a parent's specific pattern of alcohol use and alcohol-related activities and its related consequences that are directly observable to the student. *Problematic modeling of drinking* consists of engaging in problematic drinking patterns and drinking-related activities and making alcohol available in the home. This thesis will focus on two types of parental problematic modeling of drinking: 1) *parental problematic drinking* and 2)

availability of alcohol in the home. Greater parental problematic modeling of drinking is proposed to have a negative effect on college student drinking, in that it leads to greater drinking.

Parental alcohol-specific control. *Parental alcohol-specific control* is defined as parental behaviors aimed at regulating the student's use of alcohol or engagement in alcohol-related activities. This dissertation will focus on two types of alcohol-specific control: 1) *parental alcohol-related communication*, discussions about the risks and consequences associated with drinking, and 2) *parental alcohol-specific rules*, restrictions on the amount that students can drink and the types of alcohol-related activities in which they can engage. It is hypothesized that greater alcohol-specific control will be associated with lower college student drinking, with some exceptions. Greater alcohol-specific control will be associated with greater student drinking to the degree that it increases psychological reactance. Psychological reactance is more likely to occur as a result of *negative control*, control that is characterized by parental behaviors that are markedly severe, unilateral, and punitive.

Parental monitoring. General parental behaviors, like parental monitoring, have also been linked to student drinking outcomes. *Parental monitoring* is a type of general parental control that is defined as tracking and being aware of a student's general activities, associations, and whereabouts. It is proposed that monitoring, unlike modeling or alcohol-specific control, has a unitary and positive effect on student drinking; greater parental monitoring of a student's activities is associated with lower college student drinking. Parental monitoring is proposed to impact student drinking directly by making it less likely that students will engage in alcohol use and alcohol-related activities.

Overlap of parental behaviors. Clearly, there are likely to be modest correlations between parental problematic modeling of drinking and parental alcohol-specific control. Specifically, it is proposed that parents who model problematic drinking, either through their own problematic drinking patterns or through increased availability of alcohol within the home, will be less likely to engage in alcohol-specific control, as reflected by greater alcohol-specific rule-setting or alcohol-related communication. One would not expect, however, that this is the case for all parents who engage in problematic drinking patterns. Clearly, some parents who engage in and model inappropriate alcohol use and activities may recognize the dangers of alcohol use and try to inhibit alcohol use in their children through greater alcohol-specific control. Even more likely is the possibility that a parent who is low on problematic drinking will try to compensate for a spouse who is high on problematic drinking by talking more with her or his children about alcohol or enforcing alcohol-specific rules more strictly.

Mediation by student alcohol-related cognitions. It is hypothesized that all three of the parental behaviors, but most especially the alcohol-specific behaviors, such as parental alcohol-specific control and parental modeling of problematic drinking, will have both direct and indirect effects on college student drinking. Although other mediational mechanisms are possible, it is proposed that the effects of these parental behaviors on student drinking are largely mediated by student alcohol-related cognitions. Consistent with many social learning theories, and, most especially, SCT, my model proposes that alcohol-specific parental behaviors, in particular, impact student drinking by influencing both the student's *desire* to regulate his or her drinking, via perceived

drinking norms and alcohol expectancies, and the student's perceived *ability* to regulate his or her drinking, through self-efficacy to avoid drinking.

Perceived peer drinking norms. As discussed above, peer drinking norms is one of the strongest and most proximal predictors of college student drinking. *Perceived peer drinking norms* in college students is defined as a student's beliefs about the typicality or acceptability of alcohol use and activities among other students at their college. *Positive perceived peer drinking norms* is further defined as a student's belief that alcohol use and activities by college students is typical and acceptable. Greater positive peer drinking norms is hypothesized to be predictive of greater college student drinking.

With regard to the effects of parental behaviors on peer drinking norms, both TPB and SCT suggest that significant others' behaviors may impact student drinking by its influence on peer drinking norms. More specifically, alcohol researchers (Borsari & Carey, 2001) have suggested that significant others, such as peers, may influence college students' perceived drinking norms in two ways, via 1) modeling of drinking patterns and 2) alcohol-specific social control. With regard to peer influences, the effects of this modeling and peer pressure or control on peer drinking norms is always presumed to be negative in that it results in greater perceptions that alcohol use is typical and acceptable or greater positive peer drinking norms. Empirical research (Borsari & Carey, 2001; Engels et al., 1999) suggests that alcohol-specific modeling and control by parents also impact student peer drinking norms, with greater parental modeling of problematic drinking leading to greater positive peer drinking norms and greater parental alcohol-specific control leading to lower positive peer drinking norms. On the basis of this theoretical and empirical research, it is hypothesized that greater parental modeling of

problematic drinking will lead to greater positive peer drinking norms, because it conveys a greater acceptability or typicality of drinking-related behaviors. Greater parental alcohol-specific control is proposed to lead to lower, not greater, positive drinking norms, because it conveys a disapproval of alcohol use and activities. Greater parental monitoring may also lead to lower peer drinking norms because of its tendency to shelter children from less deviant (i.e., lower drinking-related use and activities) peer associations.

Self-efficacy to avoid drinking. Self-efficacy to avoid drinking is the central predictor of drinking suggested by SCT conceptions of student drinking. *Self-efficacy to avoid drinking* is defined as a student's confidence in her/his ability to avoid alcohol use and alcohol-related activities. Greater self-efficacy to avoid drinking is hypothesized to be predictive of greater student problematic drinking. Based on SCT propositions, it is proposed that greater parental modeling of problematic drinking will be associated with lower self-efficacy to avoid drinking. Although control theories of health behavior or alcohol use have not discussed self-efficacy as a potential mediator of the control/drinking relationship, greater parental control may be related to greater self-efficacy to avoid alcohol in college students, because parental regulation of drinking-related behavior helps students practice abstinence or self-regulation in this area. Continued avoidance of alcohol use and activities may serve to bolster students' confidence that they can successfully regulate their own drinking-related behaviors. Parental monitoring by discouraging general activities and associations that lead to drinking-related activity may also lead to greater self-efficacy to avoid alcohol.

Negative alcohol expectancies. With regard to outcome expectancies, SCT proposes that when others' reactions to a health behavior, such as drinking, are negative, an individual's expectancies regarding that behavior should be more negative. On the other hand, if social reactions are positive, an individual will endorse more positive expectancies regarding that health behavior (Bandura, 1991). SCT further proposes that just the anticipation of positive or negative reactions by others may influence the likelihood of that behavior. In terms of drinking, then, SCT predicts that negative and positive reactions by others, whether real or anticipated, promote greater and lower alcohol expectancies, respectively. Greater parental problematic modeling of drinking represents a positive reaction to alcohol use or activities in that it conveys to the student a positive stance regarding alcohol use and signals to students, in advance, that alcohol use will be met, most likely, with acceptance and approval. As a result, greater parental modeling of problematic drinking may lead to lower negative alcohol expectancies. Parental alcohol-specific control, on the other hand, represents a much more negative reaction to alcohol use in that it conveys to the student that drinking will not be met with approval and acceptance, but with punishment and negative consequences. As a result, greater parental alcohol-specific control is hypothesized to lead to greater negative expectancies regarding alcohol use or activities. The influence of parental monitoring on negative expectancies is less likely; monitoring may, however, lead to more negative expectancies about alcohol use in that it encourages associations with peers who are less likely to drink and more likely to hold negative beliefs about alcohol use.

Summary of Model. As is depicted in Figure 1, it is hypothesized that three parental behaviors, 1) parental modeling of problematic drinking, 2) parental alcohol-

specific control, and 3) parental monitoring, are significant predictors of student problematic drinking, assessed as either heavy alcohol consumption or increased alcohol problems. Although relatively independent of one another, it is hypothesized that greater parental problematic modeling of drinking is predictive of lower parental general or alcohol-specific control.

Parental modeling of problematic drinking and parental monitoring are proposed to have unitary and opposite effects on student problematic drinking, with parental modeling of drinking having deleterious effects on student drinking and parental monitoring having protective effects on student drinking. Parental alcohol-specific control is thought to have a protective or deleterious effect on student problematic drinking, depending on its administration. Specifically, it is hypothesized that negative alcohol-specific control weakens the otherwise negative relationship between parental alcohol-specific control and student drinking, leading, on occasion, to greater, not lower, student problematic drinking.

Although many studies have focused on the effects of parental behaviors while their children are still living at home (Barnes & Farrell, 1992), it is predicted that parental behaviors administered within the home will have lasting effects on their children, long after they have left home and have begun living on their own. Despite the growing influence of peers on college students, it is hypothesized that parental behaviors, both general and alcohol-specific, will continue to predict college student drinking. These effects are expected to remain significant, even after controlling for other, potentially stronger, predictors of college student drinking identified in the alcohol literature. In particular, this dissertation, unlike previous studies on college student drinking, will

control for the effects of past drinking. Several studies (McCabe, 2002; Wechsler et al., 1995) have indicated that problematic drinking prior to college, particularly during the senior year of high school, predicts problematic drinking or alcohol-related problems in the first year of college.

Three individual-level, alcohol-specific cognitions, namely, 1) self-efficacy to avoid drinking, 2) perceived peer drinking norms, and 3) negative alcohol expectancies, are proposed to mediate the relationships between both parental problematic modeling of drinking and parental general and alcohol-specific control and college student problematic drinking. Specific hypotheses are presented below.

My model is unique in that it is the first to look at the independent, and often opposing, effects of a number of general and alcohol-specific parental behaviors on college student drinking. Although this model predicts modest correlations between parental alcohol-specific behaviors, it also recognizes that there may exist very complex associations between parental behaviors, with parents potentially exhibiting both protective and deleterious behaviors on student drinking. In addition, although previous models of alcohol use, such as SLT and SCT, have proposed mediation of the relationships between socioenvironmental factors and drinking by alcohol-related cognitions, these theories have not articulated propositions specific to a number of different parental behaviors and student alcohol-related cognitions. My model is unique, then, in that it predicts that a number of alcohol-related beliefs mediate the relationships between both parental modeling and control and student problematic drinking. Finally, this model proposes complex relationships between parental behaviors and student alcohol-related cognitions, with some parental behaviors leading to more positive

alcohol-related cognitions, which predict lower student drinking, such as greater negative alcohol expectancies and self-efficacy to avoid drinking, and other parental behaviors leading to more negative alcohol-related cognitions, which predict greater student drinking, such as greater perceived peer drinking norms.

Hypotheses

Hypothesis 1. Greater parental monitoring during the spring semester of the senior year of high school (Time1: reported retrospectively by students in the fall semester of their freshman year of college) is predictive of lower student problematic drinking during the fall semester of the freshman year of college (Time 2), even after controlling for significant covariates and past student problematic drinking in the spring semester of the senior year in high school (Time 1; reported retrospectively by students in the fall semester of their freshman year of college).

Hypothesis 2: Greater alcohol-specific parental control at Time 1, including alcohol-related rules and alcohol-related communication, is predictive of lower student problematic drinking at Time 2, even after controlling for significant covariates and past student problematic drinking at Time 1.

Hypothesis 3: Greater parental modeling of problematic drinking at Time 1, including greater maternal and paternal problematic drinking and greater alcohol availability in the home, is predictive of greater student problematic drinking at Time 2, even after controlling for significant covariates and past student problematic drinking at Time 1.

Hypothesis 4: Student alcohol-related cognitions at Time 2 mediate the relationships between parental behaviors at Time 1 and student problematic drinking at

Time 2 (Hypotheses 1-3).

Hypothesis 5: The negativity of the alcohol-related communication at Time 1 moderates the relationship between parental alcohol-related communication at Time 1 and student problematic drinking at Time 2, such that greater negativity of alcohol-related communication weakens the negative relationship between parental alcohol-related communication and student problematic drinking (Hypothesis 2).

Hypothesis 6: Greater parental modeling of problematic drinking at Time 1, namely, parental drinking, is predictive of lower parental alcohol-specific control, namely, alcohol-specific rules and alcohol-specific communication, at Time 1.

Chapter 2

Method

Participants

Participants were introductory psychology students from the New Brunswick campus of Rutgers University ($N = 292$) who took part in an online study as partial fulfillment of a course requirement. Only college students who were 18 or 19 years of age, for whom this was their first semester at college, and who were living on their own (i.e., not with a parent or guardian) for the first time, were allowed to participate. These inclusion/exclusion criteria were imposed so as to ensure that this was the first time that students were 1) not under their parent(s)' direct control regarding alcohol use, and 2) exposed to an environment characterized by increased alcohol availability and use.

Two subjects were excluded because they indicated that they were still living with their parents and, therefore, did not meet the inclusion criteria. In addition, 10 participants were dropped from the analyses because they did not complete the survey and were missing data on all of the outcome variables. Three subjects were missing data with regard to gender; these participants were retained but were excluded from analyses in which gender was included as a covariate or in which male and female drinking was assessed separately (e.g., binge drinking). This left a total of 279 participants. An apriori power analysis, with moderate effect sizes, an alpha of .05, a desired power of .80, and multiple hypotheses testing, revealed that a sample size of 52 was necessary. T-tests of means revealed that participants who were excluded either because they were ineligible or because they did not provide information on major study variables were not significantly different from participants on study variables from those who were included

in the analyses. See the Missing Data section of Appendix C for a detailed description of other missing data and how this missing data was handled.

The mean age of the participants was 18.6 years ($SD = 0.23$), with 62% ($n = 172$) participants 18 years of age. Men composed 55% ($n = 151$) of the sample, compared to 51% of the study body on the New Brunswick Campus of Rutgers University (Office of Institutional Research, 2009). The majority of participants were *White* (72%, $n = 200$), followed by *Asians* (18%, $n = 51$), *multiracial or other* (5%, $n = 15$), *African American* (3%, $n = 8$), and *Hawaiian/other Pacific Islanders* (<1%, $n = 2$); three participants (1%) did not provide data on race. With regard to ethnicity, 10% of participants were Hispanic ($n = 28$). University Census Data (Office of Institutional Research, 2008) indicated that the composition of this sample is roughly comparable to the study body of the New Brunswick campus of Rutgers University in regard to race/ethnicity, although in this sample Whites were somewhat overrepresented (62% vs. 51%) and Asians and African Americans were somewhat underrepresented (18% vs. 25% and 3% vs. 9%, respectively).

With regard to religion ($n = 275$), 53% ($n = 145$) of the sample reported that their upbringing was *Catholic*, followed by *no religious affiliation* (13%; $n = 35$), *Jewish* (9%, $n = 25$), *Protestant* (7%, $n = 20$), *other* (9%, $n = 25$), *Hindu* (5%, $n = 14$), *multiple* (2%, $n = 4$), and *Buddhist* (<1%, $n = 1$). In regard to marital status ($n = 274$), the majority of participants (97%, $n = 274$) were *single* as opposed to *married* (2%, $n = 4$) or *partnered* (2%, $n = 5$). No participants reported being *divorced*, *separated*, or *widowed*. Finally, the majority of participants reported *living in the dorms* on campus (91%, $n = 255$), as

opposed to *living off-campus* (9%, $n = 24$). For details on other demographics, including parental characteristics, see the Descriptive Statistics section of Appendix D.

Design

The present study constituted a single-wave, cross-sectional examination of college student drinking and parental behaviors. Data were collected via an online-survey for three weeks from November, 2009 to December, 2009. All data were based on student self-report. Although second-hand information on parental behaviors introduces the possibility of bias and random error on the part of students and, thus, potentially inaccurate representation of actual parental behaviors, many researchers in the alcohol literature and elsewhere (Borawski et al., 2003; Foley et al., 2004) have reported on the usefulness of using under-aged and adult children's reports of parental behavior. As they point out, children's perceptions of parental behaviors may be more influential on a child's behavior than the actual parental behavior itself. However, the use of retrospective perceptions does introduce the possibility that the perceived parental behaviors were not the students' active perceptions at the time that they were witnessing the behavior.

Although this study constituted only a single wave, predictor and outcome variables were assessed with regard to two different time points. Specifically, students were asked to report on outcomes, student alcohol-related behaviors, in the present (i.e., during the fall semester of the academic year), with regard to Time 2, while predictors, parental behaviors, were reported on retrospectively, specifically, with regard to the spring of the senior year of high school (Time 1). In addition, mediators and moderators were also assessed with regard to Time 2. For a more detailed look at the time points referenced by study variables, see Table 1.

Procedure

As discussed above, participants were part of the subject pool for introductory psychology students at Rutgers University. At the subject pool website, students received information about exclusion criteria and general details about compensation and participation. Once students signed up for the study, they were sent a web link to the online study. Upon arriving at the study website, students were given more specific details about the study via an information sheet and were required to give their consent to participate by selecting “*I accept*”. Students ($n = 14$) who chose “*I do not accept*” were immediately exited from the survey.

The questionnaire consisted of 171 questions and took approximately 20-40 minutes to complete. Upon completion of the survey, students were thanked for their participation and were instructed to contact the principal investigator should questions or problems arise as a result of participation. The administration of the survey was done through Survey Monkey, an online tool used for survey design, collection, and analysis. Survey Monkey is extremely user-friendly and navigates participants via a series of webpages through instructions, individual questions, and scales/measures. Survey Monkey ensures a high level of security for storage and transmission of data (128 bit encryption), a standard equivalent to that used by banks and high-level government agencies. Because of the highly sensitive nature of the survey (i.e., reporting on underage and alcohol-related parenting), students were allowed to opt out of answering any of the questions. A “*prefer not to answer*” option was given for each question in the survey. However, very few students ($n = 6$) chose this option for any of the items; and for those students who did select this option, they did so for only a few items in the questionnaire.

Measures

Measures employed in the study involved assessments of 1) student and parent demographics/ characteristics, 2) parental behaviors during students' senior year of high school, 3) current student alcohol-related cognitions, and 4) student alcohol-related behaviors occurring both in the spring of their senior year of high school and currently. For a summary of the constructs and their respective measures, see Table 1. For a complete list of all of the items in each measure, see Appendix A.

Demographic Characteristics. A number of student demographic characteristics were collected including gender, age, race, ethnicity, marital status, living situation, and religion that they were raised in. Student socioeconomic status (SES) was assessed as the combined education level of their mother and father. For students with only one parent, the education level of their single parent was used as a proxy for SES. Finally, parental marital status was also assessed.

These demographics included a number of nominal variables. Because the analyses used to test most of the hypotheses (i.e., linear regression analyses) require predictors that are continuous or dichotomous, nominal demographic variables with more than two response categories were recoded as multiple dichotomous dummy variables. Student SES was not recoded; as the variable for parental education was ordinal, it was treated as an interval variable for the analyses. For those students with two parents ($n = 275$), student SES was calculated by taking the average of scores on mother and father's education; for those students from single-parent families ($n = 4$), only the score of the one parent was used.

Parental monitoring. Parental monitoring was assessed with the 6-item Parental Monitoring Scale, developed by Wood et al., (2004) for college-aged students. The Monitoring Scale showed moderately good internal consistency ($\alpha = .730$); for more details about the psychometric properties of this and other scales, see Appendix B. The scale was made up of two 3-item subscales, which asked college students to assess how much their parents 1) attempted to know and 2) actually knew what they did during the spring of their senior year of high school. Sample items from this scale included “*How much did your parents try to know what you did at night?*” and “*How much did your parents really know what you did at night?*” Response options included 0 (*didn’t try at all / didn’t know at all*), 1 (*tried a little/ knew a little*), and 2 (*tried a lot / knew a lot*). Scale scores were constructed by adding all of the items of both subscales together, with higher scores indicating greater parental monitoring.

Parental alcohol-specific rules. Parental Rules about Alcohol was assessed with a 10-item scale (Van der Vorst et al., 2005), which asked adolescents to report the degree to which their parents allowed them to consume alcohol in a variety of situations during the spring of their senior year. Sample items included, “*I was allowed to come home drunk*” and “*I was allowed to drink alcohol during the week*”. Response options ranged from 1 (*never*) to 5 (*much or most of the time*). Pilot testing revealed that some respondents were unable to answer this question because they were non-drinkers in high school and, therefore, their parents did not need to set rules around alcohol. To accommodate students for which rules were irrelevant, a “*not applicable*” option was added. All of the items were reverse-coded so as to reflect greater rule-setting around alcohol use and activities. Scale scores were constructed by summing all items’ scores,

with scores ranging from 10 to 50 and higher scores indicating greater alcohol-specific rules. The scale showed very high internal consistency ($\alpha = .990$).

Parental communication about alcohol problems. Communication about Alcohol Problems was assessed using a scale developed for this study from four items used in previous studies of college student drinking to assess communication about specific alcohol-related topics (Turrisi et al., 2001). Items asked about negative consequences or risks associated with alcohol-related use or activities. The stem of the scale read: “*During the spring of your senior year, how much did your parents talk about*”, and sample items included “*how alcohol can make you physically sick*” and “*drunk driving and its consequences*”. Response options ranged from 0 (*not at all*) to 3 (*a great deal*). Scores were constructed by adding items together, with higher scores indicating greater communication about alcohol problems. An exploratory factor analysis revealed that these four items loaded on the same factor. In addition, the 4-item scale showed high internal consistency ($\alpha = .920$; for more information about the development of this measure, see Appendix B).

Parental problematic drinking. Maternal Problematic Drinking and Paternal Problematic Drinking were assessed separately with a 1-item measure, adapted from an item by Wechsler et al., (1998), which asks students to report on the type of drinker a college student thinks they are. The items read as follows: “*Describe your mother’s/ father’s alcohol use during the spring of your senior year in high school*”. Response options were 0 (*abstainer*), 1 (*abstainer in recovery*), 2 (*infrequent or light drinker*), 3 (*moderate drinker*), 4 (*heavy drinker*), 5 (*problem drinker*), 6 (*don’t know*), 7 (*not applicable- no mother or father substitute*). Responses options 0 and 1 were collapsed

into the same response category, *abstainers*, so that the scale reflected a more continuous variable, with scores ranging from 0 (*abstainer*) to 4 (*problem drinker*). Higher scores indicated greater maternal or paternal problematic drinking.

Availability of alcohol in the home. Availability of Alcohol was measured with a 5-item scale by Van der Vorst et al., (2005). This scale asked students to rate how often particular types of alcohol were visible or available in various places in the home during the spring of their senior year in high school. Sample items included “*wine or beer in the fridge*” or “*hard liquor, such as whisky or rum, stored in the house*”. Response options ranged from 0 (*never*) to 3 (*always*). Scale scores were constructed by adding scores on all of the items, with higher scores indicating greater alcohol availability. Internal consistency of this scale was relatively high ($\alpha = .875$).

Past student problematic drinking. Past student drinking was assessed with a 1-item scale developed by Wechsler et al., (1998). The item read as follows: “*Describe your alcohol use during the spring of your senior year in high school*”. Scores ranged from 0 (*abstainer*) to 4 (*problem*), with higher scores indicating greater student past problematic drinking. As with parental problematic drinking, this variable was treated as an interval variable for analyses, although technically an ordinal variable. Two other exploratory measures of past student drinking, 1) onset of first drink and 2) onset of first drunk, were also assessed in the study; a discussion of these variables can be found in the Exploratory Variables sections of Appendix A and B.

Student binge drinking. Binge drinking was assessed with a 2-item scale, known as the *5/4 Measure of Binge Drinking* (Wechsler et al., 1995). This scale is a commonly used measure of binge drinking in college students and establishes different cut-offs for

binge drinking in men and women. Specifically, male students were asked to report how many times they had *five drinks* or more in a row in the last two weeks, while female students were asked to report how many times they had *four drinks* or more in a row in the last two weeks. A drink was defined as: 1) *a 12-oz can or bottle of beer*, 2) *a 4-oz glass of wine*, 3) *a 12-oz can or bottle of wine cooler*, or 4) *a shot of liquor straight or in a mixed drink*. Response options included 0 (*none*), 1 (*once*), 2 (*twice*), 3 (*3-5 times*), 4 (*6-9 times*), and 5 (*10 or more times*). Consistent with the literature on student drinking (Wechsler, Lee, Kuo, & Lee, 2000), both the incidence (i.e., the presence of any binge drinking in the last two weeks) and frequency (i.e., the number of binges in the last 2 weeks) was examined. To calculate the incidence (i.e., dichotomous) binge variable, responses 0 and 1 were recoded as 0 (*non-bingers*) and responses 2 through 6 were recoded as 1 (*bingers*). Although binge drinking as coded above represented an ordinal variable, it was analyzed as an interval variable, frequency of binge drinking.

Student heavy drinking. Student Heavy Drinking was assessed as Overall Intensity of Use, which was measured with the *Daily Drinking Questionnaire* (DDQ; Collins, 1985). This measure asks participants to report on both the quantity and frequency of alcohol consumption. Quantity of alcohol consumption was assessed by asking participants to report the average number of drinks they consumed on each day of a typical week in the last month. A drink was defined in the same way as for binge drinking. Frequency was assessed with a single item: “*How often did you drink alcohol during the past month?*” Response options ranged from 0 (*never*) to 6 (*once a day or more*). Overall Intensity of Use was calculated by multiplying quantity by frequency, with higher scores indicating greater overall use or heavy drinking. Two other

exploratory measures of Heavy Drinking were also used in the study: 1) frequency of drunkenness and 2) incidence of blackouts; details about these measures can be found in the Exploratory Variables sections of Appendix A and B.

Student alcohol problems. Alcohol Problems was assessed using the revised, 18-item version of the *Rutgers Alcohol Problem Index* (RAPI-R; White & Labouvie, 1989), developed specifically for college students. Students were asked to report how often they experienced a number of problems as a result of their alcohol use since the beginning of the fall semester of 2009. Specifically, the stem of the measure asked, “*How many times has this happened to you while you were drinking or because of your drinking?*” The individual items, for the most part, concerned personal, social, and school or work-related problems; in addition, they reflected problems particularly relevant to college students. Sample items included “*not able to do your homework*” and “*got into a fight with other people*”. Students were asked to report how often they experienced any of these problems since they began the current fall semester, with response options including 0 (*none*), 1 (*1-2 times*), 2 (*3-5 times*), and 3 (*greater than 5 times*). Higher scores indicated greater student alcohol problems. This scale showed good internal consistency ($\alpha = .850$).

Student negative alcohol expectancies. Student Negative Alcohol Expectancies were assessed with the cognitive impairment subscale (one of the two negative expectancies subscales) of the *Comprehensive Effects of Alcohol Scale* (CEOA; Fromme, 1993). The subscale asked participants to rate the degree to which they would expect to experience a number of negative outcomes as a result of their drinking. The stem for the scale read as follows: “*If I were under the influence of alcohol*”, and sample items included “*I would be clumsy*” and “*I would feel dizzy*”. Response options ranged from 1

(*strongly disagree*) to 4 (*strongly agree*), with higher scores indicating greater negative alcohol expectancies. The negative expectancies subscale showed good internal consistency ($\alpha = .882$). For more details about this subscale and the entire scale, see Appendix B.

Student positive peer drinking norms. Student Peer Drinking Norms was assessed with the 14-item *Drinking Norms Rating Form* (DNRF; Baer, Stacy, & Larimer, 1991) developed specifically for college students. This measure employed an open-ended format and asked students to list the typical number of drinks a typical student, in this case a Rutgers college student, consumes in an average week in the past month. The exact wording of the item was as follows: “*Consider a typical week during the last month. Please fill in a number for each day of the week indicating the typical number of drinks a typical Rutgers student of your same sex usually consumes on that day.*” Students were then asked to make the same report for their closest friend. A drink was defined as before. Scores for each day were summed to create a total scale score, with higher scores indicating greater (i.e., more positive) peer drinking norms.

Student self-efficacy to avoid alcohol. Student Self-efficacy to Avoid Alcohol was measured with the revised, 18-item *Drinking Refusal Self-efficacy Questionnaire for Adolescents* (DRSEQ-RA; Young, Hasking, Oei, & Loveday, 2007). Students were asked to rate how certain they were that they could resist drinking in a number of situations specific to college students. The stem of the scale read as follows, “*How sure are you that you could resist drinking alcohol*”, and sample items included “*when someone offers you a drink*” and “*when you are at a club/concert*”. Response options ranged from 1

(*definitely could not resist*) to 6 (*definitely could resist*). High scores indicated greater self-efficacy to avoid alcohol. The scale showed high internal consistency ($\alpha = .947$).

Negativity of alcohol-related communication. Negativity of Alcohol-related Communication was measured with a 6-item scale developed by Spijkerman, van den Eijnden, & Huiberts (2008) for adolescents. The scale asked adolescents to rate how effective they thought their parents were in their communications about alcohol. Specifically, adolescents were asked to indicate how much of the time six statements were true about their parents' discussions with them about drinking during the spring of their senior year of high school. Sample statements included "*My parents and I were interested in each other's opinion about alcohol use*" and "*My parents and I talked easily about our opinions regarding drinking*". Response options ranged from 0 (*not at all*) to 4 (*a lot*). The scale showed good internal consistency ($\alpha = .846$). Scale scores were constructed by first reverse-coding all of the items and then adding item scores, with higher scores indicating greater negativity of alcohol-specific communication. A "*Not Applicable*" option was provided for those students whose parents did not discuss alcohol with them, and scale scores were not computed for any participant who chose this option for any of the items.

Details about other measures used in this study to test exploratory hypotheses may be found in the Exploratory Variables sections of Appendix A and B.

Univariate Analyses

Descriptive statistics. Descriptive statistics, including means and standard deviations, were computed for all study variables. In addition, a number of graphical displays and numerical univariate tests were conducted to ascertain the normality of the

distributions and identify any potential outliers for all of the study variables. For a detailed discussion of specific tests, see the Univariate Tests section of Appendix C.

Bivariate associations. Bivariate correlations were conducted to assess relationships among and between study variables. First, bivariate associations among all of the categories of study variables (e.g., predictors with one another) were tested. Second, bivariate associations between categories of study variables (e.g., predictors with mediators) were tested. Bivariate associations between interval predictors and dichotomous outcomes were conducted using point-biserial correlations (equivalent to Pearson's product-moment in SPSS). Associations between interval variables were conducted using the Pearson product-moment correlation. The magnitude of correlations was rated according to the standards established by Cohen (1988): small ($r = .1$ - $.3$), moderate ($r = .3$ - $.5$), and large ($r = .5$ or greater).

Selection of covariates. Significant covariates were identified by first looking at the alcohol literature to identify variables that consistently predicted large variances in college student drinking (e.g., gender) and that were theoretically linked to college student drinking. Second, significant relationships between covariates and predictors were assessed by looking at the bivariate associations between the two sets of variables. Third, significant relationships between covariates and outcomes were tested by performing a regression analysis for each one of the drinking outcomes. All of the covariates, along with past student drinking, were entered in each of the regression analyses simultaneously. Finally, a particular variable was identified as a covariate 1) if it had been identified in the literature as a theoretically relevant and robust predictor of

student drinking, 2) if it was significantly associated with one or more of the predictors, and 3) if it was a significant predictor of the particular drinking outcome.

Two major reviews of college student drinking (Baer, 2001; Ham & Hope, 2003) have identified a number of student demographics that are associated with college student drinking. Specifically, race, gender, and religiosity/ religious affiliation have all been identified as significant predictors of a number of drinking outcomes. Correlational and regression analyses (see the Determining Covariates section of Appendix C for extensive details) revealed that religious affiliation was not a significant covariate for any of the drinking outcomes, because it was not a significant predictor of any of the drinking outcomes. It is quite possible that a student's religious upbringing is not as predictive of student drinking as a student's own religiosity or current religious affiliation, because religious upbringing reflects a parent's, rather than a student's, religious affiliation or religiosity. With regard to gender and race, gender was identified as a significant covariate for overall alcohol use, but not alcohol problems or binge drinking. Race was identified as a significant covariate of male binge drinking (both frequency and incidence), but not overall alcohol use or alcohol problems. In both cases, white students were more likely to be binge drinkers and to binge more frequently than black/African American students.

Multivariate Analyses

Main hypotheses. Hierarchical, multiple regressions were conducted to examine the influence of parental behaviors, both general and alcohol-specific, on student problematic drinking (Hypotheses 1-3). Separate linear regression analyses were conducted for each of the continuous student drinking variables (i.e., 1) overall use, 2)

alcohol problems, 3) frequency of male/ female binge drinking). Binary logistic regression analysis was used for the dichotomous variable, incidence of male/female binge drinking. In all of the regressions, the analyses controlled for theoretically indicated and statistically significant covariates. The analyses also controlled for past student problematic drinking, so as to assess the independent effects of parental behaviors on current student drinking after controlling for past drinking. In both linear and logistic regressions, control variables and past student drinking were entered in the first step; all of the parental behaviors were entered simultaneously in the second step, so as to determine their unique predictive ability above and beyond the control variables. For a summary of the regressions conducted and the variables they involved, see Table 2. An alpha level of .05 was used for all statistical tests. Although researchers (e.g., Schaeffer, 1995) suggest using Bonferroni corrections when conducting multiple tests on a single data set, these corrections were not made, because of the number of covariates and predictors that were used in the regression analyses. Entering so many predictors in the analyses and requiring them to compete against one another already provides for a relatively conservative estimate of the independent contribution of each predictor. In addition, a number of researchers (Nakagawa, 2004; Perneger, 1998) have called for an end to Bonferroni corrections, arguing that they significantly increase the possibility of making a Type II error, at the expense of making a Type I error, and that these corrections significantly reduce the number of potentially significant relationships that are reported. In lieu of Bonferroni corrections, they suggest providing readers with effect sizes for all significant relationships so that readers can assess for themselves the potential relationships between variables. In this dissertation, comparisons of effect sizes

were examined by comparing bivariate correlations from univariate analyses and squared semi-partial (part) correlations from multivariate analyses. The squared semi-partial correlation indicates the total variance in the dependent that is explained by a particular predictor after controlling for the other predictors.

The statistical significance of each step of the regression analysis was evaluated, and change in R^2 was examined to determine the amount of variance explained by the set of predictors in each step. Statistical assumptions associated with multiple linear regression (e.g., linearity, homoscedasticity, normality of errors, collinearity) were tested and corrected for if not met (Osborne & Waters, 2002). For a detailed account of assumption testing and how violations of these assumptions were handled, see the Testing of Regression Assumptions section of Appendix C. For logistic regression, the significance of each step was determined by looking at the model chi-square test (a type of likelihood ratio test; Pampel, 2000). Assumptions specific to logistic regression (e.g., linearity between predictors and logits, absence of perfect separation, absence of unduly influential outliers) were tested and relevant corrections were made if assumptions were violated (see Appendix C for a detailed account; Menard, 2002).

Mediational analyses. Mediational hypotheses were tested with all of the drinking outcomes (i.e., overall use, alcohol problems, frequency of binge drinking) except incidence of binge drinking. This variable was excluded, as results for incidence (i.e., presence) and frequency (i.e., number) of binge drinking were roughly equivalent for both main and mediational analyses. As with tests of main hypotheses, multiple, linear regression analysis was used to test all of the mediational hypotheses. An alpha level of .05 was used for all statistical tests.

The *intervening variable method*, a modification of the Baron and Kenny procedure (1986) by MacKinnon, Lockwood, Hoffman, West, & Sheets (2002), was used to determine if each student alcohol-related cognition mediated the relationships between the parental behaviors and student drinking outcomes. The *causal steps method* of Baron and Kenny requires that four conditions be met: (1) a significant association between the predictor and the outcome, (2) a significant association between the predictor and the mediator, (3) a significant association between the mediator and the outcome, and (4) a decrease in the association between predictor and outcome when the mediator is included in the model. MacKinnon's method requires that only the second and third conditions be met in order to establish mediation. Researchers (Judd & Kenny, 1981; MacKinnon, Krull, & Lockwood, 2000; Shrout & Bolger, 2002) have empirically demonstrated and theoretically argued that it is possible for mediation to occur even if the direct relationship between the independent variable (IV) and dependent variable (DV) is not significant. For a more detailed theoretical discussion of the MacKinnon model of mediation, see the Mediation Analyses section of Appendix C.

As discussed earlier, predictors and mediators were assessed retrospectively with regard to Time 1 (i.e., spring of senior year in high school) and outcomes were assessed with regard to Time 2 (i.e., currently- fall semester in college). To test for the associations between predictors and mediators, separate multiple regression analyses were conducted for each drinking outcome to determine if parental behaviors predicted each student alcohol-related cognition (i.e., peer drinking norms, negative alcohol expectancies, and self-efficacy to avoid alcohol), after controlling for significant covariates, past student drinking, and the other mediators. To test for the associations

between mediators and outcomes, multiple regression analyses were conducted for each drinking outcome. Covariates, past drinking, and parental behaviors were entered in the first step of the regressions; all of the mediators were entered in the second step so as to determine the independent effect of each mediator. (For a comprehensive list of the variables included in these mediational regressions, see Table 2.)

If both pathways from the predictor to the mediator and from the mediator to the outcome were significant, Sobel's test (MacKinnon & Dwyer, 1993) was conducted to determine if this indirect effect was significant. If Sobel's test was significant, it was concluded that the particular student alcohol-related cognition at Time 2 was a mediator of the association between the specific parental behavior and student problematic drinking outcome. Effect sizes of indirect effects for individual mediators on each drinking outcome were calculated and compared using a technique for models with multiple mediators described by Preacher and Hayes (2008).

Moderational analyses. Multiple linear regression analysis was also used to test the moderational hypothesis (Hypothesis 5). First, the original variables, parental communication about alcohol and negativity of alcohol communication, were centered, by subtracting each participant's score from the mean score. Variables were centered in order to reduce multicollinearity. The interaction variable was then created by multiplying these centered variables. Once the interaction terms were created, hierarchical, multiple linear regression was performed with two of the drinking outcomes: 1) overall use and 2) alcohol problems. Past drinking, significant covariates (gender for overall alcohol use and race for alcohol problems), and the centered predictor and moderator were entered in the first step; the interaction term was entered in the second step. As

before, an alpha level of .05 was used to test significance. Effect size was assessed using f^2 (Aiken & West, 1991). See Table 2 for a summary of the variables used in each step of the regression for this moderational analysis. If the interaction term was significant in the second step, then the interaction was considered to be significant.

Relationships between parental behaviors. Multiple, linear regression analysis was also used to test the proposition that greater problematic modeling of drinking would predict greater parental alcohol-specific control. Two separate regression analyses were conducted for each type of alcohol-specific control: 1) communication and 2) rules. In the regression analyses, both of the predictors, maternal and paternal drinking, were entered simultaneously.

Chapter 3

Results

Descriptive Statistics

Means, standard deviations, and frequencies for student alcohol use (i.e., past drinking, overall use, binge drinking) and problems are presented below. For a summary of similar descriptive statistics on other study variables, including predictor, mediator, moderator, and exploratory drinking variables, see Appendix D. In addition, for a more complete list of descriptive statistics (e.g., range, skewness, kurtosis) for all study variables, including covariates, see Table 3.

Past student drinking. With regard to past student drinking (i.e., drinking during the spring of the senior year of high school), the mean score was 1.28 ($SD = .027$), about a third of the way between the categories of *light drinker* and *moderate drinker*. Because past student drinking is technically an ordinal variable, frequencies for each category are also given, in order to give the reader a better sense of where students fell in terms of past drinking. Specifically, the majority of students reported that they were *moderate drinkers* (36%, $n = 101$), followed by *light drinkers* (30%; $n = 83$), *abstainers* (26%, $n = 73$), *heavy drinkers* (7%, $n = 20$), and *problem drinkers* (<1%, $n = 2$).

Overall alcohol use. Overall intensity of alcohol use, as discussed earlier, was calculated as a product of quantity and frequency. The number of drinks consumed in a typical week ranged from 0 to 37, with the mean number of drinks consumed in a typical week being 12.0 ($SD = 17.3$). The heaviest drinking took place on Thursday through Saturday, with the greatest average number of drinks per day consumed on Saturday ($M = 4.47$, $SD = 4.17$), followed by Friday ($M = 4.15$, $SD = 4.01$), and then Thursday ($M =$

2.81, $SD = 3.63$). The average number of drinks consumed Sunday through Wednesday ranged from .180 ($SD = .973$) for Wednesday to .490 ($SD = 1.80$) for Sunday. Regarding frequency of use, the mean score was 3.37 ($SD = 1.13$), approximately halfway between *2-3 times a month* and *1-2 times a week*. In terms of actual categories of frequency of use, the majority of students (28%, $n = 78$) reported drinking *one to two times a week*. About a fifth of students reported drinking *2-3 times a month* (21%, $n = 58$) or *3-4 times a week* (19%, $n = 53$). About 12% reported *never drinking* ($n = 32$) or drinking *once a month* ($n = 33$), and <1% reported having a drink either *nearly every day* ($n = 1$) or *once a day or more* ($n = 1$). The mean score on overall use was 37.8 ($SD = 46.8$), with scores ranging from 0 to 224.

Binge drinking. With respect to the incidence (i.e., presence) of binge drinking, the same proportion of females and males reported binge drinking in the past two weeks (39%, $n = 49$; 39%, $n = 59$; respectively). The frequency (i.e., number of episodes) of binge drinking variable, however, revealed heavier binge drinking in men ($M = 1.62$, $SD = 1.57$) than women ($M = 1.40$, $SD = 1.41$), with both of the mean scores falling between the categories *once a week* and *twice a week*. Although frequency of binge drinking was treated as an interval variable in this study, other studies of binge drinking have analyzed frequency of binge drinking as a categorical dependent variable. For example, Wechsler et al., (2000) categorized drinkers into *frequent binge drinkers* (greater than 3 times a week), *occasional binge drinkers* (once or twice a week), *non-bingers* (drinkers who do not binge) and *abstainers* (*no drinking*). With regard to these categories, in this study the majority of males were *frequent binge drinkers* (35%, $n = 53$), followed by *non-bingers* (28%, $n = 41$), *occasional binge drinkers* (26%, $n = 38$), and *abstainers* (11%, $n = 17$).

The majority of females were either *non-bingers* (34%, $n = 42$) or *occasional binge drinkers* (35%, $n = 43$), followed by *frequent binge drinkers* (26%, $n = 32$), and *abstainers* (4%, $n = 5$). These results revealed greater frequency of binge drinking in male students than female students.

Alcohol problems. The average number of problems experienced as a consequence of having drunk was 3.25 ($SD = 3.67$), with the total number of problems ranging from 0 -18. RAPI scores are typically calculated, however, so as to reflect the frequency with which problems are experienced, rather than the total number of problems experienced in a particular time period. RAPI scores calculated in this way, for this dissertation, ranged from 0-30, with a mean score of 4.42 ($SD = 4.45$).

Bivariate Associations

Predictors/covariates and outcomes. As is evident from Table 6, past student problematic drinking was significantly and positively associated with all of the current student problematic drinking outcomes. Associations were smallest for alcohol problems and incidence of male binge drinking, with correlations in the moderate range ($r = .428, p < .01$; $r = .497, p < .01$; respectively). Associations between past drinking and the other drinking outcomes were all large, with the largest associations occurring between past student drinking and frequency of male and frequency of female binge drinking ($r = .550, p < .01$; $r = .566, p < .01$). Associations between other covariates, including gender and race, and current student problematic drinking can also be found in Table 6.

With regard to parental behaviors, Table 9 reveals that relationships between parental behaviors and current student problematic drinking were much smaller than those between past student problematic drinking and current student problematic

drinking. Of all the parental behaviors, parental alcohol-specific rules had the greatest number of and largest significant associations with student problematic drinking outcomes. Specifically, parental alcohol rules was moderately associated with both the incidence and frequency of male binge drinking ($r = -.334, p < .01$; $r = -.331, p < .01$; respectively). Relationships between parental alcohol-specific rules and student problematic drinking were smaller for other drinking outcomes; alcohol rules was modestly associated with student overall alcohol use ($r = -.263, p < .01$), incidence of female binge drinking ($r = -.228, p < .05$), and student alcohol problems ($r = -.133, p < .05$). Parental alcohol rules was not significantly associated with frequency of female binge drinking ($r = .097, p = .774$).

Surprisingly, parental alcohol-related communication was significantly associated with four of the student drinking outcomes, but not in the predicted direction; parental alcohol communication was positively, not negatively, associated with student drinking. With the exception of frequency of female binge drinking, associations with drinking outcomes, such as alcohol problems ($r = .223, p < .01$) and incidence of female binge drinking ($r = .228, p < .01$), were modest, with the association between communication and student overall alcohol use being the smallest ($r = .150, p < .05$). The association between parental alcohol communication and frequency of female binge drinking was moderate ($r = .305, p < .05$).

All of the significant associations between parental drinking (i.e., maternal or paternal drinking) and student problematic drinking were modest, as compared with alcohol-specific rules and communication. Correlations between parental drinking and male or female binge drinking were larger than those between parental drinking and

overall use or alcohol problems. Maternal drinking and paternal drinking were both significantly and positively associated with frequency of female binge drinking ($r = .209$, $p < .05$; $r = .245$, $p < .01$; respectively). Paternal drinking was also associated with the incidence of female binge drinking ($r = .203$, $p < .05$), but maternal drinking was not ($r = .142$, $p = .120$). Neither maternal drinking nor paternal drinking was associated with incidence or frequency of male binge drinking. With regard to overall use and problems, maternal drinking was associated with student overall alcohol use ($r = .179$, $p < .01$), but not with student alcohol problems ($r = .117$, $p = .664$). Paternal drinking, on the other hand, was significantly and positively associated with alcohol problems ($r = .195$, $p < .01$), but not with overall use ($r = .101$, $p = .651$). Availability of alcohol was not related to any of the drinking outcomes (see Table 9).

Relationships between parental monitoring and student problematic drinking outcomes were the smallest of all of the relationships between parental behaviors and student drinking. Moreover, parental monitoring was only significantly associated with two of the student problematic drinking outcomes. Monitoring was modestly and negatively associated with student overall alcohol use ($r = -.135$, $p < .01$) and student alcohol problems ($r = -.128$, $p < .05$). Parental monitoring was not significantly associated with either measure (i.e., incidence or frequency) of female or male binge drinking (see Table 9). For a discussion of bivariate associations between the above parental behaviors and exploratory drinking variables, such as frequency of drunkenness and blackouts, see the Bivariate Associations section of Appendix D.

Predictors and mediators. As is evident from Table 11, four parental behaviors, parental monitoring, alcohol-specific rules, and alcohol-specific communication, and

paternal drinking, were significantly associated with alcohol-related cognitions. Both maternal drinking and availability of alcohol were not associated with any of the drinking cognitions. All of the significant associations were modest, with the smallest associations between parental behaviors and self-efficacy to avoid alcohol.

More specifically, parental alcohol-specific rules was significantly associated with all three of the alcohol-related cognitions; alcohol rules was positively associated with negative alcohol expectancies and self-efficacy to avoid alcohol ($r = .252, p < .01$; $r = .156, p < .01$; respectively) and negatively associated with student (positive) peer drinking norms ($r = -.288, p < .01$). Parental monitoring was significantly associated with all of the alcohol-related cognitions, except negative alcohol expectancies. Monitoring was negatively associated with peer drinking norms ($r = -.239, p < .01$) and positively associated with self-efficacy to avoid alcohol ($r = .170, p < .01$).

Both parental alcohol-specific communication and paternal drinking were significantly associated with only one of the student problematic drinking outcomes, and both of these associations were in unexpected directions. Parental alcohol-specific communication was negatively, not positively, associated with self-efficacy to avoid alcohol ($r = -.173, p < .05$). Paternal drinking was positively, not negatively, associated with negative alcohol expectancies ($r = .122, p < .05$); this was the smallest association of all of the associations between parental behaviors and student problematic drinking.

Mediators and outcomes. As revealed in Table 12, all three of the alcohol-related cognitions were significantly associated with all of the student problematic drinking outcomes, with the exception of the relationship between negative expectancies and alcohol problems. Student peer drinking norms was positively associated with all of

the drinking outcomes. Of the three alcohol-related cognitions, drinking norms had the largest associations with student problematic drinking, with three of the four positive associations ranging from moderate for frequency of male and female binge drinking ($r = .412, p < .01$; $r = .408, p < .01$; respectively) to large for overall use ($r = .592, p < .01$). Student drinking norms was modestly associated with student alcohol problems ($r = .283, p < .01$).

Student self-efficacy to avoid alcohol was negatively associated with all of the student drinking variables. The largest association between student self-efficacy and problematic drinking was for alcohol problems, which was moderately associated with self-efficacy to avoid drinking ($r = -.418, p < .01$). Self-efficacy was modestly associated with student overall alcohol use ($r = -.291, p < .01$), frequency of binge male drinking ($r = -.252, p < .01$), and frequency of female binge drinking ($r = -.247, p < .01$).

Finally, significant associations between student negative alcohol expectancies and student drinking outcomes were negative. Negative expectancies was moderately associated with frequency of male and female binge drinking ($r = -.302, p < .01$; $r = -.324, p < .01$; respectively) and modestly associated with overall use ($r = -.265, p < .01$),

Regression Analyses for Hypotheses 1-3: Parental Behaviors predict Student

Problematic Drinking

Parental behaviors predict student overall use of alcohol. The regression analyses for overall alcohol use included 276 participants; participants who indicated that parental alcohol-specific rules were “*not applicable*” ($n = 3$) were excluded. Results for these subjects were not imputed because, as discussed above, these students did not drink, and, therefore, alcohol-specific rules were not applicable. Testing of regression

assumptions revealed problems with normality, unduly influential outliers, and slight heteroscedacity for the model including significant covariates, parental behaviors, and overall use. Previous univariate examinations of overall use (see the Distributions of Variables section in Appendix D) had indicated a highly and positively skewed and kurtotic distribution, in addition to a few potentially influential outliers. After a square root transformation of overall use and the elimination of three influential outliers (scores ranging from 220 to 224 with Cook's distance scores greater than 1.00), the regression assumptions were met. For a more detailed discussion of the testing of regression assumptions for this and other variables, see the Regression Assumptions Test Results section of Appendix E.

In the first step of the regression, past drinking ($\beta = .618, p < .001$) and gender were significant predictors of overall use ($\beta = .098, p < .05$). Greater past drinking and being male were both associated with greater intensity of overall alcohol use. These two variables accounted for 36% (R^2 change = .355) of the variance in overall use. In the second step of the analyses, four parental behaviors at Time 1, 1) maternal drinking, 2) monitoring, 3) alcohol-specific rules, and 4) alcohol-related communication, were significant predictors of overall use at Time 2, even after controlling for gender and past drinking. Specifically, greater maternal drinking was associated with greater overall use ($\beta = .105, p < .05$). Contrary to expectation, greater alcohol-related communication was associated with greater, not lower, overall alcohol use ($\beta = .129, p < .05$). Greater monitoring and alcohol-specific rules were associated with lower overall alcohol use ($\beta = -.142, p < .01$; $\beta = -.178, p < .001$; respectively). Neither paternal drinking nor availability of alcohol was a significant predictor of overall alcohol use, after controlling

for gender and past student drinking ($\beta = .007, p = .897$; $\beta = -.024, p = .654$; respectively). For a summary of predicted and actual results, see Table 37.

The four significant predictors in Step 2 accounted for approximately 8% (R^2 change = .076) in the variance in overall alcohol use, after controlling for gender and past drinking. For more details of regression results for overall use, see Table 13. For a pictorial representation of significant findings, see Figure 2. With respect to the effect sizes of individual predictors, bivariate associations and semi-partial correlations (see Table 37) revealed that parental alcohol-specific rules was a more robust predictor of student overall alcohol use ($sr^2 = .028$) than any of the other parental behaviors. Effect sizes for monitoring and communication were relatively similar ($sr^2 = .016$; $sr^2 = .013$). Although the bivariate correlation between maternal drinking and student overall use was relatively high in comparison with other parental behaviors (see Table 37), semi-partial correlations revealed that the effect size for maternal drinking was smaller than any of the other parental behaviors ($sr^2 = .008$).

Parental behaviors predict student alcohol problems. The regression analysis for alcohol problems only included those participants who were drinkers ($n = 252$), since the RAPI scale asks specifically about actual problems associated with alcohol use. Testing of regression assumptions revealed several violations, including non-normality of errors, heteroscedacity, and two unduly influential outliers. Univariate tests of the distribution of this drinking outcome, discussed elsewhere (see Appendix D), revealed a slightly positive skew and kurtosis to the variable and a few potentially influential outliers. A square root transformation of this variable and elimination of two unduly influential outliers (scores = 30.0, with Cook's distance scores greater than 1.00) allowed

for regression assumptions to be met. For a more detailed discussion of multivariate assumption testing and transformations for this variable, see Appendix E.

In the first step of the regression, past drinking was a significant predictor of alcohol problems ($\beta = .416, p < .001$), accounting for approximately 16% (R^2 change = .159) of the variance in alcohol problems (as discussed above, gender was not identified as a significant covariate for this outcome). In the second step of the analyses, three parental behaviors at Time 1, 1) monitoring, 2) paternal drinking, and 3) alcohol-related communication, emerged as significant predictors of alcohol problems at Time 2, after controlling for past student drinking. Specifically, greater paternal drinking was associated with greater alcohol problems ($\beta = .142, p < .05$). Once again, greater alcohol communication was associated with greater, not lower, alcohol problems ($\beta = .172, p < .01$). Greater monitoring was associated with lower alcohol problems ($\beta = -.168, p < .01$). These three predictors accounted for 5% of the variance in alcohol problems, after controlling for past student drinking (R^2 change = .054).

Unlike results for overall alcohol use, maternal drinking ($\beta = .054, p = .406$) and alcohol-specific rules ($\beta = .048, p = .425$) were not significant predictors of alcohol problems after controlling for past drinking. As with overall use, however, availability of alcohol ($\beta = .025, p = .698$) was not a significant predictor of alcohol problems after controlling for past drinking. For more details about the regression results for this outcome, see Table 14. For an overview of the predicted and actual results for this student drinking outcome, see Table 37. Finally, for a pictorial representation of significant findings for alcohol problems, see Figure 3.

The three significant predictors in Step 2 accounted for 5% of the variance in alcohol problems, after controlling for past student drinking (R^2 change = .054). With respect to the effect sizes of individual predictors, bivariate associations and semi-partial correlations revealed that effect sizes for parental alcohol-specific rules and monitoring ($sr^2 = .023$; $sr^2 = .023$) were roughly equivalent (see Table 37) and were greater than the effect size for paternal drinking ($sr^2 = .016$).

Parental behaviors predict male binge drinking. With regard to frequency of male binge drinking, both race and past student drinking were significant predictors of male binge drinking ($\beta = .149$, $p < .05$; $\beta = .465$, $p < .001$; respectively). Being white and greater past drinking was associated with a greater frequency of male binge drinking. Race and past drinking combined accounted for about 29% (R^2 change = .286) of the variance in this drinking outcome. When parental behaviors were entered in the second step, only alcohol-specific rules at Time 1 emerged as a significant predictor of male binge drinking at Time 2 ($\beta = -.263$, $p < .001$), after controlling for race and past student drinking. Specifically, greater alcohol-specific rules was associated with lower frequency of male binge drinking. Alcohol-specific rules accounted for approximately 7% of the variance (R^2 change = .072) of the variance in frequency of male binge drinking after controlling for race and past student drinking. None of the other parental behaviors were significantly associated with frequency of male binge drinking after controlling for race and past student drinking (for these and other regression results, including semi-partial correlations, see Table 16). For an overview of predicted and actual results for this student drinking outcome, as well as effect sizes, see Table 37.

Logistic regression revealed that both race ($OR = 2.58, p < .05$) and past student drinking ($OR = 2.79, p < .001$) predicted the incidence of male binge drinking. Specifically, white male students were almost three times more likely to engage in binge drinking. Greater past drinking also increased the likelihood of male binge drinking. The second step of the regression analysis revealed that alcohol-specific rules at Time 1 was a significant predictor of the incidence of male binge drinking at Time 2, after controlling for race and past student drinking. Specifically, alcohol-specific rules was negatively associated with incidence of male binge drinking ($OR = .941, p < .05$), such that greater alcohol-related rules was associated with a decreased likelihood of male binge drinking. None of the other parental behaviors predicted the incidence of male binge drinking (see Table 16).

Parental behaviors predict female binge drinking. With regard to frequency of female binge drinking, past drinking was significantly and predictably associated with female binge drinking ($\beta = .658, p < .001$), with greater past drinking associated with greater frequency of binge female drinking. The only parental behavior that predicted frequency of female binge drinking after controlling for past student drinking was alcohol-related communication ($\beta = .184, p < .05$). Thus, greater alcohol communication at Time 1 was associated with greater frequency of female binge drinking at Time 2, after controlling for past student drinking. Alcohol-related communication accounted for about 4% (R^2 change = .038) of the variance in frequency of binge female drinking. None of the other parental variables were significant predictors of frequency of female binge drinking after controlling for past drinking (for these and other regression results see Table 17).

For an overview of predicted and actual results for this student drinking outcome, as well as effect sizes, see Table 37.

Past student drinking also significantly predicted the incidence of female binge drinking in the first step ($OR = 6.75, p < .001$), with greater past drinking being associated with a greater likelihood of binge drinking in females. When parental behaviors were entered in the second step, none of the parental behaviors were significantly associated with a greater likelihood of female binge drinking, after controlling for past drinking (see Table 18).

For a pictorial representation of results for binge drinking, both male and female, see Figure 4. Results of the regression analyses for exploratory drinking variables, frequency of drunkenness and blackouts, are not discussed here. For results concerning the exploratory outcomes, see Appendix D.

Regression Analyses for Hypothesis 4: Alcohol-related Cognitions Mediate the Relationships between Parental Behaviors and Student Drinking

Indirect effects of parental behaviors on student overall alcohol use. As is evident from Table 19, two parental behaviors were significant predictors of student peer drinking norms, 1) monitoring and 2) alcohol-specific rules, after controlling for gender, past drinking, and the other mediators. Greater parental alcohol-specific rules and monitoring were associated with lower (i.e., less positive) drinking norms ($\beta = -.148, p < .01$; $\beta = -.116, p < .05$; respectively). Semi-partial correlations revealed that monitoring ($sr^2 = .025$) and alcohol rules ($sr^2 = .019$) accounted for approximately equivalent portions of the variance.

With respect to the mediator student negative alcohol expectancies, two parental behaviors, 1) paternal drinking and 2) parental alcohol-specific rules, predicted negative alcohol expectancies after controlling for gender, past drinking, and the other mediators (see Table 20). Specifically, greater alcohol-specific rules was associated with greater negative alcohol expectancies ($\beta = .236, p < .001$). Unexpectedly, greater paternal drinking was also associated with greater negative alcohol expectancies ($\beta = .169, p < .05$). Comparison of the semi-partial correlations revealed that parental alcohol-specific rules accounted for a greater portion of the variance in student negative alcohol expectancies than paternal drinking ($sr^2 = .046; sr^2 = .021$; respectively).

Finally, concerning the third mediator, student self-efficacy to avoid alcohol, two parental behaviors, 1) monitoring and 2) alcohol-related communication, were significant predictors of self-efficacy, after controlling for gender, past drinking, and the other mediators (see Table 21). Greater monitoring was associated with greater self-efficacy to avoid alcohol ($\beta = .195, p < .001$), while greater alcohol communication was associated with lower self-efficacy to avoid alcohol ($\beta = -.132, p < .05$). Parental monitoring accounted for a greater portion of the variance in self-efficacy than alcohol-specific communication ($sr^2 = .030; sr^2 = .015$; respectively).

Concerning the testing of the second pathway (i.e., mediator to the outcome), Table 22 reveals that all three mediators, 1) self-efficacy to avoid alcohol, 2) drinking norms, and 3) negative alcohol expectancies, were associated with greater overall alcohol use. Specifically, greater student self-efficacy to avoid alcohol and greater student negative alcohol expectancies were associated with lower student overall use ($\beta = -.191, p < .001; \beta = -.117, p < .01$; respectively). Greater student peer drinking norms was

associated with greater student overall use ($\beta = .398, p < .001$). Student peer drinking norms accounted for a much greater portion of the variance in overall alcohol use ($sr^2 = .118$) than either self-efficacy ($sr^2 = .030$) or negative expectancies ($sr^2 = .012$).

Regression analyses, therefore, revealed three potential mediators of the relationships between parental behaviors and overall use. Sobel's tests indicated that all of the indirect effects were significant. (For a pictorial representation of all of the significant mediational pathways for overall alcohol use, see Figure 5.) For an overview of predicted vs. actual results for the indirect effects of parental behaviors on student overall alcohol use, see Table 38.

First, two student alcohol cognitions, 1) self-efficacy to avoid alcohol and 2) perceived peer drinking norms, mediated the relationship between parental monitoring and student overall use. Greater monitoring was associated with greater self-efficacy to avoid alcohol and lower (i.e., less positive) drinking norms, which, in turn, were associated with lower overall alcohol use. With regard to effect sizes of individual mediators, the indirect effect of parental monitoring on student overall use was greater for perceived peer drinking norms than self-efficacy to avoid alcohol (see Table 38).

Second, two student alcohol cognitions, 1) perceived peer drinking norms and 2) negative alcohol expectancies, mediated the relationship between parental alcohol-specific rules and student overall alcohol use. Specifically, greater alcohol-specific rules was associated with lower drinking norms and greater negative alcohol expectancies, which, in turn, were associated with lower overall use. With regard to effect sizes of individual mediators, the indirect effect of parental monitoring on student overall use was greater for perceived peer drinking norms than negative expectancies (see Table 38).

Third, self-efficacy to avoid alcohol mediated the relationship between alcohol communication and greater overall use. That is, greater alcohol-related communication was associated with lower self-efficacy to avoid alcohol, which, in turn, was associated with greater overall use. This positive indirect effect of communication on overall use through lower self-efficacy was completely contrary to mediational hypotheses for this parental behavior; however, these findings are consistent with findings regarding main effects above, which also revealed a positive relationship between parental alcohol communication and student drinking. For predicted and actual results concerning indirect effects for this and other drinking outcomes, see Table 38.

Finally, negative alcohol expectancies mediated the relationship between paternal drinking and student overall alcohol use. Specifically, greater paternal drinking predicted greater negative alcohol expectancies, which, in turn, predicted lower overall use. Contrary to hypotheses for mediational analyses concerning paternal drinking, paternal drinking had a positive indirect effect on (i.e., decreases) overall use through greater negative expectancies. In analyses of direct effects, paternal drinking had not emerged as a significant predictor of overall use (see Figure 2).

Indirect effects of parental behaviors on student alcohol problems. Results of mediational analyses for alcohol problems were nearly identical to those for overall use. With regard to the first set of regression analyses (i.e., predictor to mediator), Table 23 reveals that parental monitoring and alcohol-specific rules were once again significant predictors of student peer drinking norms ($\beta = -.192, p < .01$; $\beta = -.145, p < .05$; respectively). Semi-partial correlations revealed that monitoring explained a greater portion of the variance in drinking norms than alcohol rules ($sr^2 = .029$; $sr^2 = .018$;

respectively). With regard to the mediator negative expectancies, parental alcohol-specific rules and paternal drinking (see Table 24) were once again predictors of negative expectancies ($\beta = .212, p < .01$; $\beta = .174, p < .05$; respectively), with alcohol rules explaining a greater portion of the variance in expectancies than paternal drinking ($sr^2 = .039$; $sr^2 = .024$; respectively). Finally, as is evident from Table 25, parental monitoring was again a significant predictor of self-efficacy to avoid alcohol ($\beta = .185, p < .01$), but alcohol-related communication was not ($\beta = -.124, p = .069$).

In the second set of regression analyses (i.e., mediator to outcome), only self-efficacy to avoid alcohol and drinking norms were predictors of alcohol problems, after controlling for past student drinking, parental behaviors, and other mediators (see Table 26). Specifically, greater self-efficacy to avoid alcohol was associated with lower alcohol problems ($\beta = -.401, p < .001$), and greater drinking norms was associated with greater alcohol problems ($\beta = .127, p < .05$). Unlike mediational analyses for use, negative expectancies was not a significant predictor of alcohol problems ($\beta = -.015, p = .768$). Self-efficacy accounted for a much greater portion of the variance in alcohol problems than drinking norms ($sr^2 = .149$; $sr^2 = .011$; respectively).

Sobel's tests were conducted, and it was determined that all of the indirect effects were significant. For a pictorial representation of these significant mediational pathways for student alcohol problems, see Figure 6. For an overview of expected and predicted results concerning indirect effects of parental behaviors on student alcohol problems, see Table 38. As with student overall alcohol use, two student alcohol cognitions, 1) perceived peer drinking norms and 2) self-efficacy to avoid alcohol, mediated the relationships between parental monitoring and student alcohol problems. Greater

monitoring was associated with lower perceived peer drinking norms and greater self-efficacy to avoid alcohol, which was in turn associated with lower alcohol problems. Unlike results for overall alcohol use, comparison of effect sizes revealed that the indirect effect of monitoring on alcohol problems through self-efficacy to avoid alcohol was greater than the indirect effect through peer drinking norms (see Table 38). With regard to parental alcohol-specific rules, only student perceived peer drinking norms emerged as a mediator of the relationship between alcohol rules and alcohol problems. Greater parental alcohol-specific rules was associated with lower student perceived drinking norms, which in turn predicted lower student alcohol problems.

Indirect effects of parental behaviors on frequency of male binge drinking. In the first set of regression analyses (i.e., predictor to mediator), both parental alcohol-specific rules and parental monitoring were significantly associated with student drinking norms, after controlling for race, past student drinking, parental behaviors, and the other mediators ($\beta = -.239, p < .01$; $\beta = -.172, p < .01$; see Table 27). Alcohol rules accounted for a greater portion of the variance in drinking norms than monitoring ($sr^2 = .045$; $sr^2 = .024$; respectively). As Table 28 reveals, parental alcohol-specific rules was also associated with student negative alcohol expectancies, after controlling for these other variables ($\beta = .277, p < .01$), with rules accounting for a small portion of the variance ($sr^2 = .061$). Finally, with regard to the third mediator, student self-efficacy to avoid alcohol, none of the parental behaviors were significantly associated with self-efficacy to avoid alcohol, after controlling for race, past drinking, parental behaviors, and the other mediators (see Table 29).

In the second set of regression analyses, Table 30 reveals that both student self-efficacy to avoid alcohol and student peer drinking norms were significant predictors of frequency of male binge drinking ($\beta = -.203, p < .001$; $\beta = .317, p < .001$), after controlling for race, past drinking, parental behaviors, and other mediators. Drinking norms accounted for a greater portion of the variance than self-efficacy ($sr^2 = .072$; $sr^2 = .033$, respectively). Student negative alcohol expectancies was not a significant predictor of frequency of male binge drinking ($\beta = -.110, p = .108$).

Therefore, student peer drinking norms emerged as a potential mediator of the relationship between parental alcohol-specific rules and male binge drinking, even after controlling for other variables. Sobel's test indicated that this result was significant. Specifically, greater alcohol-specific rules predicted lower (i.e., less positive) perceived peer drinking norms, which, in turn, predicted lower frequency of male binge drinking. For an overview of predicted vs. actual results concerning indirect effects of parental behaviors on male binge drinking through student alcohol cognitions, see Table 38.

Indirect effects of parental behaviors on female binge drinking. Unlike results for male binge drinking, parental monitoring was significantly predictive of student self-efficacy to avoid alcohol ($\beta = .320, p < .001$) for the outcome of female binge drinking, after controlling for past student drinking, other parental behaviors, and other mediators. None of the other parental behaviors were significantly predictive of self-efficacy (see Table 33). As is revealed in Tables 31 and 32, none of the parental behaviors were significant predictors of the either two alcohol-related cognitions, drinking norms or negative alcohol-expectancies, for female binge drinking.

In the second step of the analyses, only student peer drinking norms emerged as a significant predictor of frequency of female binge drinking, ($\beta = .274, p < .001$) after controlling for past student drinking, paternal behaviors, and other mediators. Neither negative alcohol expectancies nor self-efficacy to avoid alcohol was a significant predictor of female binge drinking, after controlling for other variables (see Table 34). Based on these analyses, there were no mediators of the relationships between parental behaviors and female binge drinking. See Figure 7 for a pictorial representation of the significant mediational pathways for both male and female binge drinking. For an overview of predicted vs. actual results concerning indirect effects of parental behaviors on female binge drinking through student alcohol cognitions, see Table 38.

Regression Analyses for Hypothesis 5: Moderational Analyses

It was hypothesized that negativity of alcohol communication moderates (i.e., weakens) the negative relationship between parental alcohol communication and student problematic drinking. As discussed above, parental alcohol-related communication was positively, not negatively, related to drinking outcomes. Results of multiple regression analyses revealed that negativity of alcohol-related communication was a significant moderator of the positive relationships between parental alcohol communication and student overall alcohol use and between parental alcohol communication and student alcohol problems. Specifically, results showed that the interaction term was a significant predictor of overall alcohol use ($\beta = .126, p < .01$) and alcohol problems ($\beta = .157, p < .05$), even after controlling for past student drinking and other parental behaviors (see Table 35). These results indicate that negativity of alcohol communication moderates the positive relationship between alcohol-related communication and overall use. More

specifically, examination of this moderated effect (see Figure 8 for a pictorial representation of the moderated effect for alcohol problems) indicated that greater negativity of alcohol communication augmented the positive relationship between parental alcohol communication and student alcohol problems or student overall alcohol use.

Regression Results for Hypothesis 6: Parental Drinking Predicts Alcohol-specific Control

Parental drinking predicts alcohol-specific rules. Results indicated that only maternal drinking was significantly related to parental alcohol-related rules ($\beta = -.239, p < .001$). Greater maternal drinking was predictive of lower alcohol-specific rules. Contrary to expectations, paternal drinking was not a significant predictor of alcohol rules ($\beta = -.084, p = .178$).

Parental drinking predicts alcohol-specific rules communication. Results indicated that only paternal drinking was significantly related to parental alcohol-related communication ($\beta = .150, p < .05$). Contrary to expectations, greater paternal drinking was predictive of greater alcohol-specific communication; maternal drinking was not a significant predictor of alcohol communication ($\beta = .070, p = .273$). For more detailed results of regression analyses of parental drinking on parental alcohol-specific control, see Table 36. Results concerning exploratory hypotheses are not discussed here. For a discussion of these results, see Appendix E.

Chapter 4

Discussion

College campuses across the country are plagued by serious problems stemming from student alcohol use (Johnston et al., 2000). Predicting what variables impact student drinking is an important endeavor in that it can inform university policies and interventions around student drinking. As the results of this study and other empirical research have revealed, college student drinking is greatly influenced by both students' drinking patterns prior to college and student alcohol-related cognitions. In addition, empirical research has revealed that student activities, such as involvement in athletics and Greek organizations, further differentiate student drinking. Although parental behaviors such as parental monitoring, drinking, and alcohol-specific control have a much smaller influence on student drinking than cognitive and other situational factors and prior drinking behavior, results from the study conducted suggest that parental behaviors prior to students' entering college may have lasting effects on their children's alcohol use and problems into their first year of college. More importantly, results suggest that the associations between parental behaviors and student drinking may be mediated, at least partly, through student alcohol-related cognitions, a major predictor of student problematic drinking. These results are important because parents are likely to be significantly interested in and invested in their offspring's well-being; therefore, they represent a valuable ally in the effort to reduce student drinking.

Results from this study indicated that parental modeling of problematic drinking and parental control, both general and alcohol-specific, have varied effects, in terms of direction and size, on student problematic drinking. With a few exceptions, findings were

consistent with previous research that indicated deleterious effects of parental problematic drinking and protective effects of parental control on student drinking. In addition, parental behaviors were differentially associated with particular drinking outcomes. Although several parental behaviors were associated with student overall use and alcohol problems, binge drinking was not significantly associated with many, if any, parental behaviors.

In the subsequent section, a discussion of the pattern of student drinking in this study's sample will be presented, followed by a detailed discussion of the differing effects of parental control and modeling on student problematic drinking, both directly and indirectly through alcohol-related cognitions. Finally, the discussion will conclude with a general presentation of the study's strengths and limitations, as well as an exploration of the implications and significance of this dissertation's model and results.

Student Problematic Drinking

Data from this study replicated results from national studies (Wechsler et al., 2000; Johnston et al., 2000) that suggest that drinking in college is a significant problem. With regard to binge drinking, about 39% of both male and female students reported having binged in the last weeks, which is only slightly lower than the percentage of college student binge drinking reported nationally (Wechsler et al., 1998; Wechsler et al., 2000). With regard to frequency of binge drinking, males had somewhat higher rates of binge drinking than females, in that they were more likely to be frequent binge drinkers than occasional binge or non-binge drinkers, as was the case for females; again, results regarding the frequency of male and female binge drinking were comparable to results of previous national studies (Johnston et al., 2000; Wechsler et al., 2000).

Overall use was also relatively high for this sample of college students; students consumed approximately 12 drinks a week, a little lower than the national average of 14 drinks per week (Wechsler et al., 1995), with the heaviest drinking taking place on Friday and Saturday. The average frequency of use was about 1-2 times a week, which is comparable to other studies (Carey, 1995; Wechsler et al., 1998). The average total number of and frequency of alcohol problems was comparable to, although slightly lower than, average results reported by national studies (Borsari, Neal, Collins, & Carey, 2001; Carey, 1995), with the average number of problems being about 3 in the last month. The most frequently reported problems were those relating to fights with others, neglect of responsibilities, and missed attendance at school or work. Clearly, alcohol use has implications for students' academic and career achievement, as well as their aggressiveness toward others.

Parental Monitoring Predicts Student Problematic Drinking

Direct effects of parental monitoring on student drinking. In the first semester of college, students' retrospective reports of their parents' monitoring of their drinking during the spring of their senior year in high school were associated with concurrent measures of both overall alcohol use and alcohol problems. Greater parental monitoring was associated with both lower student overall alcohol use and alcohol problems, even after controlling for past drinking and gender (for overall use). Although monitoring has been demonstrated as having a protective effect on adolescent drinking while in the home (Beck, Shattuck, Haynie, Crump, & Simons- Morton; 1999; Borawski et al., 2003), this is one of the first studies to suggest that parental monitoring has lasting effects on college student problematic drinking in the first year. Results are consistent with findings from a

prospective study by Abar and Turrisi (2008) showing that greater parental monitoring is predictive of lower student overall alcohol use. The results are inconsistent with null findings for overall alcohol use reported by Sessa (2005). The lack of significant findings in the study by Sessa (2005) is most likely due to the fact that the scale used by Sessa to measure monitoring was not confined to monitoring alone and assessed general rule-setting and punishment as well. Inconsistent findings may also have been due to differences in the two studies' samples; the sample used by Sessa (2005) included far greater numbers of males, students with much lower SES, and students who were still living with their parents.

Indirect effects of parental monitoring on student drinking. The results of this study suggest that the relationships between parental monitoring and both student overall alcohol use and student alcohol problems are mediated by two student alcohol-related cognitions: 1) self-efficacy to avoid alcohol and 2) perceived peer drinking norms. Greater parental monitoring is predictive of greater self-efficacy to avoid alcohol and lower perceived peer drinking norms, which, in turn, are associated with lower student drinking. Comparison of effect sizes revealed that the indirect association between monitoring and overall use was greater for perceived drinking norms than self-efficacy; in contrast, the indirect association between monitoring and alcohol problems was greater for self-efficacy than for perceived peer drinking norms. These findings of indirect associations lend support to my proposed model and, more specifically, to the proposition that monitoring contributes to student drinking, because of its encouragement of appropriate alcohol-related cognitions. Monitoring of a child's more general activities may signal to a child that drinking-related behavior is not typical among their peers;

moreover, it may also provide children with the necessary practice they need to learn to avoid and abstain from alcohol use and activities.

Results concerning the impact of monitoring on peer drinking norms are consistent with studies that have reported that greater monitoring by parents is associated with less deviant (i.e., lower alcohol using) peer associations. Previous research (Abar & Turrisi, 2008; Barnes et al., 1995) has suggested that monitoring by parents in high school affects adolescent drinking by decreasing associations with peers who drink either while in high school or later in college. Moreover, a study with college students (Abar & Turrisi, 2008) has demonstrated that peer associations mediate the relationship between monitoring and alcohol use and problems, in that greater monitoring in the summer prior to college is associated with fewer friends who drink in college, which, in turn, leads to lower drinking. Interestingly, peer associations in these studies was operationalized and assessed as adolescent or students' perceived peer drinking norms, rather than actual alcohol use among students' peers. Together, the results of this study and previous studies suggest that perceived peer drinking norms may partially mediate the relationship between monitoring and student drinking.

Summary of the effects of parental monitoring on student drinking. Despite the fact that parental monitoring was significantly associated both directly and indirectly with two student drinking outcomes (i.e., overall use and problems), these results should be viewed with caution. Recent work on parental monitoring and children's deviant behavior (Kerr & Stattin, 2000) suggests that the effects of monitoring may be due not to parents' efforts, but rather to student disclosure. Because monitoring has often been assessed with regard to what, not how, parents know about their children's whereabouts,

activities, and friends, it is difficult to determine exactly what the source of that knowledge is and whether parents' behaviors are actually related to children's behaviors. In this study, monitoring was studied as both parental efforts and knowledge; further analyses revealed that only one of the monitoring subscales (i.e., "actually knew", not "tried to know") was significantly associated with student overall alcohol use and problems. It is possible then that the negative association between parental monitoring and student drinking is explained by differences in student disclosures to parents about their private lives, rather than any efforts on the part of parents. Greater student disclosure may be indicative of generally more responsible behavior on the part of the student or of a closer relationship with the parent; either of these third variables may be the explanation for the relationship between parental monitoring and student drinking. Future empirical research should investigate this possibility. If future research indicates that parents' tracking of student activities does influence student drinking, parents should be encouraged to monitor their children's drinking behavior, even if it is through more proximally distant methods such as email or phone contact.

Parental Problematic Modeling of Drinking Predicts Student Problematic Drinking

Direct effects of parental drinking on student drinking. In terms of modeling influences, both maternal and paternal drinking in the spring of the senior year of high school were significantly associated with student drinking outcomes in the fall semester of their first year of college. However, whereas greater maternal drinking was predictive of greater overall alcohol use, greater paternal drinking was predictive of greater alcohol problems. Findings regarding parental drinking are consistent with findings from studies with both college students and adolescents in middle and high-school that report positive

associations between maternal and paternal drinking and offspring's drinking (Barnes et al., 1995; Standing & Nicholson, 1989; White et al., 2000). The findings are inconsistent with previous research that has reported differences in the effects of maternal and paternal drinking on children's problematic drinking, with some studies (Gabel et al., 1998; Zhang, Welte, & Wieczorek, 1999) reporting that paternal, not maternal drinking, predicts children's drinking. These results may be partially explained by the fact that earlier studies often used different assessment tools to capture maternal and paternal drinking. Nonetheless, this and other research (Hamburg, DiFranceisco, Webster, Gliberman, & Schork, 1990; Johnson & Jacob, 1995), which has reported that a same-sex parent's drinking is more influential than an opposite-sex parent's drinking on children's drinking, suggest that the sex of the parent, as well as the child, may make a difference in the potency of the effects of maternal vs. paternal drinking on offspring's drinking. Further analyses revealed that there were no same-sex effects of parental drinking on male and female student drinking. However, analyses did reveal gender differences; both maternal and paternal drinking were more robustly associated with male overall alcohol use and alcohol problems than female alcohol use and problems.

The effects of maternal and paternal drinking were investigated separately in this study for male and female binge drinking, because a gender-specific measure of binge drinking was used. However, neither maternal nor paternal drinking was a predictor of either the incidence or frequency of male or female binge drinking. A possible explanation for these findings is that binge drinking may not reflect serious underlying patterns of alcohol dependency, as do overall use and alcohol problems. Binge drinking may, instead, be a consequence of student activity involvement, such as being an athlete

or a member of Greek organizations, or living situations (Ham & Hope, 2003) that increase access to and pressure to engage in alcohol use and activities.

Indirect effects of parental drinking on student drinking. Although there was no direct relationship between paternal problematic drinking and student overall alcohol use, mediational analyses revealed that negative alcohol expectancies mediated the indirect relationship between these two variables. Surprisingly, this indirect relationship was negative, not positive; greater paternal drinking was associated with greater, not lower, negative expectancies, which, in turn, was associated with lower student alcohol use. This is interesting, because previous studies on parental drinking have focused on the direct relationships between parental drinking patterns and college student problematic drinking to the exclusion of mediated effects. The findings of this study suggest complex relationships between paternal drinking and student drinking with paternal problematic drinking having both a protective and deleterious effect on college student problematic drinking outcomes. In the case of alcohol problems, paternal drinking may result directly in greater alcohol problems not so much because children want to emulate their father, but because of the general dysfunction that paternal drinking causes. With regard to overall use, negative alcohol expectancies may act as a suppressor variable, in that the overall negative mediated effect of paternal drinking on overall use undermines the positive and direct impact that paternal drinking has on overall use. Negative effects of paternal drinking on negative alcohol expectancies may be a result of the observation of the general dysfunction or consequences associated with paternal drinking.

The finding of a positive relationship between paternal drinking and negative alcohol expectancies is inconsistent with findings that alcohol-abusing adolescents with

alcoholic parents have more positive alcohol expectancies than those adolescents with non-alcohol abusing parents (Brown, Creamer, & Stetson, 1987). Clearly, however, discrepancies between our findings and the findings by Brown et al. (1987) may be due to the use of a non-clinical vs. clinical sample for both parents and children, respectively. Only one other study, Wood et al., (2004), has explored the mediation of significant others' modeling of drinking and late adolescent drinking by alcohol expectancies. This study explored peer modeling of problematic drinking and found expected relationships between peer modeling and positive alcohol expectancies. It may be, however, that peer modeling of problematic drinking leads to more positive alcohol expectancies, because peers do not reliably experience the effects of peer drinking, as they do a father's drinking.

Interestingly, none of the alcohol-related cognitions mediated the relationships between maternal drinking and student drinking outcomes. Contrary to propositions of SCT and SLT, and my own model, problematic drinking by mothers was not predictive of students' beliefs about their self-efficacy to avoid alcohol or other alcohol-related cognitions. Maternal drinking, therefore, may operate via other pathways, such as the desire to emulate the parent's behavior or the tendency to associate with peers who drink alcohol and engage in alcohol-related activities.

Summary of the effects of parental drinking on student drinking. The results of this study suggest that parental drinking is associated with student overall alcohol use and alcohol problems, but not with student binge drinking. In addition, it seems that parental drinking may be more influential on sons' than daughters' drinking. Maternal drinking and paternal drinking seem to have differential effects on student drinking both

in terms of the type of drinking outcome they are associated with and the direction of that association. These results, along with findings from other studies of parental drinking, point to the importance of emphasizing to parents the lasting influence their drinking can have on their children's alcohol-related activities, even after they leave home.

Availability of alcohol in the home predicts student drinking. With regard to the second measure of modeling, availability of alcohol was not a significant predictor of any of the student drinking outcomes in either the main or mediated analyses. Although researchers (Van Zundert et al., 2006) have suggested that availability of alcohol may influence not only current use through increased accessibility, but also through a signaling of parental approval of alcohol use, this study did not find any relationship between availability of alcohol in the home during the spring of the senior year and college student drinking in the first year. These results are consistent with those reported by Van Zundert et al., (2006). This suggests that availability of alcohol may not signal to adolescent children any problematic messages regarding the acceptability of problematic drinking either in or outside of the home.

Parental Alcohol-specific Control Predicts Student Problematic Drinking

Direct effects of alcohol-specific control on student drinking outcomes.

Turning now to alcohol-related control, both alcohol-specific rules and communication were significantly related to several student problematic drinking outcomes. Specifically, both rules and communication were significantly associated with student overall alcohol use. Comparison of effect sizes indicated that the association between parental alcohol-specific rules and overall use was greater than those between either parental monitoring or parental alcohol-specific communication and overall use. With regard to other drinking

outcomes, alcohol-specific rules was significantly associated with frequency of binge drinking, and alcohol-specific communication was additionally associated with student alcohol problems and female binge drinking. Interestingly, whereas greater alcohol-specific rules was associated with lower student problematic drinking, greater alcohol-specific communication was associated with greater student problematic drinking.

Significant and negative associations between alcohol rules and student drinking are consistent with findings from studies conducted with Dutch adolescents (Van der Vorst, 2005). This is one of the first studies in the U.S. to suggest that parental rules around alcohol-related activities in high school has a lasting impact on adolescents' drinking behavior, even into college. Findings concerning binge drinking suggest that this is particularly true for male students. Very few studies with college students have investigated the relationship between alcohol-specific control and student drinking. Results from this study suggest that the influence of alcohol-specific rules should be explored and that parental rules may represent an important avenue for future interventions to reduce adolescent and college student drinking.

Results regarding alcohol-related communication were somewhat unexpected in that most theories of health-related control propose that control results in better, not worse, health-related behavior. These results are not entirely inconsistent, however, with either theoretical or empirical research. As discussed in the section on control above, alcohol-specific control may result in poorer behavior to the degree that it promotes psychological and behavioral reactance. With regard to empirical findings, a recent study with college students (Turrisi et al., 2007) also found that overall alcohol communication and communication about the legal and social consequences of alcohol use was

associated with greater drinking; only communication about the importance of “*being committed to a healthy lifestyle*” was associated with lower drinking. These results suggest that the effects of alcohol communication may vary according to the content of the communication and also that alcohol communication may backfire promoting behavioral reactance (i.e., greater student drinking). To test this possibility, regression analyses were conducted to determine if greater alcohol-related communication predicted greater student-reported reactance (see Appendix A for the scale used to measure reactance). Results revealed that greater alcohol-related communication was significantly associated with greater student’s expressed reactance to alcohol communication ($\beta = .152, p < .01$). Interestingly, greater alcohol-specific rules was not significantly associated with greater student’s reactance to alcohol rules ($\beta = .026, p = .669$). In addition, alcohol communication, unlike other parental control variables, was positively associated with parental drinking and availability of alcohol. It is possible, then, that parents who drink try to compensate for their increased drinking by discussing the risks of alcohol use with their children. Encouraging children to do as parents say, and not as they do, may create psychological reactance in their children and lead to increased drinking.

Another explanation for the positive findings regarding communication is the possibility of reverse causation. The model proposed above, as well as propositions of social learning theories, predicts that student drinking will have a reciprocal effect on parental behavior in that greater student drinking leads to greater parental alcohol-specific control. This may be especially true for alcohol-specific communication. Whereas parents are likely to institute alcohol-specific rules prior to and irrespective of any sign of deviance in children’s drinking, parental alcohol-specific communication may

only occur after children begin drinking. In addition, for those parents who do communicate with their children prior to drinking, communication may substantially increase as a result of children's drinking. Further regression analyses revealed that greater past student drinking (i.e., drinking while in the senior year of high school) was significantly associated with greater alcohol-related communication in the senior year of high school ($\beta = .275, p < .001$).

Indirect effects of alcohol-specific rules on student drinking. Analyses of the indirect effects of parental alcohol-specific rules and communication on student problematic drinking suggest that alcohol-related cognitions mediate the relationships between both alcohol-specific rules and communication and student drinking. More specifically, with regard to alcohol-specific rules, parental alcohol rules was indirectly and negatively associated with both student overall alcohol use and frequency of male binge drinking. In addition, although there was no direct association between alcohol-specific rules and student alcohol problems, mediational analyses revealed an indirect and negative relationship between parental alcohol rules and student alcohol problems. The lack of a direct relationship between rules and problems suggests the influence of a suppressor variable, possibly reactance, which counteracts the negative effect of parental alcohol-specific rules on student alcohol problems.

With regard to specific mediators, perceived peer drinking norms mediated the negative relationship between parental alcohol rules and all three of the student drinking outcomes (i.e., overall use, alcohol problems, and frequency of male drinking). Greater alcohol rules was associated with lower peer drinking norms, which in turn was associated lower student problematic drinking. Comparison of effect sizes indicated that

the indirect association of parental alcohol-specific rules and student overall alcohol use via perceived drinking norms was greater than the association between monitoring and overall use through drinking norms.

In addition to perceived norms, negative alcohol expectancies mediated the negative relationship between alcohol rules and overall use. Greater alcohol rules was associated with greater negative alcohol expectancies, which in turn was associated with lower student drinking. Comparison of effect sizes indicated that perceived peer drinking norms was a more robust mediator of the relationships between alcohol rules and overall use than negative alcohol expectancies. These results suggest that greater rule-setting around alcohol alters students' beliefs around alcohol expectancies and peer drinking norms, such that they believe alcohol use is less prevalent among their peers and leads to more negative consequences. The mediational results regarding drinking norms should be viewed with caution, however. It is possible that the positive associations between the mediator, student peer drinking norms, and student problematic drinking is explained by students who drink more reporting greater drinking among peers. A desire to see their own drinking as normative may lead to greater perceived peer drinking norms. However, construction of difference scores between student quantity of weekly alcohol use and both perceived drinking norms of a typical Rutgers student and perceived drinking norms of closest friend revealed that the majority of students perceived themselves as drinking less than the typical Rutgers student or their closest friend, although this percentage was significantly higher for drinking norms associated with a typical Rutgers student (75%) than for one's closest friend drinking (59%). Moreover, mediational analyses involving

the variable perceived peer drinking norms as a difference score revealed no significant differences in results.

The indirect and positive association between parental alcohol communication and student overall use was mediated by self-efficacy to avoid alcohol. Greater alcohol communication was associated with lower self-efficacy, which in turn was associated with greater student overall use. As before, greater alcohol communication was expected to be associated with greater, not lower, self-efficacy to avoid alcohol. These results suggest the possibility of reverse causation effects, with parents communicating more about alcohol with adolescents who show less confidence or efficacy with regard to alcohol use or activities. With regard to the other drinking outcomes, self-efficacy did not mediate the relationships between parental alcohol-specific communication and any of the other drinking outcomes, including those with which alcohol communication was directly related, namely, alcohol problems and female binge drinking. This finding suggests that the positive and direct relationship between parental alcohol communication and student drinking may be explained by a different mediator such as psychological reactance, or a reciprocal effect of drinking on parental communication.

Summary of effects of alcohol-specific control on student drinking. Both alcohol-specific rules and communication were significantly associated with student problematic drinking, although the direction of the effects was different for these variables. Comparisons of effect sizes between parental alcohol-specific control and parental general control (i.e., monitoring) tentatively suggest that alcohol-related control may play a more important part in student drinking than general control. Perceived peer drinking norms and negative alcohol expectancies emerged as potential mediators for the

relationships between alcohol rules and student drinking; in contrast, indirect associations between alcohol communication and student drinking (i.e., overall use) were mediated by self-efficacy to avoid alcohol, although indirect associations between alcohol communication and student problematic drinking were largely absent.

Comparison of Student Drinking Outcomes

Almost all of the parental behaviors, with the exception of availability of alcohol, were associated with both student overall use and student alcohol problems. In contrast, both the frequency and incidence of male and female binge drinking were largely unexplained by parental behaviors. Only alcohol-specific control was significantly associated with binge drinking (i.e., alcohol rules and male binge drinking; alcohol communication and female binge drinking), and results suggested a deleterious, not protective effect, of alcohol-specific communication on frequency of female binge drinking. These findings suggest that student overall alcohol use and problems are more influenced by parental behaviors than student binge drinking. Student binge drinking may not only be more influenced by situational and cognitive factors, but also by peers' behaviors, such as peers' drinking and offers of alcohol or invitations to alcohol-related activities.

Negativity of Alcohol Communication Moderates the Relationship between Alcohol Communication and Student Problematic Drinking

Results from this dissertation's study lent support to the proposition that the negativity of parental alcohol-specific communication moderated the relationships between parental alcohol-specific communication and both student overall alcohol use and student alcohol problems. Moderational analyses were significant for both types of

drinking outcomes. These results are consistent with propositions of recent health-related control theories that the quality of the health-related control influences the impact of that control on health behavior and, more specifically, that negative control can undermine the otherwise positive effects of control on health behavior by creating behavioral reactance. Although greater parental alcohol-communication was associated with greater, not lower, student problematic drinking, the negativity of that communication was consistent with predicted effects in that it further augmented the negative effects of alcohol communication on student drinking. Findings from this study suggest that theoretical and empirical research on the associations between parental alcohol-related control and student drinking needs to include an exploration of both the quantity and quality of control; the possibility of deleterious effects of health-related control as a result of its administration needs to be considered.

Relationships between Parental Drinking and Control

Greater maternal drinking was predictably associated with lower parental alcohol-specific rules. There was no significant relationship between paternal drinking and alcohol-specific rules. This suggests that lower drinking on the part of the mother, but not the father, may make it more likely that there are rules around alcohol use. These results may be due to the fact that mothers, more often than fathers, assume the responsibility of establishing and enforcing rules around their children's alcohol use and that maternal drinking interferes with mothers' ability to carry out this type of control. In contrast, paternal drinking, not maternal drinking, was associated with alcohol-related communication, and, unpredictably, it was positively associated with communication. This suggests that paternal drinking may be perceived more seriously within families,

prompting parents, or perhaps just mothers, to discuss the consequences of alcohol use with their children.

Strengths and Limitations

One of the major limitations of this study is that it did not represent a truly longitudinal test of the direct or indirect propositions of my model. Although predictors and outcomes were assessed with reference to different time points, reports of the type of drinker that a student was in the spring of her/his senior year could not serve as an adequate control for the variety of student alcohol-related outcomes assessed in this study (e.g., binge drinking or alcohol problems). In addition, retrospective reports of drinking may not have accurately represented actual drinking during the spring of the senior year of high school. In reporting their past drinking behavior, some students may have been motivated to make their drinking behavior seem more deviant than it actually was in order to seem more grown up in high school. In addition, current student drinking may have informed estimates of past drinking in that students may have been consciously or unconsciously motivated to appear consistent with regard to their past and present behavior. A better approach would have been to assess student drinking both during high school and at college using the same measures for each type of drinking outcome.

Parental behaviors were also assessed retrospectively and via student reporting. Both of these aspects of assessments introduce the potential for biases. Retrospective reporting introduces the greater difficulty, however. As discussed earlier, many researchers have argued that perceptions of parental or other persons in an individual's life may be more influential than the actual behaviors themselves. Clearly, assessing both adolescents' perceptions of parental behaviors and actual parental behaviors while they

were occurring (i.e., during the spring of the senior year of high school) would have allowed for more confidential causal assertions and for an exploration of correlations between students' perceptions of parental behavior and actual parental behavior. Despite these limitations, this study represents one of the first to control for past drinking and to assess parental behaviors and student drinking at different time points, even if only through recollections of these behaviors.

The nature of the assessment of mediators also represented potential problems. The mediators, alcohol-related cognitions, were assessed at the same time point as the student drinking outcomes. Several researchers (Baron & Kenny, 1986; MacKinnon et al., 2001; Preacher et al., 2007) have suggested that mediational tests should involve assessment of predictors, mediators, and outcomes at three different time points. Claims, therefore, cannot be made regarding causal associations between student alcohol-related cognitions and student drinking outcomes. The fact that results were consistent with other studies demonstrating prospective associations between student alcohol-related beliefs and student drinking is suggestive of a causal view of these cross-sectional findings. Moreover, it is important to remember that this study represents one of the first to assess the mediation of parental behaviors and student drinking by student alcohol-related cognitions. Although there were limitations in the study design, this study represents an important beginning in the investigation of possible pathways by which parental behaviors influence college student drinking.

In addition to design concerns, this study was also limited with regard to the type of statistical analyses employed. Relying on several separate regression analyses to test the many hypotheses associated with the mediation model that was proposed introduces

the significant possibility of making a Type I error. A more appropriate type of multivariate analyses to test these multiple hypotheses would have been structural equation modeling (SEM; Kline, 2005). In addition to being able to simultaneously test multiple hypotheses, this method allows one to test multiple relationships between the variables and to determine which model fits the data most effectively. Almost certainly, there are reciprocal relationships between parental behaviors and student drinking. The concept of reciprocal determinism between behaviors of closely related others is central to most social learning theories (Bandura, 1991; Abrams & Niaura, 1986). SEM would be a more elegant and effective way to test for these reciprocal effects rather than relying on several regression analyses that exchange student and parental behaviors as predictors and outcomes. In representing constructs as latent variables, SEM may avoid some of the problems with the current analyses, including underestimating significant relationships between the variables because of measurement error.

Despite the fact that all of the limitations discussed above present constraints on statements regarding the causal relationships between parental behaviors and student drinking-related outcomes or the mediated effects by student alcohol-related cognitions, this study does have many strengths. Unlike previous studies, it investigated and controlled for a variety of parental behaviors, both general and alcohol-specific, that have been reliably shown to be associated with college student problematic drinking. In addition, it explored cognitive pathways by which these parental behaviors affect student drinking. The author was only able to find a few studies that have investigated mediation of relationships between parental behaviors and children's drinking, much less college student drinking. Finally, this study is one of the first to both explore and explain positive

relationships between parental alcohol-specific control and student drinking. The ability of health-related control to promote worse, not better, outcomes is something that has been relatively unexplored in the drinking literature, much less the health behavior literature in general.

Future Directions and Implications

As discussed in the section above, future studies should attempt to test prospective and mediated associations between parental behaviors and student drinking with longitudinal studies that assess predictors, mediators, and outcomes at three different time points. In addition, future studies should attempt to delineate the nature of the association between parental alcohol-related communication and student drinking. Longitudinal studies would help to clarify the relationship between these two variables, as would intervention studies in which parental alcohol-related communication is directly manipulated. In addition, studies should investigate the ability of both the content and quality of the alcohol communication to moderate the effects of communication on student drinking; a more global exploration of the ability of alcohol-related control, including rules as well, to promote reactance as a result of its administration (i.e., negative or positive) would also be warranted.

One of the most important investigations may be to explore how multiple parental behaviors, such as parental general control, alcohol-specific control, and drinking, are related to one another. It would be highly beneficial to identify particular constellations of general and alcohol-specific behaviors within parents. As discussed before, it is quite possible that a parent attempts to compensate for his or her spouse's problematic drinking through greater alcohol-related communication or rule setting or general monitoring.

Assessing parental behaviors separately in mothers and fathers will allow for more definitive conclusions regarding the likely complex relationships between different types of parental behaviors and different spouse's behaviors. Assessing maternal and paternal behavior individually will also allow for comparisons as to the relative effects of not just maternal and paternal drinking, but also maternal and paternal control, on student drinking outcomes.

Finally, the results of this study suggest that a number of parental behaviors, during a time when children are beginning to experiment with alcohol use and activities, have a lasting impact on children's alcohol-related behavior even after they no longer are living in their parent's home(s). Moreover, these lasting effects seem to be due, in part, to the ability of parents' behavior to modify their children's alcohol-related cognitions. These results suggest that one possible intervention to address college student drinking is to target both general and alcohol-specific parental behavior even before students enter college. Targeting behaviors that specifically alter student's beliefs about the typicality of alcohol use on college campuses and their ability to successfully avoid alcohol-related pressures may be a preventative measure to curb student drinking-related behaviors.

Chapter 5

Conclusion

This dissertation presented and tested a mediated model of parental behaviors and college student drinking by student alcohol-related cognitions. This model proposed that parents' behaviors continue to have an effect on their offspring's drinking even after they leave home and enter college, partly through the ability of parental behaviors to alter alcohol-related cognitions. Although the cross-sectional nature of this study precludes causal claims, results suggest that parental behaviors during high school are associated with student problematic drinking and that student alcohol-related cognitions may, in fact, mediate these associations. Associations between parental behaviors prior to college and college student drinking highlight the importance of targeting interventions toward both parents and students prior to students entering college.

It will be interesting to determine in future studies if the effects of parental behaviors in high school continue to be relevant as students progress in college and if parental behaviors while students are in college influence student drinking. My proposed model suggests that the effects of parental behaviors are lasting in that they change not only their offspring's alcohol-related behavior but also their alcohol-related cognitions; in addition, my model suggests that parental behavior while students are in college affects student drinking. Despite the physical and psychological distance between parents and their college-aged students and the growing influence of the campus environment and a student's peers, parents very likely remain an important influence in their offspring's lives.

In addition to the specific findings related to student problematic drinking, this dissertation adds to the growing literature that suggests that a theoretical shift is necessary in health and social psychology. While previous studies on alcohol and other health related behaviors have successfully detailed important individual level factors, new studies such as the one discussed in this dissertation point to the growing need for further investigation into the ways in which significant others' behaviors and other contextual factors impact individuals' health behaviors. While it is clear that intrapersonal factors (i.e., alcohol-related cognitions) have significant predictive value, it is also increasingly clear that those factors must be investigated in conjunction with interpersonal factors in order to understand the complex and reciprocal nature of human behavior and behavior change.

These findings not only have significant theoretical implications, but also provide important guidance for potential interventions and policy initiatives. It is increasingly evident that interventions and policies that assume that individual level behaviors have exclusively individual level predictors will be ineffective. The evidence from this dissertation and other recent research suggests that a more dynamic understanding of health and behavior change is necessary in order to create change that will improve outcomes for individuals and society.

Table 1

Constructs and Measures

Parental Behaviors and College Student Drinking Constructs and Measures							
DEPENDENT							
<i>Construct</i>	<i>Variable</i>	<i>Scale</i>	<i># Items</i>	<i>Time Period</i>	<i>Response Set</i>	<i>Range</i>	<i>Alpha</i>
Student Heavy Drinking							
	1. Male/Female Binge Drinking	How many times did you have 5/4 drinks in a row?	1	Past 2 weeks	0 (never) to 5 (10 times or more)	Same	N/A
	2. Overall Intensity of Use	Daily Drinking Questionnaire	15	Past 30 Days	<i>Quantity</i> : open-ended <i>Frequency</i> : 0 (never) -6 (once a day or more)	0+	.765
Student Alcohol Problems	Same	Rutgers Alcohol Problem Index-R (RAPI-R)	18	Since beginning of fall semester	0 (none) to 3 (greater than five times)	0- 48	.850

Table 2

Regression Analyses and Variables

HYPOTHESIS	DEPENDENT VARIABLE	1ST STEP	2ND STEP	# OF REGRESSIONS
Hypotheses 1-3: Parental Behaviors predict Student Drinking	Student Drinking Outcome (e.g., Overall use, Alcohol Problems, and Frequency/Incidence of Binge Drinking-M/F)	1. Past Student Drinking 2. Gender (for overall use) 3. Race (for male binge drinking)	All of the Parental Behaviors	6 (one for each drinking outcome)
Hypothesis 4: Student Alcohol-related Cognitions mediate Parental Behaviors and Student Drinking				
1. Parental Behaviors predict Student cognitions	Student Alcohol-related Cognition (e. g., Self-efficacy, Negative Expectancies, or Drinking Norms)	1. Past Student Drinking 2. Gender (for overall use) 3. Race (for male binge drinking)	1. Parental Behaviors 2. Other two Alcohol-related Cognitions (e.g., Negative Expectancies and Drinking Norms)	12 (3 for each drinking outcome)

HYPOTHESIS	DEPENDENT VARIABLE	1ST STEP	2ND STEP	# OF REGRESSIONS
2. Student Cognitions predict Student Drinking	Student Drinking Outcome (Overall Use, Problems, or Frequency of Binge Drinking- M/F)	1. Past Student Drinking 2. Gender (for use) 3. Race (for male binge drinking)	1. All of the Parental Behaviors 2. All of the Alcohol-related Cognitions	4 (one for each drinking outcome)
Hypothesis 5: Negativity of Communication moderates relationship between Alcohol-specific Communication & Student Drinking	Student Drinking Outcome (Overall Use or Alcohol Problems)	1. Past Student Drinking 2. Gender (for overall use) 3. Alcohol-related Communication (centered) 4. Negativity of Alcohol Communication (centered)	1. Interaction term	2 (1 for each drinking outcome)

Table 3

Descriptive Statistics

Variable	N	%	Range	Mean	SD	Skewness	Kurtosis
<i>A. Covariates/ Demographics</i>							
Sex	276						
-Female	125	45					
-Male	141	55					
Religion	275						
-Catholic	145	53					
-None	35	13					
-Other	29	11					
-Jewish	25	9					
- Protestant	20	7					
-Hindu	14	5					
-Buddhist	1	<1					
Race	279						
-White	200	72					
-Asian	51	18					
-Multiracial	15	5					
- Black	8	3					
-Hawaiian/ Other Pacific	2	<1					
Ethnicity	273						
-Hispanic	28	10					
-Non-Hispanic	245	89					
Housing	277						
-Dorms	255	92					
-Off-campus	22	8					
Student Marital	274						
-Married	265	96					
-Partnered	5	2					
-Separated	4	2					
Parent Marital	275						
-Married	216	79					
-Divorced	47	17					
-Partnered	6	2					
-Separated	4	1.5					
-Widowed	2	<1					
Parental Education			1-5	3.26	1.27	-.355	-1.03
Past Drinking	279		0-4	1.28	.955	.162	-.763

Variable	N	%	Range	Mean	SD	Skewness	Kurtosis
<i>B. Predictors</i>							
Monitoring	279		6-18	14.1	2.58	-.415	.022
Availability	279		0-15	6.38	4.48	.245	-1.01
Rules	279		5-20	6.38	4.66	.270	-1.127
Communication	279		5.15	10.79	4.44	.247	-1.06
Maternal Drinking	279		0-4	.88	.744	.570	.373
Paternal Drinking	279		0-4	1.16	.905	.580	.201
<i>C. Outcomes</i>							
Use	279		0- 462	27.8	38.3	3.15	52.5
Problems	256		0-30	3.25	4.42	.340	5.45
Male Binge Incidence	151						
-Yes	59	39					
-No	92	61					
Female Binge Incidence	124						
-Yes	49	39					
-No	75	61					
Female Binge Frequency	125		0-3	1.40	1.84	.078	.866
Male Binge Frequency	149		0-3	1.62	1.85	.085	1.04
<i>D. Mediators</i>							
Drinking Norms	279		0-182	35.0	22.4	1.35	22.4
Expectancies	279		11-44	25.8	5.55	.325	5.33
Self-Efficacy	279		17-108	95.6	14.2	.846	14.1
<i>E. Moderator</i>							
Negativity of Communicate	279		5- 25	15.1	5.56	.365	5.56

Note: SD = Standard Deviation; % = Percentage

Table 4

Bivariate Associations among Covariates

	Past Drinking	Gender	Race
Past Drinking	1		
Gender	.064	1	
Race	.310**	.150*	1

Note. †p < .10; *p < .05; **p < .01

Table 5
Bivariate Associations between Covariates and Predictors

	Monitoring	Availability	Maternal Drinking	Paternal Drinking	Alcohol Rules	Alcohol Communication
Gender	-.151*	-.156**	-.064	-.138*	.060	-.010
Race	.092	.159**	.339**	.139**	-.100	.222**
Past Drinking	-.074	.088	.143*	.180**	-.256**	.261**

Note. †p < .10; *p < .05; **p < .01

Table 6

Bivariate Associations between Covariates and Outcomes

	Use	Problems	Frequency Binge Male	Frequency Binge Female	Incidence Binge Male	Incidence Binge Female
Past Drinking	.508**	.428**	.550**	.566**	.497**	.522**
Gender	.196*	.042	.106	.100	.046	.042
Race	.252**	.139*	.299**	.128*	.259**	.096

Note. † $p < .10$; * $p < .05$; ** $p < .01$

Table 7

Bivariate Associations among Predictors

	Maternal Drinking	Paternal Drinking	Alcohol Rules	Availability	Alcohol Communication	Monitoring
Maternal Drinking	1.00					
Paternal Drinking	.088	1.00				
Alcohol Rules	-.151*	-.089	1.00			
Availability	.453**	-.013	-.137**	1.00		
Alcohol Communication	.165**	.195**	-.060	.181**	1.00	
Monitoring	-.042	.163**	.138*	.071	.299**	1.00

Note. †p < .10; *p < .05; **p < .01

Table 8
Bivariate Associations among Outcomes

		Frequency Binge Drinking		Incidence Binge Drinking (Y/N)		Overall Use	Alcohol Problems
		Female	Male	Female	Male		
Frequency Binge Drinking	Female	1.00					
	Male	N/A	1.00				
Incidence Binge Drinking (Y/N)	Female	.817**	N/A	1.00			
	Male	N/A	.821**	N/A	1.00		
Overall Use		.702**	.774**	.601**	.618**	1.00	
Alcohol Problems		.549**	.508**	.426**	.419**	.560**	1.00

Note. †p < .10; *p < .05; **p < .01

Table 9

Bivariate Associations between Predictors and Outcomes

	Use	Problems	Frequency Binge Male	Frequency Binge Female	Incidence Binge Female	Incidence Binge Male
Maternal Drinking	.179**	.117	.105	.209**	.142	.076
Paternal Drinking	.101	.195**	.057	.245**	.203**	.036
Alcohol Rules	-.263**	-.133*	-.344**	-.097	-.228*	-.331**
Availability	.036	.089	.090	.065	.139	.059
Alcohol Communication	.150*	.223**	.141	.305*	.228*	.156
Monitoring	-.135*	-.128*	-.149	-.071	-.006	-.121

Note. †p < .10; *p < .05; **p < .01

Table 10
Bivariate Associations among Mediators

	Peer Drinking Norms	Negative Expectancies	Self-efficacy
Peer Drinking Norms	1.00		
Negative Expectancies	-.158*	1.00	
Self-efficacy	-.109	.016	1.00

Note. † $p < .10$; * $p < .05$; ** $p < .01$

Table 11

Bivariate Associations between Predictors and Mediators

	Norms	Negative Expectancies	Self-efficacy
Monitoring	-.239**	.044	.170**
Availability	.024	-.013	-.096
Maternal Drinking	.095	-.106	-.067
Paternal Drinking	.017	.122*	-.053
Rules	-.288**	.252**	.156**
Communication	.081	-.044	-.173*

Note. †p < .10; *p < .05; **p < .01

Table 12
Bivariate Associations between Mediators and Outcomes

	Use	Problems	Frequency Binge Male	Frequency Binge Female
Norms	.592**	.283**	.412**	.408**
Self-efficacy	-.291**	-.418**	-.252**	-.247**
Negative Expectancies	-.265**	-.103	-.302**	-.324**

Note. †p < .10; *p < .05; **p < .01

Table 13
Regression of Overall Alcohol Use on Parental Behaviors

	B	β	sr^2	p
Gender	.635	.083	.007	.073
Past Drinking	2.10	.511	.215	***
Monitoring	-.214	-.142	.016	**
Availability	-.021	-.024	.000	.654
Mother Drinking	.546	.105	.008	*
Father Drinking	.029	.007	.000	.897
Rules	-.065	-.178	.028	***
Communication	.113	.129	.013	*

Note. †p < .10; *p < .05; **p < .01

Note. Overall use is represented by the transformed version of this variable

Table 14

Regression of Alcohol Problems on Parental Behaviors

	B	β	sr^2	p
Past Drinking	.511	.352	.108	***
Monitoring	-.084	-.168	.023	**
Availability	.008	.025	.000	.698
Maternal Drinking	.096	.054	.002	.406
Paternal Drinking	.206	.142	.016	*
Rules	.006	.048	.002	.425
Communication	.051	.172	.023	**

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Alcohol Problems is represented by the transformed version of this variable

Table 15

Regression of Frequency of Male Binge Drinking on Parental Behaviors

	B	β	sr ²	p
Past Drinking	.634	.411	.128	***
Race	.456	.136	.014	.086
Monitoring	-.020	-.030	.000	.688
Availability	.001	-.001	.000	.995
Mother Drinking	.018	.008	.000	.918
Father Drinking	-.094	-.050	.002	.538
Rules	-.038	-.263	.061	***
Communication	-.009	-.025	.000	.753

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Table 16

Regression of Incidence of Male Binge Drinking on Parental Behaviors

	B	OR	p
Race	1.07	2.90	*
Past drinking	.912	2.49	***
Monitoring	-.078	.925	.411
Maternal Drinking	-.156	.856	.642
Paternal Drinking	-.174	.841	.551
Availability	.014	1.01	.810
Rules	-.061	.941	*
Communication	.020	1.02	.718

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Table 17

Regression of Frequency of Female Binge Drinking on Parental Behaviors

	B	β	sr ²	p
Past Drinking	1.01	.619	.287	***
Monitoring	-.047	-.090	.006	.249
Availability	-.026	-.084	.012	.284
Maternal Drinking	-.010	-.005	.002	.952
Paternal Drinking	.131	.090	.006	.256
Rules	.010	.070	.004	.356
Communication	.055	.184	.026	*

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Table 18

Regression of Incidence of Female Binge Drinking on Parental Behaviors

	B	OR	p
Past Drinking	1.89	6.62	***
Monitoring	-.014	.986	.881
Availability	.024	1.02	.680
Maternal Drinking	-.542	.582	.162
Paternal Drinking	.221	1.25	.440
Rules	-.032	.969	.257
Communication	.054	1.06	.734

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Table 19

Regression of Student Drinking Norms on Parental Behaviors for Overall Alcohol Use

	B	β	sr^2	p
Gender	.634	.170	.027	**
Past Drinking	.450	.226	.040	***
Monitoring	-.131	-.181	.025	**
Availability	.010	.024	.000	.716
Maternal Drinking	.044	.018	.000	.789
Paternal Drinking	.017	.008	.000	.899
Rules	-.205	-.116	.019	*
Communication	.051	.122	.011	.060
Negative Expectancies	-.014	-.041	.001	.495
Self-efficacy	-.074	-.048	.002	.428

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Overall Use and Drinking Norms are represented by the transformed versions of these variables.

Table 20
Regression of Student Negative Alcohol Expectancies on Parental Behaviors for Overall Alcohol Use

	B	β	sr^2	p
Gender	-.438	-.040	.001	.518
Past Drinking	-.903	-.155	.018	*
Monitoring	-.160	-.075	.004	.262
Availability	.014	.012	.000	.867
Maternal Drinking	-.569	-.077	.004	.260
Paternal Drinking	1.03	.169	.021	*
Rules	.122	.236	.046	***
Communication	.084	.067	.003	.312
Drinking Norms	-.245	-.081	.005	.227
Self-efficacy	-.114	-.025	.001	.689

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Overall Use and Drinking Norms are represented by the transformed versions of these variables.

Table 21
Regression of Student Self-efficacy to Avoid Alcohol on Parental Behaviors for Overall Alcohol Use

	B	β	sr^2	p
Sex	.231	.095	.008	.120
Past Drinking	-.254	-.195	.030	**
Monitoring	.092	.195	.030	**
Availability	-.016	-.057	.002	.405
Maternal Drinking	.016	.010	.000	.887
Paternal Drinking	-.077	-.058	.002	.400
Rules	.008	.072	.004	.263
Communication	-.040	-.132	.016	*
Negative Expectancies	-.003	-.012	.000	.847
Drinking Norms	-.034	-.051	.002	.428

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Overall Use and Drinking Norms are represented by the transformed versions of these variables.

Table 22

Regression of Overall Alcohol Use on Alcohol-related Cognitions

	B	β	sr ²	p
Gender	.183	.024	.000	.572
Past Drinking	1.23	.301	.067	***
Monitoring	-.021	-.014	.000	.756
Availability	-.023	-.028	.000	.575
Maternal	.441	.085	.005	.070
Paternal	.136	.032	.001	.495
Rules	-.031	-.084	.006	.059
Communication	.045	.052	.002	.254
Drinking Norms	.845	.398	.118	***
Negative Expectancies	-.082	-.117	.012	**
Self-efficacy	-.602	-.191	.030	***

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Overall Use and Drinking Norms are represented by the transformed versions of these variables.

Table 23

Regression of Student Peer Drinking Norms on Parental Behaviors for Alcohol Problems

	B	β	sr^2	p
Past Drinking	.453	.230	.046	***
Monitoring	-.131	-.192	.029	**
Availability	-.008	-.019	.000	.772
Maternal Drinking	.102	.043	.001	.524
Paternal Drinking	-.008	-.004	.000	.950
Rules	-.024	-.145	.018	*
Alcohol Communication	.034	.083	.005	.198
Negative Expectancies	-.032	-.098	.008	.107
Self-efficacy	-.161	-.106	.010	.084

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Alcohol Problems and Drinking Norms are represented by the transformed versions of these variables.

Table 24

Regression of Student Negative Alcohol Expectancies on Parental Behaviors for Alcohol Problems

	B	β	sr^2	p
Past Drinking	-.571	-.094	.007	.167
Monitoring	-.176	-.084	.005	.230
Availability	.043	.032	.001	.621
Maternal Drinking	-.878	-.120	.010	.090
Paternal Drinking	1.05	.174	.024	*
Rules	.106	.212	.039	**
Communication	.040	.032	.001	.640
Drinking Norms	-.339	-.110	.010	.107
Self-efficacy	-.254	-.054	.003	.405

Note. † $p < .10$; * $p < .05$; ** $p < .01$, *** $p < .001$

Note. Alcohol Problems and Drinking Norms are represented by the transformed versions of these variables.

Table 25
Regression of Student Self-efficacy to Avoid Alcohol on Parental Behaviors for Alcohol Problems

	B	β	sr^2	p
Past Drinking	-.215	-.167	.023	*
Monitoring	.078	.185	.024	**
Availability	-.022	-.084	.005	.230
Maternal Drinking	.022	.014	.000	.840
Paternal Drinking	-.021	-.016	.000	.814
Rules	.003	.029	.001	.660
Communication	-.033	-.124	.012	.069
Drinking Norms	-.077	-.117	.011	.084
Negative Expectancies	-.011	-.053	.003	.405

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Alcohol Problems and Drinking Norms are represented by the transformed versions of these variables.

Table 26
Regression of Student Alcohol Problems on Student Alcohol-related Cognitions

	B	β	sr^2	p
Past Drinking	.323	.218	.039	***
Monitoring	-.039	-.077	.004	.204
Availability	-.002	-.006	.000	.919
Maternal Drinking	.068	.039	.001	.523
Paternal Drinking	.184	.128	.012	*
Rules	.005	.043	.002	.452
Communication	.034	.114	.010	.054
Drinking Norms	.085	.127	.011	*
Negative Expectancies	.003	-.015	.000	.768
Self-efficacy	-.467	-.401	.149	***

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Alcohol Problems and Drinking Norms are represented by the transformed versions of these variables.

Table 27
Regression of Student Drinking Norms on Parental Behaviors for Frequency of Male Binge Drinking

	B	β	sr^2	p
Race	.401	.095	.007	.263
Past Drinking	.408	.211	.032	*
Monitoring	-.139	-.172	.024	*
Availability	.023	.140	.014	.101
Maternal Drinking	-.109	-.041	.001	.641
Paternal Drinking	-.067	-.028	.000	.746
Rules	-.043	-.239	.045	**
Communication	.066	.140	.014	.101
Negative Expectancies	-.012	-.034	.001	.666
Self-efficacy	-.127	-.084	.006	.297

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Drinking Norms is represented by the transformed version of this variable.

Table 28
Regression of Student Negative Expectancies on Parental Behaviors for Frequency of Male Binge Drinking

	B	β	sr^2	p
Race	-1.46	-.125	.012	.169
Past Drinking	-.539	-.101	.007	.286
Monitoring	.017	.007	.005	.933
Availability	-.013	-.003	.000	.726
Maternal Drinking	-.026	-.003	.001	.971
Paternal Drinking	1.04	.160	.018	.090
Rules	.137	.277	.061	**
Communication	.175	.135	.013	.143
Drinking Norms	-.110	-.040	.001	.666
Self-efficacy	-.014	-.003	.000	.969

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Drinking Norms is represented by the transformed version of this variable.

Table 29
Regression of Student Self-efficacy to Avoid Alcohol on Parental Behaviors for Male Binge Drinking

	B	β	sr^2	p
Race	.404	.144	.015	.109
Past Drinking	-.327	-.255	.047	**
Monitoring	.031	.058	.003	.506
Availability	-.012	-.042	.001	.666
Maternal Drinking	-.117	-.066	.003	.478
Paternal Drinking	-.111	-.071	.003	.447
Rules	.015	.122	.011	.174
Communication	-.043	-.139	.014	.126
Drinking Norms	-.063	-.095	.007	.297
Negative Expectancies	-.001	-.003	.000	.969

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Drinking Norms is represented by the transformed version of this variable.

Table 30

Regression of Frequency of Male Binge Drinking on Student Alcohol-related Cognitions

	B	β	sr^2	p
Race	.420	.124	.011	.090
Past Drinking	.380	.245	.041	.001
Monitoring	.007	.011	.000	.873
Availability	-.010	-.029	.000	.708
Maternal Drinking	.057	.026	.000	.725
Paternal Drinking	-.061	-.032	.001	.668
Rules	-.019	-.134	.013	.067
Communication	-.033	-.089	.006	.228
Drinking Norms	.254	.317	.072	***
Negative Expectancies	-.032	-.110	.012	.108
Self-efficacy	-.245	-.203	.033	**

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Drinking Norms is represented by the transformed version of this variable.

Table 31
Regression of Student Drinking Norms on Parental Behaviors for Frequency of Female Binge Drinking

	B	β	sr^2	p
Past Drinking	.478	.253	.043	*
Monitoring	-.045	-.074	.004	.467
Availability	-.001	-.003	.001	.972
Maternal Drinking	.371	.172	.019	.104
Paternal Drinking	.010	.006	.000	.952
Rules	.009	.058	.003	.536
Communication	.031	.090	.006	.356
Negative Expectancies	-.024	-.083	.006	.355
Self-efficacy	-.201	-.139	.016	.139

Note. † $p < .10$; * $p < .05$; ** $p < .01$, *** $p < .001$

Note. Drinking Norms is represented by the transformed version of this variable.

Table 32
Regression of Student Negative Alcohol Expectancies on Parental Behaviors for Female Binge Drinking

	B	β	sr^2	p
Past Drinking	-1.30	-.202	.027	.065†
Monitoring	-.352	-.170	.020	.112
Availability	.000	.000	.000	.997
Maternal Drinking	-.730	-.099	.006	.375
Paternal Drinking	1.02	.176	.023	.089†
Rules	.081	.150	.018	.129
Communication	.039	.033	.001	.749
Drinking Norms	-.314	-.092	.007	.355
Self-efficacy	-.090	-.018	.000	.856

Note. †p < .10; *p < .05; **p < .01, ***p < .001

Note. Drinking Norms is represented by the transformed version of this variable.

Table 33
Regression of Student Self-efficacy to Avoid Alcohol on Parental Behaviors for Female Binge Drinking

	B	β	sr^2	p
Past Drinking	-.257	-.198	.026	.058
Monitoring	.133	.320	.075	**
Availability	-.028	-.113	.001	.242
Maternal Drinking	.176	.118	.008	.268
Paternal Drinking	-.073	-.062	.003	.530
Rules	.002	.021	.000	.822
Communication	-.026	-.107	.008	.273
Drinking Norms	-.097	-.140	.016	.139
Negative Expectancies	-.003	-.016	.000	.856

Note. † $p < .10$; * $p < .05$; ** $p < .01$, *** $p < .001$

Note. Drinking Norms is represented by the transformed version of this variable.

Table 34
Regression of Frequency of Female Binge Drinking on Student Alcohol-related Cognitions

	B	β	sr^2	p
Past Drinking	.820	.502	.163	***
Monitoring	-.020	-.038	.001	.625
Availability	-.033	-.105	.008	.157
Maternal Drinking	-.708	-.042	.001	.609
Paternal Drinking	.129	.088	.005	.246
Rules	.007	.053	.002	.735
Communication	.043	.144	.016	.055†
Drinking Norms	.238	.274	.060	***
Negative Expectancies	-.012	-.048	.002	.483
Self-efficacy	-.096	-.076	.005	.290

Note. † $p < .10$; * $p < .05$; ** $p < .01$, *** $p < .001$

Note. Drinking Norms is represented by the transformed version of this variable.

Table 35
Regression of Student Problematic Drinking on Interaction of Alcohol Communication
and Negativity of Alcohol Communication

	B	β	sr^2	p
USE				
Past Drinking	2.48	.600	.250	***
Communication	.133	.147	.017	*
Negativity of Alcohol Communication	.080	.114	.010	*
Interaction of Communication and Negativity	.020	.126	.015	*
PROBLEMS				
Past Drinking	2.09	.363	.121	***
Communication	.280	.221	.038	**
Negativity of Alcohol Communication	.202	.209	.036	**
Interaction of Communication and Negativity	.034	.157	.023	**

Table 36

Regression of Parental Alcohol-specific Control on Parental Drinking

	B	β	sr^2	p
ALCOHOL COMMUNICATION				
Maternal Drinking	.417	.159	.004	.273
Paternal Drinking	.739	.150	.019	*
ALCOHOL RULES				
Maternal Drinking	-4.07	-.239	.049	***
Paternal Drinking	-1.17	-.084	.006	.178

Table 37

Summary of Direct Effects of Parental Behaviors on Student Problematic Drinking

	Hypothesized	Reported	Effect size	
			(sr ²)	r
USE				
Maternal Drinking	↑	↑	.008	.179
Paternal Drinking	↑	NS		
Availability of Alcohol	↑	NS		
Monitoring	↓	↓	.016	-.135
Alcohol Rules	↓	↓	.028	-.263
Alcohol Communication	↓	↑	.013	.150
PROBLEMS				
Maternal Drinking	↑	NS		
Paternal Drinking	↑	↑	.016	.195
Availability of Alcohol	↑	NS		
Monitoring	↓	↓	.023	-.128
Alcohol Rules	↓	NS		
Alcohol Communication	↓	↑	.023	.223

Note: Upward/ downward arrow indicates increases/ decreases in drinking, respectively.

Note: sr² = semi-partial correlation; r = bivariate correlation

Table 37 (cont.)

	Hypothesized	Reported	Effect size	
			(sr ²)	r
MALE BINGE FREQUENCY				
Maternal Drinking	↑	NS		
Paternal Drinking	↑	NS		
Availability of Alcohol	↑	NS		
Monitoring	↓	NS		
Alcohol Rules	↓	↓	.061	-.344
Alcohol Communication	↓	NS		
FEMALE BINGE FREQUENCY				
Maternal Drinking	↑	NS		
Paternal Drinking	↑	NS		
Availability of Alcohol	↑	NS		
Monitoring	↓	NS		
Alcohol Rules	↓	NS		
Alcohol Communication	↓	↑	.026	.305

Note: Upward/ downward arrow indicates increases/ decreases in drinking, respectively.

Note: sr² = semi-partial correlation; r = bivariate correlation

Table 38

Summary of Indirect Effects of Parental Behaviors on Student Problematic Drinking
through Alcohol-related Cognitions

	Mediator	Hypothesized	Reported	Effect Sizes
USE				
Paternal Drinking	Expectancies	↑	↓	.019
Maternal Drinking		↑	NS	
Availability		↑	NS	
Monitoring	Norms	↓	↓	-.072
	Self-efficacy	↓	↓	-.037
Alcohol Rules	Norms	↓	↓	-.046
	Expectancies	↓	↓	-.028
Alcohol Communication	Self-efficacy	↓	↓	.025
PROBLEMS				
Paternal Drinking		↑	NS	
Maternal Drinking		↑	NS	
Availability		↑	NS	
Monitoring	Norms	↓	↓	-.024
	Self-efficacy	↓	↓	-.074
Alcohol Rules	Norms	↓	↓	-.018
Alcohol Communication		↓	NS	

	Mediator	Hypothesized	Reported	Effect Sizes
MALE BINGE FREQUENCY				
Paternal Drinking		↑	NS	
Maternal Drinking		↑	NS	
Availability		↑	NS	
Monitoring		↓	NS	
Alcohol Rules	Norms	↓	↓	-.055
Alcohol Communication		↓	NS	
FEMALE BINGE FREQUENCY				
Paternal Drinking		↑	NS	
Maternal Drinking		↑	NS	
Availability		↑	NS	
Monitoring		↓	NS	
Alcohol Rules		↓	NS	
Alcohol Communication		↓	NS	

Note: Upward/ downward arrow indicates increases/ decreases in drinking, respectively.

Note: sr^2 = semi-partial correlation; r = bivariate correlation

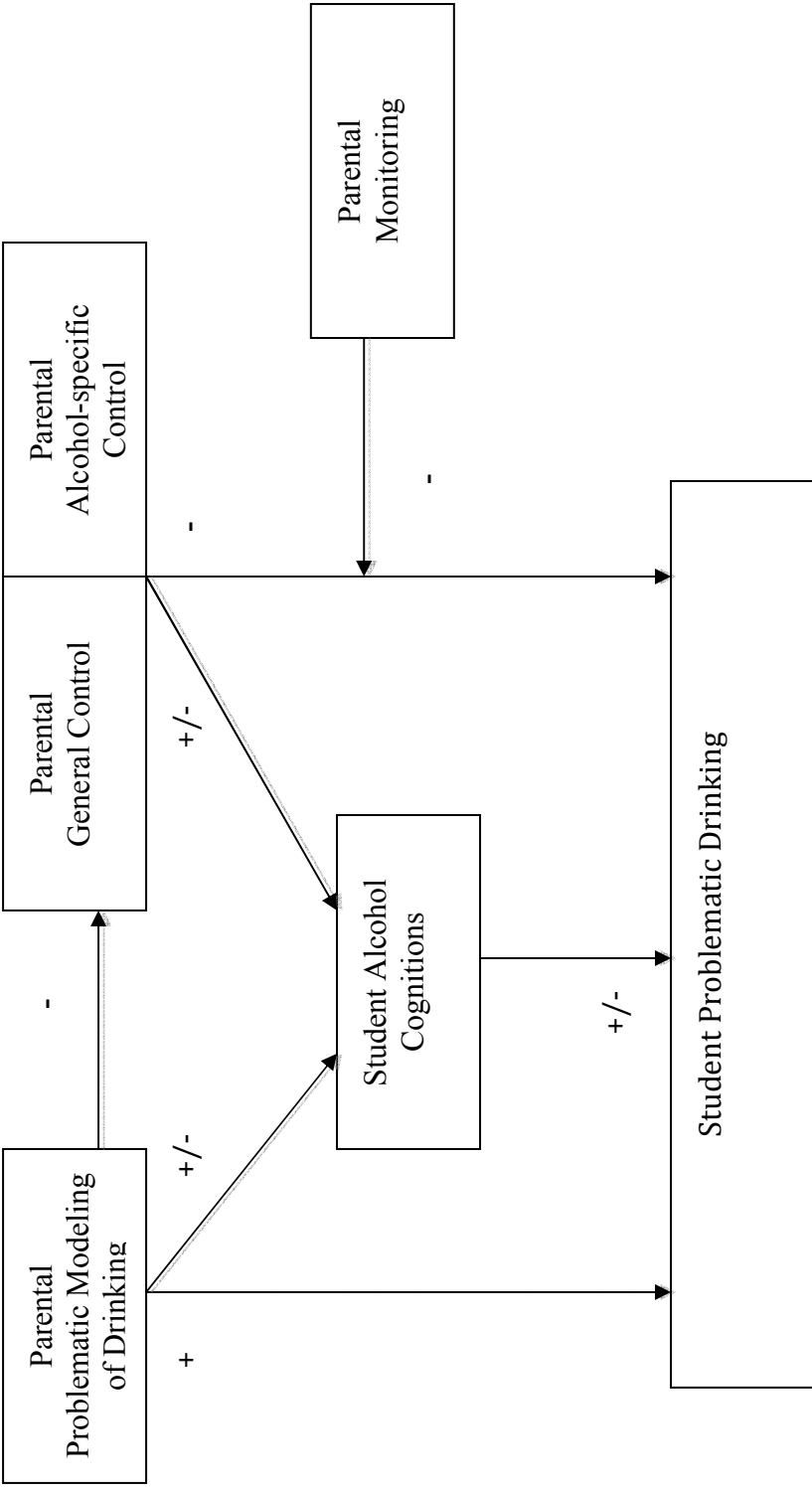


Figure 1. Mediated model of parental modeling and control and student problematic drinking by student alcohol cognitions.

Note: (+) = positive association; (-) = negative association; (+/-) = both positive and negative associations

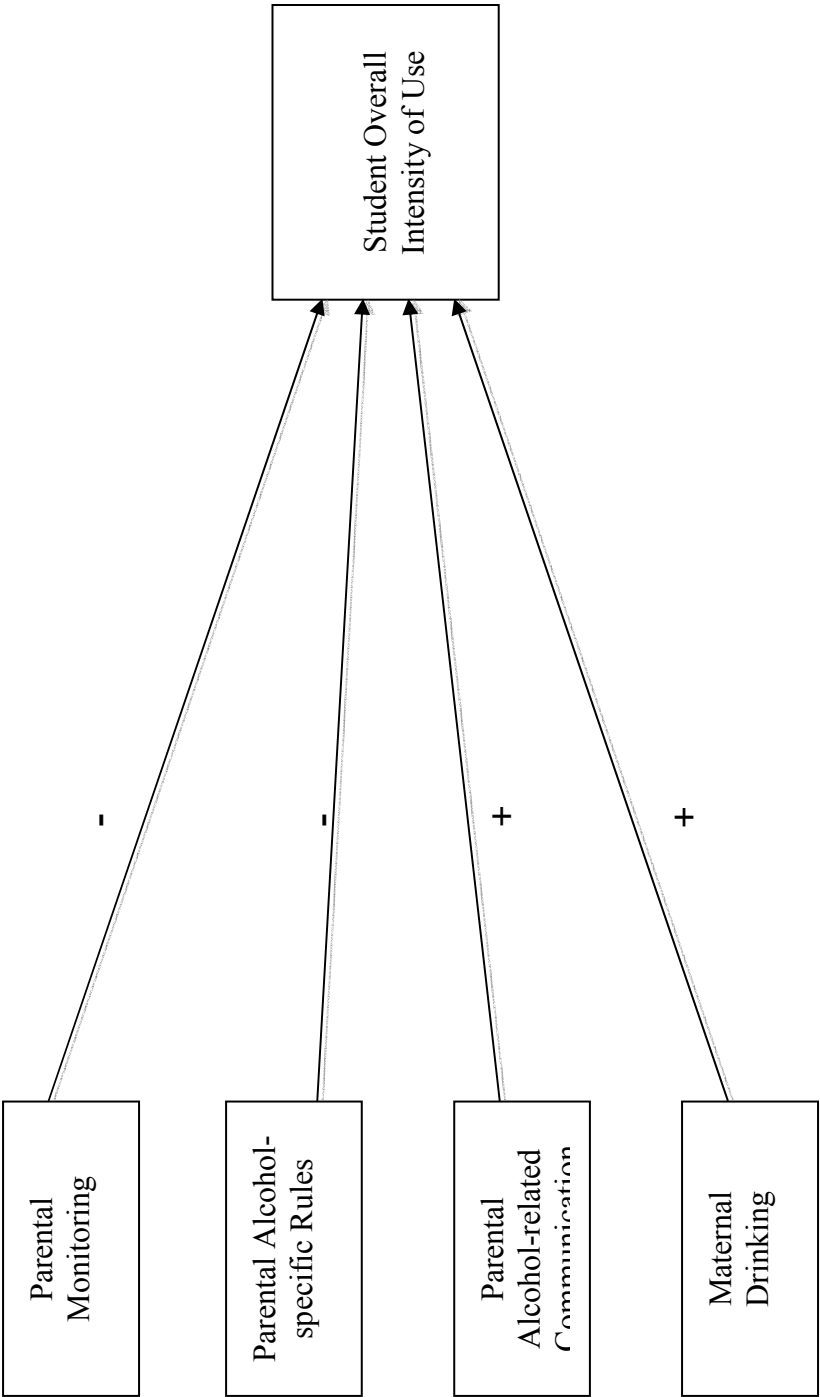


Figure 2. Results: Parental behaviors predict student overall intensity of alcohol use

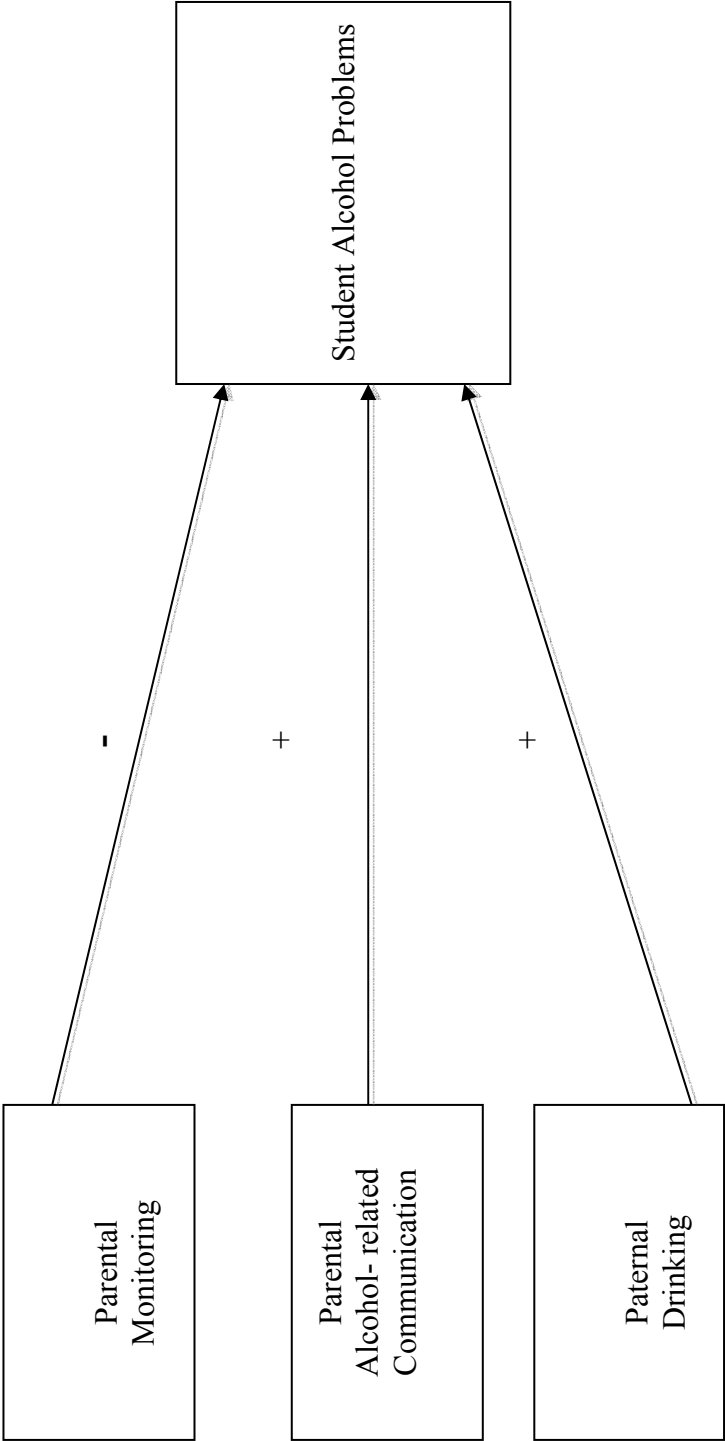


Figure 3. Results: Parental behaviors predict student alcohol problems

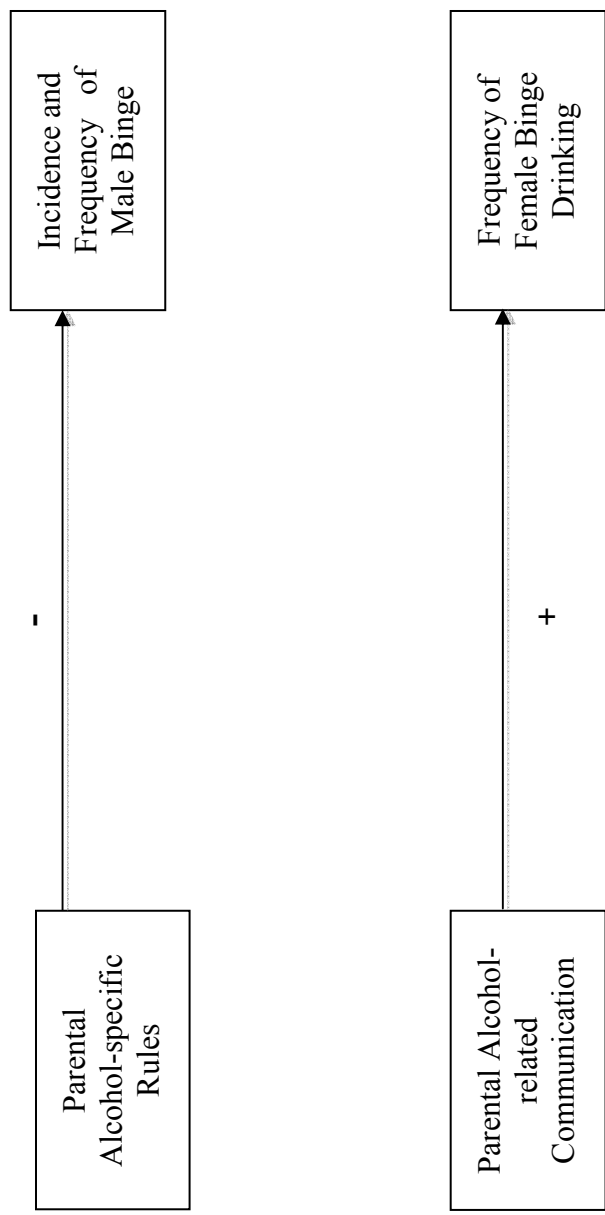


Figure 4. Results: Parental behaviors predict student binge drinking

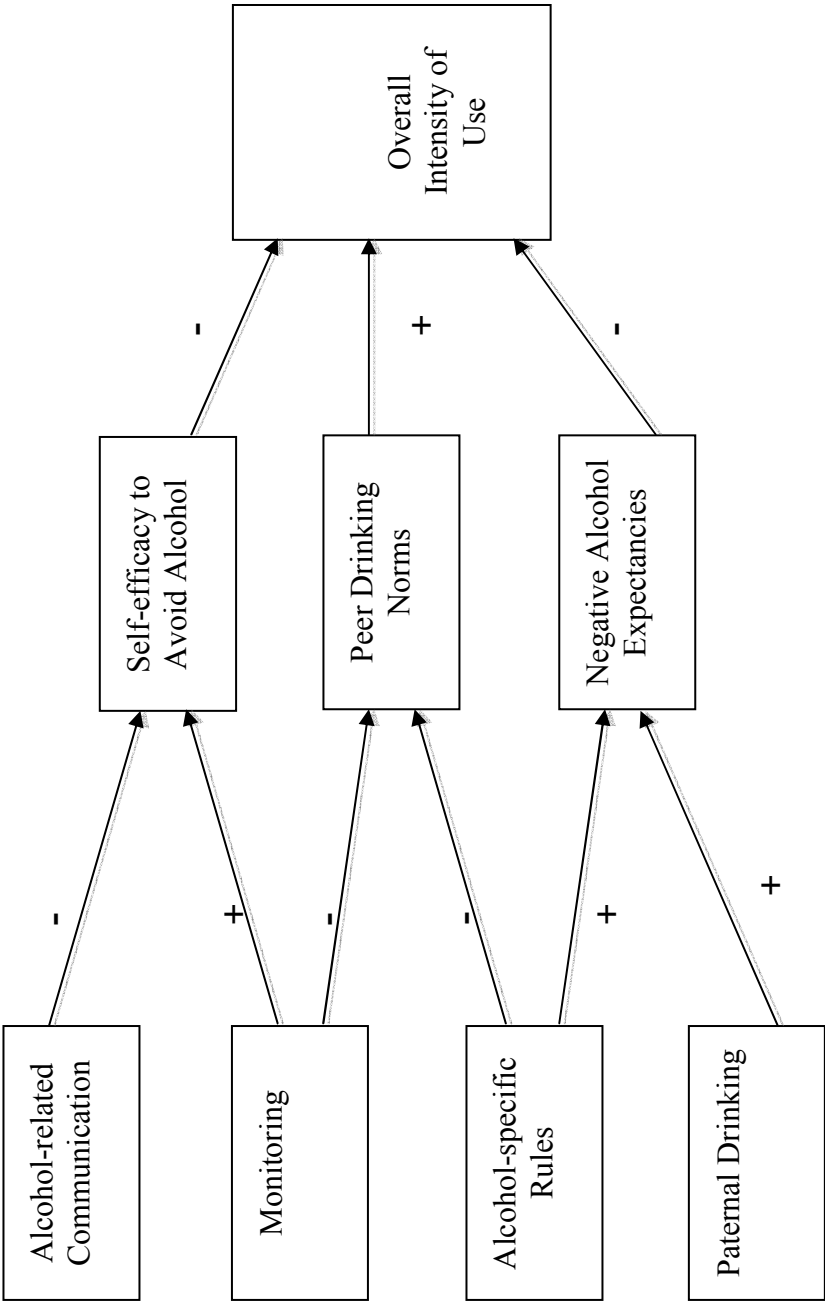


Figure 5. Results: Alcohol-related cognitions mediate relationships between parental behaviors and student overall use

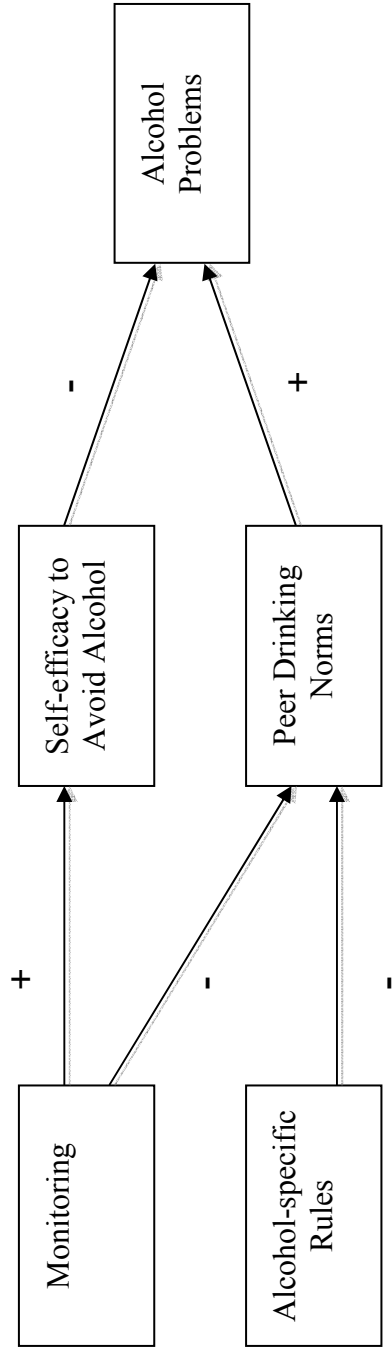


Figure 6. Results: Student alcohol-related cognitions mediate relationships between parental behaviors and student alcohol problems



Figure 7. Results: Student alcohol-related cognitions mediate the relationships between parental behaviors and student binge drinking

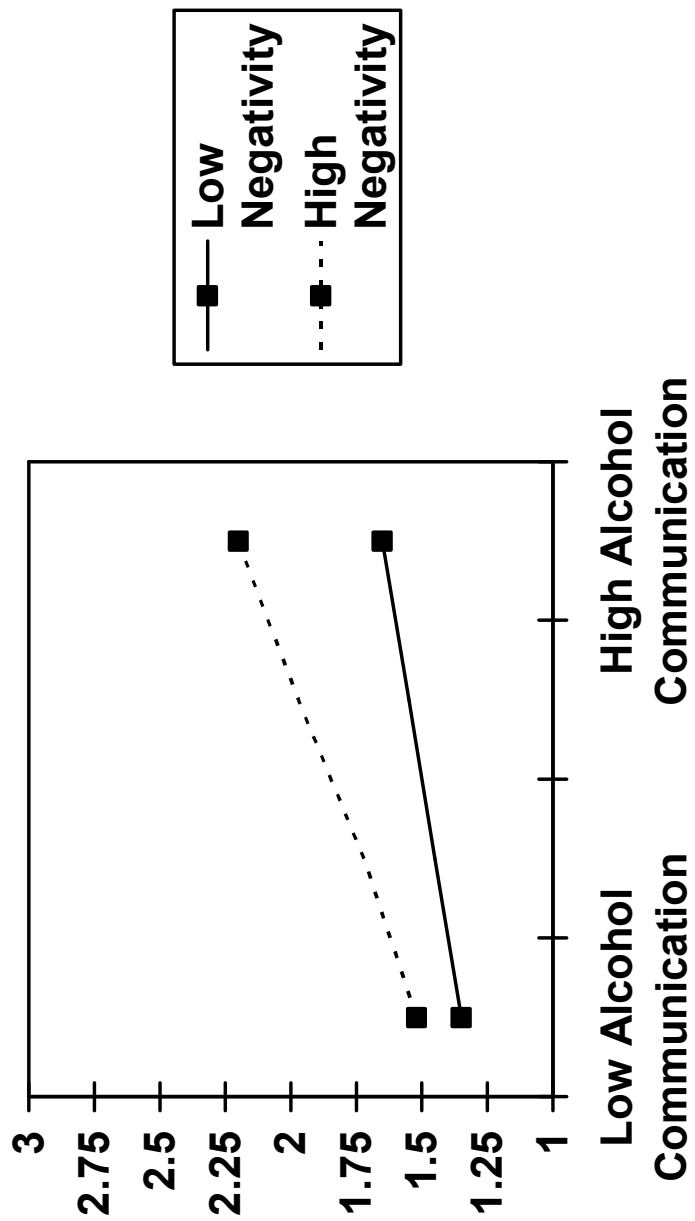


Figure 8. Negativity of alcohol communication moderates the relationship between parental alcohol communication and student alcohol problems.

Appendix A

Measures

Demographics

1. What is your date of birth?
 2. What is your sex? Male/ Female
 3. Where do you live during the current school year while you are at college (choose one answer)? Dorm, off-campus apartment, parent's home, other (please specify: _____)
 4. If you are currently not living with your parent(s), is this the first time that you have lived on your own? Yes/ No
 5. What is your marital status? Single, married, partnered, divorced, separated, widowed
 6. Are you Hispanic or Latino? Yes/ No
 7. What is your racial background? American Indian, Asian, Black or African American, Native Hawaiian or other Pacific Islander, White, Other
 8. In what religion were you raised? Jewish, Buddhist, Catholic, Protestant, Hindu, Islam, Agnostic, Atheist, Other, None
 9. What is your parents' marital status? Married, partnered, divorced, separated, widowed, not applicable- never married
 10. What is the highest level of education that your mother/ father achieved? High school diploma/ GED (1), some college (2), associates degree (3), 4-year degree (4), graduate degree (5)
-

Parental Drinking (Wechsler et al., 1998)

The following questions are about your perceptions of your parents' alcohol use during the spring of your senior year. If you are not sure of an answer, please give us your best estimate.

1. Describe your mother's use of alcohol during the spring of your senior year.
2. Describe your father's use of alcohol during the spring of your senior year.

Response options: not applicable- no father/mother or substitute (0), abstainer (1), abstainer-former problem drinker in recovery (2), infrequent or light drinker (3), moderate drinker (4), heavy drinker (5), problem drinker (6), don't know (7)

Parental Alcohol-specific Rules (Van der Vorst et al., 2005)

The following questions ask about specific rules that your parents may have had regarding alcohol use while you were living with them. In answering the following questions, consider the time corresponding to the spring of your senior year.

1. I was allowed to drink one glass of alcohol at home when my parents were around.
2. I was allowed to drink one glass of alcohol at home when my parents were not around.
3. I was allowed to drink more than one glass of alcohol at home when my parents were not around.
4. I was allowed to drink as much alcohol as I'd like outside the house.
5. I was allowed to drink alcohol with my friends at a party.
6. I was allowed to drink alcohol with my friends.

7. I was allowed to come home drunk.
8. I was allowed to become drunk when I go out with my friends.
9. I was allowed to drink alcohol on the weekend.
10. I was allowed to drink alcohol during the week.

Response options: 0 (never), 1 (hardly ever), 2 (some of the time), 3 (often), 4 (most or much of the time)

Parental Alcohol-Related Communication (Turrissi et al., 2007)

The following questions pertain to topics regarding alcohol that you and your parents may have discussed when you lived with them. In answering these questions, please consider the time period associated with the spring of your senior year. If you are unsure of any answer, please respond to the best of your knowledge.

At some point during the spring of my senior year my parents and I talked about:

1. The negative consequences of mixing alcohol and sex
2. How drinking can make you physically sick
3. How drinking could get me in trouble with the police
4. How drinking could lead to serious drinking problems
5. How drinking is bad for your health
6. Drunk driving and its consequences
7. About the risk of riding in a car with someone who has been drinking
8. The ways that alcohol can impair my judgment
9. How mixing alcohol with medications and other drugs can be dangerous
10. How embarrassing it would be for the family if I were caught drinking

11. How being caught drinking might make my friends' parents prohibit them from hanging out with me

12. How being caught drinking might lead to suspension from school

Response options: 1 (not at all), 2 (somewhat), 3 (moderate amount), 4 (a great deal)

Quality of Parental Alcohol-related Communication (Spijkerman et al., 2005)

The following items focus on the quality of communications between you and your parents during the spring of the previous year. We want to find out how effective you think your parents were as communicators.

1. My parents and I were interested in each other's opinion about alcohol use.
2. My parents and I talked easily about our opinions regarding drinking.
3. When my parents and I discussed drinking-related topics, I felt at ease.
4. When my parents and I talked about drinking, I found them unfair and unreasonable.
5. When my parents and I talked about drinking, I felt understood by them.
6. When we talked about alcohol use, my parents were taking me seriously.

Response options: 0 (not at all), 1 (seldom), 2 (sometimes), 3 (often), 4 (a lot)

Student Self-efficacy to Avoid Drinking (DRSEQ-RA; Young et al., 2007)

Most people find it easier to resist drinking in some of these situations than others. Please circle the number beside each statement that best describes how much you could resist drinking in each case.

How sure are you that you could resist drinking alcohol?

1	2	3	4	5	6
I am very sure I could NOT resist drinking	I most likely could NOT resist drinking	I probably could NOT resist drinking	I probably could resist drinking	I most likely could resist drinking	I am very sure I could resist drinking

1. when you are watching TV?
2. when you are angry?
3. when you are having lunch?
4. when you are at a party?
5. when you are on the way home from school?
6. when someone offers you a drink?
7. when you feel frustrated?
8. when you are listening to music or reading?
9. when you are worried?
10. when you are by yourself?
11. when your friends are drinking?
12. when you feel upset?
13. when you have just finished playing sports?
14. when you are at a nightclub/concert?
15. when you are feeling down?
16. when you first arrive home?
17. when you feel nervous?
18. when you feel sad?

Student Negative Alcohol Expectancies (CEOA; Fromme et al., 1993)

This questionnaire assesses what you would expect to happen if you were under the influence of alcohol. Mark a response from (1) for disagree to (4) for agree, depending on whether or not you would expect the effect to happen to you if you were under the influence of alcohol. These effects will vary, depending upon the amount of alcohol you typically consume.

If I were under the influence of alcohol:

1. My senses would be dulled.
2. My writing would be impaired.
3. I would have difficulty thinking.
4. I would neglect my obligations.
5. My head would feel fuzzy.
6. I would feel dizzy.
7. I would be clumsy.
8. I would feel shaky and jittery.
9. My responses would be slowed.

Response options: 1 (disagree), 2 (slightly disagree), 3 (slightly agree), 4 (agree)

Student Peer Drinking Norms (Baer, 1991)

This section asks you to report on your own drinking and to estimate others' drinking over the past month. For all questions, one drink equals:

- A 12-ounce can or bottle of beer
- A 4-ounce glass of wine
- A 12-ounce bottle or can of wine cooler

A shot of liquor straight or in a mixed drink

1. Consider a TYPICAL WEEK during the past month. Please fill in a number for each day of the week indicating the TYPICAL NUMBER OF DRINKS a typical Rutgers student of your same sex usually consumes on that day.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of Drinks							

2. Consider a TYPICAL WEEK during the past month. Please fill in a number for each day of the week indicating the TYPICAL NUMBER OF DRINKS your best friends usually consume on that day.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of Drinks							

Introduction to Student Drinking Measures

The following questions are about your alcohol use. We want to remind you that your answers are confidential, and we appreciate your honesty.

A “drink” means any of the following:

A 12-ounce can or bottle of beer

A 4-ounce glass of wine

A 12-ounce bottle or can of wine cooler

A shot of liquor straight or in a mixed drink

Past drinking

1. Describe your alcohol use during the spring of your senior year in high school.

Response options: abstainer (0), abstainer- former problem drinker in recovery (1), infrequent or light drinker (2), moderate drinker (3), heavy drinker (4), problem drinker (5)

Binge Drinking (Wechsler et al., 1998)

1. Think back over the last two weeks. How many times have you had five or more drinks in a row?
2. During the last two weeks, how many times have you had four drinks in a row?

Response options: don't drink (0), none (1), once (2), twice (3), 3-5 times (4), 6-9 times (5), 10 or more times (6)

Overall Alcohol Use (Baer et al., 1991)

1. Consider a TYPICAL WEEK during the past month. Please fill in a number for each day of the week indicating the TYPICAL NUMBER OF DRINKS you usually consume on that day.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of Drinks							

2. How often did you drink alcohol during the past month?

Response options: never (0), about once a month (1), 2-3 times a month (2), once or twice a week (3), 3-4 times a week (4), nearly every day (5), once a day or

more (6)

Student Alcohol-related Problems (RAPI-R; White & Labouvie, 1989)

How many times has this happened to you while you were drinking or because of your drinking during the last year?

1. Not able to do your homework or study for a test
2. Got into fights with other people (friends, relatives, strangers)
3. Missed out on other things because you spent too much on alcohol
4. Went to work or school high or drunk
5. Caused shame or embarrassment to someone
6. Neglected your responsibilities
7. Relatives avoided you
8. Felt you needed more alcohol than used to
9. Tried to control your drinking (tried to drink only at certain times of the day or in certain places, that is, tried to change your pattern of drinking)
10. Had withdrawal symptoms, that is, felt sick because you stopped or cut down on drinking
11. Noticed a change in your personality
12. Felt that you had a problem with alcohol
13. Missed a day (or part of a day) of school or work
14. Wanted to stop drinking but couldn't
15. Suddenly found yourself in a place that you could not remember getting to
16. Passed out or fainted suddenly

17. Had a fight, argument, or bad feeling with a friend

18. Had a fight, argument, or bad feeling with a family member

Response options: 0 (none), 1 (1-2 times), 2 (3-5 times), 3 (more than 5 times)

Exploratory Variables

Frequency of Drunkenness (Turrissi et al., 2007)

1. In the past month, how often did you drink enough to get drunk (by drunk we mean unsteady, dizzy, or sick to your stomach?)

Response options: never (0), about once a month (1), 2-3 times a month (2), once or twice a week (3), 3-4 times a week (4), nearly every day (5), once a day or more (6)

Blackouts (Turrissi et al., 2007)

1. In the past month, have you ever awakened after a night of drinking not able to remember things that you did or places that you went? Yes (1), No (0)
-

Onset of Drinking or Getting Drunk (Wechsler et al., 1995)

1. How old were you the first time you drank alcohol (that is, more than a few sips)?

Response options: have never drank, age 10 or younger, greater than 10 (please specify: _____)

2. How old were you the first time you got drunk?

Response options: have never drank, age 10 or younger, greater than 10 (please specify: _____)

Reactance to Rules (Tucker & Mueller, 2000)

1. In response to your parents' attempts to regulate your drinking, what did you do?
 - a) I did what they wanted me to do.
 - b) I did the opposite of what they wanted me to do.
 - c) I did my drinking from them.
 - d) My parents did not control my drinking.
-

Reactance to Alcohol-related Communication (Tucker & Mueller, 2000)

1. After talking with your parents about drinking, how did you respond?
 - a) I did what they wanted me to do.
 - b) I did the opposite of what my parents wanted me to do.
 - c) I hid my drinking from them.
 - d) My parents did not discuss my drinking with me.
-

Reason for Alcohol Communication (Turrissi et al., 2001)

1. If your parents did talk to you about drinking alcohol (in the spring of the previous year), was it because they had found out that you had been drinking?
 - a. Yes, they talked to me because they found out I had been drinking.
 - b. No, we talked about it because of another reason.
 - c. No, we talked about a lot of things including drinking.
 - d. No, we never talked about drinking.

Appendix B

Psychometric Properties of Scales

Parental Monitoring

Although this scale showed only moderate internal consistency, examination of item-total statistics revealed that each item's score was highly correlated with the total score on the scale and that deleting any one item did not improve Cronbach's alpha. Inter-item correlations, along with an exploratory factor analysis, revealed that the scale did, in fact, contain two separate components, relating to 1) how much parents attempted to know and 2) how much they actually knew about student's behavior.

Parental Alcohol-specific Rules

The authors (Van der Vorst et al., 2005) reported that the Rules scale demonstrated good content validity, with an explorative factor analysis revealing that all of the items loaded on one factor (.560- .940). My own factor analysis also revealed only one factor. In addition, the authors reported good divergent validity, in that alcohol-specific rules was only moderately correlated with alcohol-specific monitoring ($r = .340$). In this study, alcohol-specific rules was not significantly correlated with alcohol-related communication, indicating good divergent validity. Finally, predictive validity has been demonstrated by a number of studies (Van der Vorst et al., 2006; Van Zundert et al., 2006) indicating that greater alcohol-specific rules is associated with lower adolescent problematic drinking.

Parental Alcohol-related Communication

Reliability analyses revealed that the twelve individual items included in the study questionnaire (see items above) concerning physical, legal, social, and other topics

concerning alcohol did not have an adequate internal consistency ($\alpha = .643$). Moreover, an exploratory factor analyses revealed several different factors or components. Analyses of the inter-item correlations, as well as the exploratory factor analysis, revealed that four items (*“how alcohol makes you sick”*, *“consequences of drunk driving”*, *“risks of riding in a car with someone who has been drinking”* and *“how drinking could get me into trouble with the police”*) were highly inter-correlated and loaded on one factor.

Moreover, these items had significant face validity in that they all seemed to measure negative consequences of alcohol use. With the other items deleted, the internal consistency of the four-item scale rose considerably and to an acceptable level. Item-total statistics revealed that each of the four items was highly correlated with total scores.

My attempts to construct other sub-scales with the remaining 8 items failed either due to a lack of internal consistency or face and content validity. Moreover, preliminary bivariate correlations between the twelve communication items and the outcome measures revealed that only the items discussed above correlated significantly with student drinking. These analyses justified dropping the 8 items from any further analyses, even on an individual basis.

Alcohol-related communication was also assessed using a 1-item measure of Overall Alcohol-related Communication, developed by Turrissi (2001) for use with college students. The item read as follows: *“Overall, how would you rate the extent to which your parents talked to you about drinking?”* Students were asked to rate on a scale from 0 (*not at all*) to 4 (*a great deal*) the extent to which their parents talked to them about drinking, with higher scores indicating greater overall alcohol-related communication. Analyses revealed, however, that this measure was not predictive of

student problematic drinking and introduced a great deal of collinearity with the other communication measure when present in the regression analyses. For these reasons, as well as the fact that a 4-item measure is preferable to a 1-item measure, this measure of communication was not used in the analyses.

Parental Problematic Drinking

Technically, this variable represents an ordinal-level variable, and the primary analyses used in this study for hypothesis testing, linear regression, requires interval or dichotomous predictor variables. However, social science researchers (Achen, 1991) have argued that ordinal level variables with five or more classes may be used as interval-level predictors in regression analyses without significant violation of regression assumptions. Indeed, variables based on a 5-point Likert scale are often used in survey and social science research.

Parental Availability of Alcohol in the Home

Reliability analyses further revealed that the items on this scale test the same construct; specifically, item-total statistics revealed that scores on each item were highly correlated with the total score on the scale. This scale is relatively new in the adolescent alcohol research. As such, there has not been extensive testing of the psychometric properties of this scale. However, my own exploratory factor analysis revealed that all of the items loaded on only one factor, indicating good content validity. In addition, availability was only slightly to moderately correlated with parental drinking and other alcohol-related parental behaviors (see Table 6), indicating divergent validity.

Student Alcohol Problems

Participants who were abstainers ($n = 22$) were not asked to answer questions

from this scale, as this scale asks about problems associated with alcohol use. The authors of this scale (White & Labouvie, 1989), as well as others (Borsari & Carey, 2000; Marlatt et al., 1998; White, Johnson, & Buyke, 2000), report that this scale demonstrates good content, divergent, and predictive validity.

Past Student Drinking

As with parental drinking, this 1-item scale represents an ordinal variable. However, it was used as an interval-level predictor for the same reasons as those discussed with regard to parental drinking above.

Frequency of Binge Drinking

In addition to requiring interval or dichotomous predictors, multiple linear regression analysis also requires interval or dichotomous outcomes. As with ordinal predictors, there is a long tradition, however, of using ordinal-level outcome variables as interval-level dependent variables, so long as the number of response categories is not very small, usually from five to seven and the responses are not concentrated in a few response categories (Achen, 1991; Berry, 1993). As discussed in the main portion of this dissertation, this variable contains six response categories, and frequencies in each category were reasonably large (> 11), except for the “*10 times or greater*” response category, which had from 2 (females) to 6 (males) responses. Therefore, the last two categories were collapsed into one category, “*greater than 6 times*”, and the number of response categories (i.e., five) was still acceptable. Thus, this variable was used as an interval-level outcome in this study.

Student Negative Alcohol Expectancies

Other reliability statistics revealed that the Negative Expectancies Scale was

internally consistent. Specifically, item-total correlations revealed that all of the items from each of the two subscales were highly correlated with the total score of the combined scale. In terms of content validity, a factor analysis revealed that the items loaded as predicted on one factors. The authors of the scale have reported that the scale as a whole demonstrates good predictive validity, with alcohol expectancies, as measured by the CEOA, accounting for 15% of the variance in frequency of alcohol use and 20% of the variance in the quantity of alcohol use (Fromme & D'Amico, 2000). In addition, they reported that each subscale is significantly associated with alcohol use.

Student Self-Efficacy to Avoid Alcohol

Confirmatory factor analyses have revealed that this scale has three components (i.e., corresponding to three different situations), with one underlying construct (Young et al., 2006). Further analyses (Young et al., 2007) revealed that the scale demonstrated good criterion validity, in that each of the factors were negatively correlated with alcohol consumptions. In addition, differences in alcohol consumption between different drinking groups indicated good discriminant validity. As this is a fairly new scale, predictive validity and test-retest reliability has not been investigated.

Quality of Alcohol-related Communication

This scale was originally composed of 6 items. However, item 4 was dropped after analyses revealed problems with this item. Examinations of inter-item correlations, and item-total statistics revealed that item 4 was not correlated highly with the total score or other item scores. Moreover, after dropping the item from the analysis the Cronbach's alpha rose from .846 to .910. An exploratory factor analysis revealed that all of the other 5 items loaded on one component, while item 4 loaded on a different component.

Therefore, item 4 was dropped from the analysis, and the total score was calculated without using this item.

Exploratory Variables

Onset of drinking. Onset of drinking or getting drunk was also assessed, as it has been shown to be predictive of adolescent and student drinking in other studies (Ham & Hope, 2003). Onset of drinking was assessed with the following item: “*How old were you when you first got drunk?*” Onset of Drunk was measured with the following item: “*How old were you the first time you got drunk (by drunk we mean unsteady, dizzy, or sick to your stomach)?*” Response options for both items were 1 (*10 years or younger*), 2 (*greater than 10*), and 3 (*have never drunk*). Higher scores indicated later onset of drink or drunk.

Frequency of drunkenness. Frequency of Getting Drunk was assessed with a 1-item measure that is often used in the alcohol literature (Turrise et al., 2001; Wechsler et al., 1998). The item asked participants to report on how frequently they got drunk in the past month. The specific item read as follows: “*In the past month, how often did you get drunk (by drunk we mean unsteady, dizzy, or sick to your stomach)?*”, with response options ranging from 0 (*never*) to 6 (*once a day or more*). Higher scores indicated greater frequency of drunkenness. This variable, like binge drinking above, was used as an interval variable in analyses, although technically it is an ordinal variable.

Blackouts. The incidence of blackouts was assessed with a 1-item dichotomous measure that is commonly used in the alcohol literature (Turrise et al., 2007). The item asked students to report on whether or not they have experienced a blackout in the past

month. The item read as follows: *“In the past month, have you ever awakened after a night of drinking not able to remember things that you did or places that you went?”*

Reactance to alcohol-related rules/ communication. Reactance to Parental Rules and Reactance to Parental Alcohol-related Communication were both assessed with a 1-item measure. The item for reactance to rules read as follows: *“In response to your parents’ attempts to control your drinking, what did you do?”* The item for reactance to communication read: *“After talking with your parents about drinking how did you respond?”* Response options for both measures were 0 (*I did what they wanted me to do*), 1 (*I hid it*), and 2 (*I did the opposite*). The scales also included a *“not applicable”* option, so as to accommodate those students whose parents did not have rules or did not discuss drinking with them. Higher scores indicated greater reactance to alcohol-related rules or communication.

Reason for alcohol-related communication. The Reason for Alcohol-related Communication was also assessed with an item that asked students: *“If your parents did talk to you about drinking alcohol (in the spring of the previous year), was it because they had found out that you had been drinking?”*

Appendix C

Data Management/ Analyses

Missing Data

Missing values on study variables ranged from 0 cases (e.g., Overall Use) to 13 cases (e.g., Father's Education), with none of the variables missing more than 5% of cases. About a fifth of participants (19%, $n = 54$) had missing data, with the majority of these participants ($n = 48$) missing data on one to two variables and the other six participants missing data on only three to four variables. An analysis of mean differences (i.e., t-tests) revealed no differences between participants missing data and participants not missing data on study variables. In addition, Little's MCAR (i.e., missing completely at random) test for means was not significant ($p = .128$), indicating that the data was missing completely at random.

Although the data were MCAR, listwise deletion, deletion of all participants with missing data, was not considered because almost one-fifth of subjects were missing data; deletion of all participants with missing data would have led to a significant loss of power. Instead, I employed a maximum-likelihood estimate (MLE) technique by Schafer & Olsen (1998), which uses the Expectation-Maximization (EM) algorithm. This algorithm produces parameter estimates based on the data that is present and then produces estimates for the missing data (i.e., means, variances, and covariances) based on those parameters. Unlike other MLE algorithms, the EM method adds a small amount of error to the variances that it estimates and then uses the new estimates to impute the data, so as not to underestimate the error. This algorithm does not assume a multivariate

normal distribution for the variables with missing data. The EM method was performed using the SPSS EM procedure in the Missing Values Analysis.

Determining Covariates

Before collapsing nominal covariates into dichotomous variables, associations between these covariates (e.g., religion) and continuous predictor variables were tested using the Eta test of association. Bivariate associations between the ordinal covariates, (i.e., maternal and paternal education) and continuous predictors were assessed with the Spearman's Rho correlation. Results of these correlational analyses revealed no significant relationships between these ordinal and nominal covariates and predictors, and these results are not reported here. As discussed elsewhere, nominal covariates were then recoded to create dichotomous variables and mother and father education were combined to create a continuous student SES variable.

Correlational analyses between student demographics and predictor variables (i.e., parental behaviors) revealed that three covariates, 1) gender, 2) race, and 3) parent marital status, were significantly associated with one or more of the predictors. None of the other student demographics, including having/not having a religious upbringing, were significantly associated with any of the parental behaviors. Specifically, gender was significantly and modestly correlated with three of the parental behaviors: monitoring ($r = -.124, p < .05$), availability ($r = -.167, p < .01$), and paternal drinking ($r = -.160, p < .01$). Thus, being female was associated with greater monitoring, greater availability of alcohol, and greater paternal drinking. Gender was not significantly associated with maternal drinking, alcohol-specific rules, or alcohol-related communication. Race (i.e., white or non-white) was significantly associated with all of the parental behaviors except

for monitoring ($r = .089, p = .141$). Being white was associated with greater availability of alcohol ($r = .146, p < .05$), maternal drinking ($r = .338, p < .01$), paternal drinking ($r = .135, p < .05$), and communication about alcohol problems ($r = .166, p < .01$). Being white was negatively associated with rules ($r = -.168, p < .01$). Parental marital status (i.e., married/ not married) was significantly and positively associated with monitoring ($r = .175, p < .01$) and alcohol-specific rules ($r = .162, p < .01$). Having parents who were married was associated with greater monitoring and alcohol-specific rules. Parental marital status was not significantly associated with the other parental behaviors.

Regression analyses were conducted to determine if covariates were significant predictors of drinking outcomes; these analyses controlled for past drinking. Results revealed that gender was a significant predictor of overall use, after controlling for past drinking ($\beta = .161, p < .01$) and that race was a significant predictor of frequency and incidence of male binge drinking ($\beta = .149, p < .01$; $OR = 2.82, p < .05$; respectively) after controlling for past drinking. There were no other significant relationships between demographic covariates and outcomes.

Univariate Tests of Distributions and Outliers

To test for the normality of distributions, a number of methods were used. Graphical methods included examining histograms, as well the Q-Q plots (probability plots), of all of the variables. In addition, skewness and kurtosis statistics were examined to identify non-normality; these statistics can be found in Table 3. Variables were considered highly skewed or kurtotic if these statistics were greater than ± 2 . To identify outliers, box-plots were examined, and cases involving scores greater than or less than 3 standard deviations (SDs) from the mean were flagged.

Mediation

Mediational models, such as those of Baron and Kenny (1986), often assume that statistically adjusting for the effects of a mediator results in a decrease in the magnitude of the association between the independent and dependent variable, and that the total effect of the independent variable on the dependent variable is equivalent to the addition of two pathways (the direct and indirect effect of the IV on the DV) that have the same signs. In fact, it is possible for the indirect effect of an IV to have a sign opposite to that of the direct effect, such that the indirect effect partially (or completely) cancels out the effects of the direct effect. By producing an indirect effect that is opposite in sign to the direct effect, a mediator or suppressive variable essentially increases the predictive validity of the IV on the DV, because in controlling for the mediator, the relationship between the IV and DV actually increases rather than decreases. Mediational models that account for these suppression effects are often referred to as inconsistent mediational models (MacKinnon et al. 2000; Shrout & Bolger, 2002). The model of Baron and Kenny does not account for suppressor effects, and, thus, does not provide a complete picture of the mediated effects of predictors on outcomes.

In the discussion of the effects of control in the main portion of this thesis, it was indicated that parental control may, in fact, create psychological reactance, which may, in turn, increase the likelihood of the behavior. Therefore, it is theoretically possible that alcohol-related and general control may create psychological reactance, which acts as a suppressor variable and reduces the proposed positive relationships between control and student drinking. For this reason, we have chosen to forego the more conservative Baron and Kenny approach (1986) and employ a mediational model more sensitive to both

consistent and inconsistent mediation. In utilizing the MacKinnon et al., (2002) approach, we will test whether two associations or pathways are significant: 1) the pathway from predictor to mediator and 2) the pathway from the mediator to the predictor. We will not require that the pathway from predictor to outcome be statistically significant. If both associations and pathways are significant, then we will assume that the conditions for mediation have been met for a particular IV, mediator, and DV.

Testing for Regression Assumptions

A number of assumptions need to be met in order to run multiple linear regression analyses. These include 1) linear relationships between the predictor and outcome variables, 2) a normal distribution of the errors, 3) homogeneity of variance or homoscedasticity, the requirement that the error variance is constant, 4) independence of errors, and 5) model specification, the model includes all relevant variables and no irrelevant variables. Other issues that should be considered but are not explicit assumptions of regression are 1) the absence of unduly influential outliers, 2) the absence of multicollinearity (i.e., linear relationships) among the predictors, 3) adequate sample size, and 4) interval and dichotomous level predictors and interval level outcome variables.

To test for the normality of the errors, I used a number of graphical and numerical methods appropriate to multivariate analyses; these methods are similar to those used to test for normality of the individual variables. Histograms and Q-Q plots of the unstandardized residuals were examined for deviations from normality. In addition, the Shapiro-Wilk test of normality was conducted.

Unduly influential outliers, observations that have a large residual and an extreme

value on the predictor variable, were identified with a number of graphical and numerical methods as well. First, I examined the partial regression plots for each predictor to identify potential outliers; I also examined the histogram of the standardized residuals. During the regression analyses, I requested both Cook's D and leverage statistics. Those cases with Cook's distance scores greater than one were automatically deleted. For those cases that met the more stringent criterion ($\text{Cook's } D > 4/n - k - 1$, where k = number of predictors), decisions to eliminate an outlier were based on 1) whether they had a high leverage as well ($\text{leverage} > (2k+2)/n$, where k is the number of predictors, is considered high), 2) whether they appeared to be serious outliers in plots, and 3) whether the removal of them from the analyses significantly changed the regression coefficients. Transformations of variables were always attempted prior to deletion to remove the influence of significant outliers.

To assess for linearity, I used two graphical methods: 1) partial regression plots and 2) a scatterplot of the standardized residuals vs. the fitted (i.e., predicted) values. I also examined this latter scatterplot to assess for heteroscedacity.

When any of the above assumptions were violated, I looked at the distributions of the variables and carefully examined them again for normality. Skewness and kurtosis statistics, along with boxplots (for outliers), were checked. Variables that looked especially non-normal were subjected to transformations. Square root, logarithmic, and inverse transformations were considered, in that order. However, the nature of the distribution also determined the type of transformation used. For example, when symmetry in the tail was necessary, square root transformations were performed; when symmetry in the middle of the transformation was needed, logarithmic transformation

were computed. For variables with negative skew, I first subtracted all values from the highest value plus 1 and then performed the transformations. The most appropriate transformation was the one that made the distribution of the variables the most normal and, most importantly, that resulted in the regression assumptions being met. When transformation of variables did not eliminate the influence of extreme outliers, these cases were deleted.

To test for multi-collinearity in linear regression analyses, I looked at the tolerance and the variance inflation factor (VIF). Any variables with tolerances greater than .10 or VIF values greater than 10 were investigated further. In addition, collinearity diagnostics were run in SPSS; this technique creates cross-products of the independent variables and factors them. Multicollinearity is indicated if any of the factors have a condition index greater than 30 and variance proportions greater than .50 (Belsley, Kuh & Welsch, 1980). There was no evidence of multicollinearity in any of the regression analyses.

Finally, I determined that the sample size was adequate to conduct linear regression analyses. I used the convention that a sample size is adequate if there are at least twenty times as many cases as independent variables (in this case, 279 is well over the required number of $20 \times 8 = 160$).

The assumptions of binary logistic regression are slightly different from those for linear regression. There are no necessary assumptions of normality of errors, homoscedasticity, or linearity between the predictor and the outcome. However, logistic regression does assume 1) a linear relationship between the predictors and the log odds or logits of the dependent, 2) a dichotomous outcome variable, 3) no unduly influential

outliers, 4) absence of perfect separation (i.e., groups of the dependent variable are not perfectly separated by the independent variable), and 5) proper model specification. Also, an adequate sample size is also necessary. I tested assumptions regarding linearity using the Box-Tidwell Transformation Test. To assess for proper model specification, I looked at the Hosmer and Lemeshow (chi-square) statistic, a test of the goodness of fit. Outliers were considered unduly influential and deleted if the standardized residual for a particular case was greater than 1.96 for a significance level of .05 and 2.58 for a significance level of .01. Inspection of scores (number of cases) in each category of each dichotomous dependent variable revealed no perfect separation on any of the independent variables. Finally, the sample size was considered adequate as there were at least 10 cases per independent variable (Hosmer & Lemeshow, 1989).

Appendix D

Univariate Results

Descriptive Statistics

Onset of drinking. In regard to onset of drinking or getting drunk, 8% ($n = 23$) of students reported never having drunk and 9% ($n = 24$) reported never having gotten drunk. Of the students who were not abstainers ($n = 256$), 90% ($n = 230$) of students reported that they were older than 10 years of age when they had their first drink, while 10% ($n = 26$) of students reported that they were 10 years or younger. Of students who report having gotten drunk in the past ($n = 232$), 99% ($n = 229$) of students reported that they were older than 10 years of age when they first got drunk and 1% ($n = 3$) reported that they were 10 years or younger. The mean age of students' first drink was 14.75 ($SD = 2.21$) and the mean age of students' first drunk was 15.83 ($SD = 1.66$).

Other drinking variables. For the variable Frequency of Drunkenness, the mean score was 1.67 ($SD = .085$), a little over halfway between the categories *once a month* and *2-3 times a month*. To give the reader a better idea of where students fell on the categories of this scale, the majority of students (31%, $n = 87$) reported *never* getting drunk in the past 30 days, followed by 24% of students ($n = 68$) reporting getting drunk *2-3 times a month*, 19% of students ($n = 52$) getting drunk *1-2 times a week*, 14% of students ($n = 39$) getting drunk *once a month*, 12% of students ($n = 34$) getting drunk *three to four times a week*, and <1% ($n = 1$) reporting getting drunk *nearly every day*. No students reported getting drunk *once a day or more*. With regard to blackouts, the majority of students (75%, $n = 209$) did not report experiencing a blackout in the last month.

Demographics. As discussed elsewhere, student SES scores were calculated by averaging maternal and paternal education scores. The mean SES score was 3.26 ($SD = 1.27$), with scores ranging from 0 to 5; the mean score fell between the categories of *associates* and *4-year degree*. To give the reader a better idea of where mothers and fathers fell in regard to educational levels, the majority of students reported that the highest education level achieved by their mothers was *bachelors* (29%, $n = 76$), followed by *high school* (24%, $n = 67$), *graduate* (21%, $n = 57$), *some college* (15%, $n = 42$), *associates* (9%, $n = 24$), and *other* (2%, $n = 4$). Seven people did not provide data on mother's education. With respect to fathers' education, the majority of students reported that the highest level of education attained for fathers was *bachelors* (31%, $n = 83$), followed by *graduate* (25%, $n = 66$), *high school* (17%, $n = 46$), *some college* (14%, $n = 37$), *other* (7%, $n = 19$), and *associates* (6%, $n = 15$). Twelve subjects did not provide data on father's education.

The majority of students reported that their parents were *married* (79%, $n = 216$), followed by *divorced* (17%, $n = 47$), *widowed* (2%, $n = 6$), *separated* (2%, $n = 4$), and *partnered* (<1%, $n = 2$). Four subjects reported that their parents were not married.

Parental behaviors. The mean score on the Parental Monitoring variable was 14.09 ($SD = 2.58$), with scores ranging from 0 to 18. For other descriptive statistics on this and other parental behavior variables, see Table 3. The mean score on the Availability scale was 6.36 ($SD = 4.48$), with scores ranging from 0 to 15. Total scores on the Alcohol-specific Rules scale ranged from 10-50, with a mean score of 40.8 ($SD = 11.0$). The mean score on the Communication about Alcohol Problems was 11.0 ($SD = 4.66$), with scores ranging from 5 to 20.

The mean score on paternal drinking was 1.16 ($SD = .054$); the mean score on maternal drinking was .89 ($SD = .045$). These mean scores both fell approximately around the category of *light drinker*. Although parental drinking was analyzed as an interval variable in this study, frequencies for each category of this ordinal variable are given to provide the reader a better indication of where mothers and fathers fell with regard to drinking. The majority of students, about half, characterized both their mothers and fathers as *light drinkers*; slightly more students endorsed mothers (50%, $n = 138$) as *light drinkers* than fathers (42%, $n = 118$). Student reports of parental drinking diverged, however, for the second and third most common categories of parental drinkers. *Abstainers* (32%, $n = 90$) was the next highest drinking category for mothers, followed by *moderate drinkers* (17%, $n = 47$). In comparison, a similar number of students endorsed fathers as *abstainers* (24%, $n = 68$) and *moderate drinkers* (25%, $n = 71$). The categories of *heavy drinkers* and *problem drinkers* were the least commonly endorsed categories by students for both mothers and fathers, although fathers were more likely to be *heavy* or *problem drinkers* (*heavy*: 5%, $n = 14$; *problem*: 1%, $n = 4$) than mothers (*heavy*: 1%, $n = 3$; *problem*: <1%, $n = 1$). Four students (1%) reported that they “*did not know*” their father's drinking pattern. Students' perceptions of maternal and paternal drinking growing up was also assessed; descriptive statistics for these variables were similar student reports of maternal and paternal drinking during the spring of the senior year, respectively.

Mediators. Student Peer Drinking Norms had a mean score of 35.1 ($SD = 22.4$), with scores ranging from 0 to 182. For a list of other descriptive statistics for this and other mediator variables, see Table 6. Student Negative Alcohol Expectancies had a mean

score of 35.9 ($SD = 5.33$) with scores ranging from 11 to 44. Student Self-Efficacy to Avoid Alcohol had a mean score of 30.3 ($SD = 14.1$), with scores ranging from 18 to 108.

Moderator. Total scores on Negativity of Communication ranged from 5 to 25, with a mean score of 15.1 ($SD = 5.56$). For a complete list of descriptive statistics for this variable, see Table 3.

Univariate Tests of Distributions of Variables and Outliers

Most of the variables were normally distributed with no potentially troublesome outliers. These variables were Past Student Drinking, Frequency of Male/ Female Binge Drinking, Maternal/ Paternal Problematic Drinking, Parental Availability of Alcohol in the Home, Parental Monitoring, Student Negative Alcohol Expectancies, and Negativity of Alcohol-related Communication. Variables with problematic distributions or potentially influential outliers are discussed below.

Student overall use. Two of the student drinking variables, Overall Use and Alcohol Problems, had non-normal distributions. Specifically, with regard to Overall Use, the Q-Q plots and kurtosis and skewness statistics indicated that this variable was highly and positively skewed and kurtotic. Box-plot tests revealed a few potentially troublesome outliers, ranging from 220 to 224. These outliers were over three standard deviations from the mean.

Student alcohol problems. Examination of the Alcohol Problems variable indicated that this variable deviated slightly from a non-normal distribution, although skewness and kurtosis statistics were within the ± 2 range. The Q-Q Plot revealed a slight negative skew and positive kurtosis. A box-plot test revealed a couple of possible outliers, with one outlier in particular being potentially troublesome (score = 30).

Parental alcohol-specific rules. Only one parental behavior variable, Alcohol-related Rules, demonstrated a slightly non-normal distribution. Although the skewness and kurtosis statistics were within range, the histogram and the Q-Q plot for this variable indicated a slight negative skew. Boxplot tests revealed three possible outliers, all with scores of 10.

Student alcohol-related cognitions. Two mediators, Student Peer Drinking Norms and Self-efficacy to Avoid Alcohol, had non-normal distributions. Examination of the skewness and kurtosis statistics and the Q-Q plot indicated that Drinking Norms was slightly and positively skewed and highly and positively kurtotic. A box-plot test revealed a potentially troublesome outlier (score = 182). Descriptive statistics (kurtosis and skewness), as well as examination of the Q-Q Plot, of Self-Efficacy to Avoid Alcohol revealed a positive skew and kurtosis. No problematic outliers were identified.

Bivariate Associations

Bivariate associations among study variables, including predictors, outcomes, and mediators, are discussed here. In addition, bivariate associations between predictors and exploratory drinking outcomes are also reported. Finally, associations among covariates and between covariates and predictors/ outcomes are not discussed here, but they are presented in Tables 4, 5, and 6.

Predictors. A little over half of the correlations among predictors were significant (see Table 7). Significant correlations are discussed heretofore. All of the correlations were modest, with the exception of the correlation between maternal drinking and availability of alcohol, which was moderate. Specifically, with regard to parental problematic modeling of drinking, maternal drinking was negatively related to parental

alcohol-specific rules ($r = -.151, p < .05$) and, unpredictably, positively related to parental alcohol-related communication ($r = .165, p < .01$). Paternal drinking was also positively related to parental alcohol-related communication ($r = .195, p < .01$) and, in addition, was positively associated with parental monitoring ($r = .163, p < .01$). As with maternal drinking, availability of alcohol was also negatively correlated with alcohol-specific rules ($r = -.137, p < .01$) and positively correlated with alcohol-related communication ($r = .195, p < .01$).

One explanation for these findings regarding positive associations between problematic modeling of drinking and monitoring and alcohol-related communication is that problematic drinking in the household by one parent may encourage more communication about alcohol and general monitoring by the non-drinking or social drinking spouse out of concern for the drinking parent's influence on the child. For example, as a result of fathers' increased drinking, mothers may monitor their children's activities more and talk to them more about the consequences of drinking. Alternatively, parents who drink more may view alcohol use as acceptable or normal and encourage safe use of alcohol and participation in alcohol-related activities through greater monitoring and alcohol-specific communication. This interpretation is supported by the findings that parental drinking and alcohol availability are all significantly and negatively associated with alcohol-specific rules, suggesting a more lax attitude toward alcohol use.

Interestingly, availability of alcohol was positively and moderately correlated with maternal drinking ($r = .453, p < .01$), but not significantly correlated with paternal drinking. As the mother is the primary caretaker, perhaps she is able to shield her children from alcohol availability when she is not the one who is drinking, but cannot if

she is the household drinker. Finally, the association between maternal and paternal drinking was not significant ($r = .088, p = .57$), suggesting that parental drinking patterns are not often necessarily concordant.

With regard to general and alcohol-specific control, parental monitoring was slightly and positively associated with both alcohol-specific communication ($r = .295, p < .01$) and alcohol-specific rules ($r = .138, p < .05$). However, alcohol-specific rules was not related to alcohol-specific communication ($r = .040, p = .43$), suggesting that the two constructs are unique.

Outcomes. All of the drinking outcomes were significantly and positively associated with one another, with correlations ranging from .419 to .821 ($p < .001$; see Table 8). All of the correlations among binge drinking, overall use, and alcohol problems were moderate to large. These large associations suggest that there is considerable overlap among the predictors; however, the correlations are not so large to suggest that the scales are measuring the same drinking behavior.

Mediators. Only student peer drinking norms and student negative alcohol expectancies were significantly correlated with one another ($r = -.158, p < .05$); the association between the two was negative and modest. As can be seen in Table 10, neither student drinking norms nor negative alcohol expectancies was significantly correlated with student self-efficacy to avoid alcohol.

Predictors and exploratory drinking outcomes. None of the parental behaviors, except for alcohol-related communication, were significantly associated with student incidence of blackouts. Alcohol-related communication was significantly, modestly, and positively correlated with blackouts ($r = .151, p < .05$). With regard to frequency of

drunkenness, maternal drinking, parental alcohol-related communication, and parental alcohol-specific rules were significantly and modestly correlated with this drinking outcome. Maternal drinking and parental alcohol-related communication were positively associated with frequency of drunkenness ($r = .199, p < .01$; $r = .274, p < .01$, respectively), whereas parental alcohol-specific rules was negatively associated with frequency of drunkenness ($r = -.254, p < .01$). Paternal drinking, parental availability of alcohol, and parental monitoring were not significantly associated with frequency of drunkenness.

Appendix E

Multivariate Results

Tests of Regression Assumptions

Main analyses. Two sets of regression analyses testing main hypotheses (i.e., parental behaviors predict student drinking outcomes) revealed problems with regression assumptions. Specifically, the analyses involving 1) overall alcohol use and 2) alcohol problems raised a number of issues.

Parental behaviors predict overall use. Cook's distance scores ($D > 1$), leverage values, and numerous graphs revealed three unduly influential outliers. In addition, the Q-Q plot of the residuals and the Shapiro-Wilk statistic ($W = .904, p < .001$) revealed a highly non-normal distribution of the residuals. Moreover, the plot of the residuals (standardized) against the fitted values revealed slight heteroscedasticity.

Several transformations of this variable were attempted. The square root transformation yielded the greatest normality and homoscedasticity. Specifically, there was a random distribution of residuals in all of the partial regression plots, and the Q-Q plot of the residuals, along with a non-significant Shapiro Wilk ($W = .992, p = .165$), revealed a normal distribution. Even after this transformation, however, deletion of the three outliers discussed above was required as they continued to demonstrate serious influence.

Parental behaviors predict alcohol problems. Cook's distance scores ($D > 1$), leverage scores, and graphical methods revealed two potentially influential outliers. Moreover, the Q-Q plot of the residuals and the Shapiro-Wilk statistic ($W = .891, p <$

.001) revealed a highly non-normal distribution of the residuals. Moreover, the plot of the residuals (standardized) about the fitted values revealed slight heteroscedasticity.

Univariate tests of the distribution of the alcohol problems variable, discussed elsewhere, had revealed a moderately positive skew and a highly positive kurtosis (see Table 3). Several transformations of this variable were attempted, and regression analyses were run on these transformed variables. The square root transformation of alcohol problems rendered the most normal distribution of both the alcohol problems variable itself and the unstandardized residuals, after deleting the unduly influential outliers. Graphical methods revealed acceptable homoscedasticity and normality, as did the Shapiro-Wilk statistic ($W = .884, p = .165$).

Mediational analyses. When mediational analyses were conducted for each drinking outcome, regression analyses of 1) student self-efficacy to avoid alcohol on parental behaviors and 2) student peer drinking norms on parental behaviors both revealed problems with regression assumptions.

Self-efficacy to avoid alcohol. Graphical methods and numerical tests revealed slightly heteroscedastic and non-normal distributions for all of the drinking outcomes when self-efficacy to avoid alcohol was the dependent variable in the first step of the mediational analyses. Two potential outliers were also identified. Univariate tests of the self-efficacy variable (see Appendix D) revealed a highly positive kurtosis and slightly negative skew. Before attempting transformations of the variable (i.e., square root, log), the distribution of the variable was reflected so as to be left or positively skewed. This involves adding a constant so that the lowest value after the transformation is 1. A logarithmic transformation yielded the most normal distribution of the drinking outcome

and the unstandardized residuals. The specific equation used was $T = -\log_e (R + C1) + C2$, where C1 is the constant used to ensure that the lowest value of the raw score (R) plus C1 is equal to 1.0 and C2 is the constant used to ensure that the lowest value of the transformed score (T) is equal to 1.0. There were no violations of regression assumptions once self-efficacy was transformed.

Peer drinking norms. Graphical methods and numerical tests revealed slight heteroscedasticity and violations of normality for all of the distributions when peer drinking norms was the dependent variable in the first step of the mediational analyses. In addition, there was an extremely influential outlier (score = 182). Univariate tests of drinking norms revealed a slight positive skew and a large positive kurtosis (see Table 3). Multiple transformations were attempted with a square root transformation generating the most normal distribution of norms and allowing the regression assumptions to be met. Before the transformation was computed, a very small constant was added to the scores of the norms variable because there were a number of cases with a score of 0 on drinking norms. Deletion of the extreme outlier was also required to make the distribution of the residuals normal.

Results of Exploratory Analyses

Frequency of drunkenness as outcome. Preliminary analyses revealed that race was a significant covariate for this drinking outcome. When both race and past student problematic drinking were included in the first step of the regression analysis, it was revealed that they were both significant predictors of frequency of drunkenness. Specifically, greater past drinking and being white were associated with greater frequency of drunkenness ($\beta = .506, p < .001$; $\beta = .171, p < .01$, respectively). These two

variables accounted for approximately 34% (R^2 change = .338). In the second step of the analysis, none of the parental behaviors were significant predictors of frequency of drunkenness, after controlling for race and past drinking.

Blackouts. Preliminary analyses revealed no significant covariates for this outcome. In the first and second step of the regression analyses, past student problematic drinking was a significant predictor of blackouts ($OR = 3.00, p < .001$), with past drinking associated with a greater likelihood of reporting a blackout. When parental behaviors were entered in the second step, none of the parental behaviors were significant predictors of the likelihood of a blackout.

Negative control moderates parental monitoring / student drinking relationship. Multiple regression analyses were conducted to determine if negative general control, assessed as authoritarianism (i.e., high demandingness and low supportiveness) using the Involvement/Demandingness subscales of the Parenting Style Index (Steinberg, Lamborn, Darling, Mounts, & Dornbusch, 1994; see Appendix A for list of items), moderated the relationship between parental monitoring and two student drinking outcomes: overall alcohol use and alcohol problems. The interaction term (i.e., authoritarianism multiplied by the centered monitoring variable) was not significant in either of the regression analyses. When analyses were run using alcohol-specific control (i.e., alcohol rules), the interaction term (authoritarianism multiplied by the centered rules variable) was not a significant predictor of either student overall alcohol use or problems.

Closeness to parent moderates parental drinking/ student drinking relationship. Researchers (Jung, 1995; Zhang et al., 1999) have proposed and demonstrated that closeness to one's parent may moderate the effects of that parent's

drinking on adolescent drinking. Multiple regression analyses were conducted to determine if closeness to mother or father moderated the effects of maternal or paternal drinking, respectively, on college student drinking (see Appendix A for Closeness scale). Results indicated that the interaction terms (e.g., closeness to mother multiplied by maternal drinking) were not significant predictors of either student overall alcohol use or alcohol problems. These findings are inconsistent with those reported by Jung (1995) for overall alcohol use. Discrepancies between findings may be attributed to the fact that the study by Jung assessed cross-sectional associations between parental drinking and student drinking, while my study looked at prospective associations between parental drinking and student drinking.

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