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FRIENDS, ROMANTIC PARTNERS, AND CASUAL SEXUAL PARTNERS: EXPLORING THE SOCIAL

TRANSMISSION OF ALCOHOL USE IN ADOLESCENCE AND YOUNG ADULTHOOD

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ABSTRACT

The prevalence of heavy alcohol use increases across adolescence and young adulthood, creating risks for health and development. Social relationships, including friendships and romantic and sexual relationships, may influence adolescent and young adult alcohol use. Understanding diverse social influences on heavy alcohol use in adolescence and young adulthood is important for preventing heavy alcohol use and its associated negative consequences. In this dissertation, I examined how diverse social relationships are associated with heavy alcohol use during adolescence and young adulthood. By incorporating multiple relationships and exploring multiple mechanisms of social influence, this dissertation advances understanding of both *who* matters for heavy alcohol use in adolescence/young adulthood, and *how* those individuals matter.

In Paper 1, I used data from PROSPER to examine the unique associations of close others' frequency of drunkenness, unstructured socializing, and alcohol-related attitudes with adolescents' (ages 13-18) own frequency of drunkenness. I distinguished between the contributions of romantic partners, friends, and romantic partners' friends in order to determine whether these potential sources of influence have unique associations with drunkenness. When examined separately, close others' frequency of drunkenness, alcohol-related attitudes, and unstructured socializing each predicted adolescents' own frequency of drunkenness. However, in a combined model, only friends' frequency of drunkenness contributed independently to adolescents' frequency of drunkenness. Furthermore, unstructured socializing with friends predicted increased frequency of drunkenness as adolescents aged.

In Paper 2, I assessed how romantic partners' binge drinking and negative alcohol-related consequences are associated with changes in young adults' (ages 18-24 at baseline) own binge drinking using data from Add Health. I also explored whether relationship type (dating, cohabiting, or married) moderated these associations. Young adults increased their binge drinking frequency over six years if their partner binge drank more frequently at baseline. In addition, individuals increased their binge

drinking frequency if their partners experienced more negative alcohol-related consequences at baseline; however, this association was no longer significant after controlling for additional variables. None of the associations measured differed by relationship type.

In Paper 3, I used data from the University Life Study to examine how sexual behavior with committed romantic and casual sexual partners, and with and without heavy alcohol use, is associated with daily fluctuations in college students' affect. Sexual behavior was associated with increases in positive affect and decreases in negative affect. These improvements in affect did not differ according to heavy alcohol use, sexual partner type, or interactions of these variables with each other or with semester in college.

Overall, the results of this dissertation highlight the importance of friends in determining adolescents' heavy alcohol use and the importance of romantic/sexual partners in determining young adults' heavy alcohol use. The mechanisms of social influence on heavy alcohol use differ between friendships and romantic relationships and across developmental stages. Findings suggest that prevention strategies may differ when addressing friends' versus romantic partners' potential influences on heavy alcohol use.

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Chapter 1

Introduction

Understanding social influences on heavy alcohol use in adolescence and young adulthood is important for preventing the negative consequences of heavy alcohol use. Past research on the topic of close relationships and alcohol use in adolescence and young adulthood has examined friendships and romantic and sexual relationships as contexts for alcohol use (e.g., Burk, van der Vorst, Kerr, & Stattin, 2012; Fischer & Wiersma, 2012; Kreager, Haynie, & Hopfer, 2013). However, the mechanisms of social influence on alcohol use across diverse relationships remain poorly understood. Understanding how a wide range of social relationships predict heavy alcohol use and its consequences will advance explanations of the social transmission of alcohol use. In addition, understanding how friends, committed romantic partners, and casual sexual partners may influence heavy alcohol use offers implications for prevention efforts that aim to reduce heavy alcohol use.

Together, the three papers of this dissertation demonstrate how a wide range of social relationships are associated with heavy alcohol use and short-term alcohol-related outcomes in adolescence and young adulthood. In Paper 1, I examine the unique associations of close others' frequency of drunkenness, unstructured socializing, and alcohol-related attitudes with adolescents' (ages 13-18) own frequency of drunkenness. I distinguish between the contributions of romantic partners, friends, and romantic partners' friends in order to determine whether these potential sources of influence have unique associations with drunkenness. In Paper 2, I measure how romantic partners' binge drinking and negative alcohol-related consequences are associated with changes in young adults' (ages 18-32) own binge drinking. I also explore whether relationship type (dating, cohabiting, or married) moderates these associations. In Paper 3, I examine how sexual behavior with committed romantic and casual sexual partners, and with and without heavy alcohol use, is associated with daily fluctuations in college students' affect.

Alcohol Use in Adolescence and Young Adulthood

The operationalization of alcohol use varies across studies. Alcohol use may refer to any alcohol consumption or the frequency or quantity of alcohol consumption within a given period. Intervals of assessment of alcohol use may range from lifetime to a single day, or even shorter. Although some research has focused on any alcohol use as an outcome in adolescence, other research focuses on heavy alcohol use. *Heavy alcohol use* may refer to more than four (for women) or five (for men) drinks in a day, or more than seven (for women) or 14 (for men) drinks per week (National Institute on Alcohol Abuse and Alcoholism, n.d.).

Within the category of heavy alcohol use, researchers have identified binge drinking and drunkenness as two related indicators of heavy alcohol use. Definitions of *binge drinking* (also referred to as *heavy episodic drinking*) vary. Often, binge drinking refers to having more than five drinks "in a row" (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016), "on a single occasion" (e.g., Guilamo-Ramos, Jaccard, Johansson, & Turrisi, 2004), or over the course of two hours (Centers for Disease Control [CDC], 2015; National Institute on Alcohol Abuse and Alcoholism, n.d.). Additional measures of binge drinking have separate criteria of four drinks for women or five drinks for men (Wechsler, Dowdall, Davenport, & Rimm, 1995; Wechsler & Nelson, 2001).

Drunkenness is a state of reduced capacity for rational action resulting from alcohol ingestion (Kerr, Greenfield, & Midanik, 2006; Midanik, 2003). Drunkenness can be assessed with both objective and subjective measurement instruments. Objective measurements of drunkenness focus on blood alcohol content (BAC); U.S. laws for driving under the influence of alcohol define legal intoxication as having a BAC higher than 0.8% - 1.0% (80 mg/dl – 100 mg/dl; Babor, 2010). Researchers may directly measure blood alcohol content or estimate it from number of drinks consumed, time spent drinking, and participants' weight, age, and gender (eBAC; Hustad & Carey, 2005). Subjective measurements of drunkenness typically ask people to report whether they felt drunk or high due to alcohol consumption

(Midanik, 2003). Objective and subjective measurements of drunkenness are correlated with each other

(Kerr et al., 2006), but self-reported drunkenness may better predict social consequences, alcohol

dependence symptoms, and alcohol-related harm than objective measurements (Midanik, 1999).

Heavy alcohol use, including binge drinking and drunkenness, increases across adolescence. In

9th grade, 10% of adolescents report having engaged in binge drinking (CDC, 2015). By 12th grade, this

rate increases to 25% (CDC, 2015). Rates of lifetime drunkenness increase from 11% in 8th grade to 47%

by 12th grade (Johnston et al., 2016). Young adulthood brings additional increases in heavy alcohol use,

particularly for college students, as they experience increased freedom and opportunities to socialize

with peers (Arnett, 2005; Brown et al., 2008; Schulenberg & Maggs, 2002).

The increasing prevalence of heavy alcohol use across adolescence and young adulthood creates

risks for health and development, but is also associated with perceived benefits by drinkers. Frequent

heavy alcohol use in adolescence is associated with abnormalities in brain structure and function

(Squeglia, Jacobus, & Tapert, 2009). Adolescents and young adults who drink heavily are at increased

risk of substance use disorders (Substance Abuse and Mental Health Services Administration [SAMHSA],

2014). Even when heavy alcohol use does not lead to addiction, it is associated with increased risk of

injury, illness, impaired driving, physical altercations, and sexual assault (CDC, 2015; Neal & Fromme,

2007). Despite these risks, many adolescents and young adults perceive benefits of alcohol use, such as

enhancing social status and coping with stressful events (Maisto, Carey, Carey, & Gordon, 2002; Patrick

& Maggs, 2011; White, Fleming, Catalano, & Bailey, 2009). These positive subjective aspects of alcohol

use may partially explain the increasing prevalence of heavy alcohol use over the course of adolescence

and young adulthood (Sher, Wood, Wood, & Raskin, 1996). Because the health risks associated with

heavy alcohol use are greater than those associated with light or moderate alcohol use (CDC, 2015; Neal

& Fromme, 2007; SAMHSA, 2014), I focus on different types of heavy alcohol use in this dissertation.

However, because research contains multiple strategies of measuring alcohol use (Borsari & Carey,

2003), I note when past research findings apply to heavy alcohol use and when they apply to alcohol use more broadly throughout this dissertation.

Social Influences on Alcohol Use

Social relationships may influence heavy alcohol use in adolescence and young adulthood. Much research on close relationships and alcohol use in adolescence and young adulthood focuses on peers, defined as individuals who are similar in social circumstances due to belonging to common age, grade, or school groups. A peer may be, for example, "other people my age" or "a typical student at my school" (Borsari & Carey, 2003). Within peer relationships, individuals may have friendships and romantic relationships. Friendships involve a greater degree of emotional closeness and interaction than other peer relationships (Adams, Blieszner, & De Vries, 2000). Romantic relationships share these qualities with friendships, but are marked by a distinctive emotional intensity and current or anticipated sexual behavior (Collins, Welsh, & Furman, 2009). Research on social influences on alcohol use in adolescence and young adulthood has measured peers, friends, and romantic partners as sources of social influence. Throughout this introduction, I specify when research findings apply to peers, friends, or romantic partners.

Multiple mechanisms may be responsible for social influences on alcohol use. Multiple theories of deviant behaviors propose that close others' characteristics, including their alcohol-related behaviors and attitudes, influence individuals' own alcohol use. Differential association theory (Sutherland, 1947) proposes that individuals learn deviance by acquiring the attitudes of peers who have favorable attitudes toward deviant behaviors. These attitudes include approval/tolerance of deviant behaviors and expectations about reward and punishment for engaging in delinquent behaviors (Ragan, 2014; Tittle, Burk, & Jackson, 1986). Social learning theory expands on differential association's emphasis on attitudes, proposing that close others' behaviors also predict individuals' own behaviors (Akers, Krohn, Lanza-Kaduce, & Radosevich, 1979; Warr & Stafford, 1991). By observing others' alcohol use, individuals

learn norms (social expectations that guide behavior) for alcohol use.

In addition to modeling norms for behavior, other social learning processes may explain the role of close others in determining alcohol use. Social learning theory proposes that individuals adopt close others' behavior via unconscious mimicry in addition to consciously learning norms (Akers et al., 1979; Bandura, 1977). In addition, close others can indirectly influence heavy alcohol use by influencing the short-term outcomes of heavy alcohol use (Jones, Corbin, & Fromme, 2001; Park, 2004). According to a feed-forward model of alcohol use (Lee, Maggs, Neighbors, & Patrick, 2011), both direct and vicarious experiences with alcohol (i.e., individuals' own experiences and their observations of others' experiences, respectively) shape alcohol-related norms and alcohol-related expectancies (Goldman, 1994; Oei & Baldwin, 1994). In turn, these norms and expectancies influence future patterns of alcohol use. Thus, observing close others' alcohol use and alcohol-related consequences determines individuals' beliefs about alcohol use, shaping future alcohol use. For example, observing close others' heavy alcohol use and alcohol-related consequences may influence individuals' beliefs about the effects of alcohol, leading to changes in heavy alcohol use. In addition, sexual partners may influence the short-term outcomes of sexual behavior after heavy alcohol use, with implications for future decisions about heavy alcohol use and sex.

Although the papers in this dissertation focus on heavy alcohol use, much research on social influences and alcohol use has measured any alcohol use, including the presence and frequency of any alcohol use (Iannotti & Bush, 1992; Kirke, 2004; Maxwell, 2002; Osgood et al., 2013). These findings support social learning of alcohol use; adolescents whose friends and romantic partners use alcohol are more likely to increase their own alcohol use than adolescents whose friends do not use alcohol (Kirke, 2004; Maxwell, 2002; Osgood et al., 2013). In addition, friends' alcohol-related attitudes predict changes in individuals' own alcohol use (LaBrie, Hummer, Neighbors, & Larimer, 2010; Larimer, Turner, Mallett, & Geisner, 2004; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007).

In contrast to differential association and social learning theories, which emphasize the values that close others transmit, social ecological theories emphasize that close relationships influence the structure of daily lives (Hawley, 1950; Haynie & Osgood, 2005). Adolescent social circles that are characterized by frequent unstructured socializing (spending time together without purpose or supervision) create opportunities to engage in a range of risk behaviors, including alcohol use (Gold, 1970). Social ecological theories of alcohol use and other deviant behaviors draw from both social control and routine activities theories (Barnes, Hoffman, Welte, Farrell, & Dintcheff, 2007; Osgood, Wilson, O'Malley, Bachman, & Johnston, 1996). Both theories emphasize that individuals engage in deviant behaviors during unstructured leisure time because there are increased opportunities for engaging in these behaviors when one's time is otherwise unoccupied (Gold, 1970; Hirschi, 1969). In addition, routine activities theory highlights that individuals are motivated to engage in deviant behaviors when the rewards of engaging in the behavior outweigh the risks of punishment and when others are also willing to engage in the behavior (Gold, 1970; Hawdon, 1999).

Three characteristics of unstructured socializing in adolescence increase opportunities and motivation for engaging in deviant behaviors: the presence of peers, the absence of authority figures, and the lack of structured activities (Osgood et al., 1996). The presence of peers makes engaging in deviant behaviors easier and more rewarding. The absence of authority figures reduces the potential for punishment for engaging in these behaviors. The lack of structured activities means that individuals have time to engage in these behaviors. Research findings support social ecological explanations of alcohol use—unstructured socializing with friends predicts alcohol use in adolescence (Haynie & Osgood, 2005; Osgood & Anderson, 2004; Sun & Longazel, 2008).

The Importance of Examining a Range of Social Relationships

Although associations of friends' alcohol use, alcohol-related attitudes, and unstructured socializing with adolescents' own heavy alcohol use are well-documented, less is known about how

other types of relationships may be associated with heavy alcohol use and its outcomes. In particular, there is limited understanding of how various sexual relationships may influence heavy alcohol use and the outcomes associated with it. Sexual relationships in adolescence and young adulthood are diverse. Although committed romantic relationships are the most common context for sexual behavior (Fielder, Carey, & Carey, 2013; Siebenbruner, 2013), many individuals report engaging in sexual behavior with casual partners (Claxton & van Dulmen, 2013; Wentland & Reissing, 2007). Even among romantic relationships there is diversity, including dating, cohabiting, and marital relationships (Furman & Collibee, 2014; Meier & Allen, 2009; Shulman & Connolly, 2013). Accounting for this diversity in research on the links between relationships and heavy alcohol use is necessary for a nuanced understanding of how relationships and heavy alcohol use develop together over time.

It is important to understand how multiple social relationships are associated with heavy alcohol use and its outcomes from both theoretical and prevention perspectives. From a theoretical perspective, examining multiple types of relationships will determine whether the theoretical mechanisms for behavioral influence are similar across a range of relationships. In turn, this theoretical knowledge can inform prevention efforts. The findings of past research on peers and adolescent alcohol use have informed interventions that aim to decrease heavy alcohol use. Such interventions reduce friendship ties with heavy-drinking peers (Valente, Gallaher, & Mouttapa, 2004; Valente et al., 2007), alter the behavior/attitudes of influential adolescents (Valente et al., 2004), reduce opportunities for unstructured socializing (Smith, 2007; Tebes et al., 2007), and change beliefs about peers' drinking behavior and attitudes (Lewis, Neighbors, Oster-Aaland, Kirkeby, & Larimer, 2007; Neighbors et al., 2010; Walters & Neighbors, 2005).

The outcomes of the present research may inform the content and target populations of interventions. Regarding intervention content, the mechanisms of social influence determine appropriate intervention strategies. For example, if social influence processes operate in a similar way

within romantic relationships as they do in friendships, the same interventions that are used to address friends' influence may be extended to address romantic partners' influence. An intervention that alters the alcohol-related behavior and attitudes of influential adolescents might consider recruiting adolescents who are in romantic relationships. Thus, the effects of these programs would extend to romantic partners and partners' friends, as well as friends. It is also possible that mechanisms for the social transmission of heavy alcohol use differ across relationship types. For example, friends' heavy alcohol use, alcohol-related attitudes, and unstructured socializing all predict individuals' own heavy alcohol use. However, it is possible that in romantic relationships only partners' heavy alcohol use predicts individuals' own heavy alcohol use. These disparate findings would suggest a need for different intervention strategies to reduce the influence of different relationships on heavy alcohol use in adolescence. In this example, intervening on close others' attitudes or unstructured socializing could effectively reduce friends' influence, but not romantic partners' influence.

Developmental Changes in Alcohol Use, Social Relationships, and Social Influences on Alcohol Use

Alcohol use, social influences on alcohol use, and the nature of social relationships change rapidly during adolescence and young adulthood, creating challenges and opportunities for researchers. Regarding alcohol use, the prevalence of alcohol use, including various measures of heavy alcohol use, increases during adolescence and into young adulthood (CDC, 2015; Johnston et al., 2016; O'Malley & Johnston, 2002). On average, rates of heavy alcohol use peak during between 20-24 years old, then decline (Jackson, Sher, Gotham, & Wood, 2001; Muthén & Muthén, 2000), although there is interpersonal variation in these developmental trajectories (Maggs & Schulenberg, 2004). There is some evidence that attitudes toward alcohol use also change from middle school to high school, with older adolescents perceiving more peer approval of alcohol use (Keefe, 1994).

Social relationships also change substantially during adolescence and young adulthood with implications for understanding social influences on alcohol use. In adolescence, friends become

increasingly important, as individuals spend increasing amounts of time with their friends and are more susceptible to friends' influence on alcohol use and other behaviors (Brechwald & Prinstein, 2011; Steinberg & Monahan, 2007). In addition, romantic partners become increasingly important during adolescence and young adulthood. By age 18, the majority of adolescents have had a romantic relationship (Regan, Durvasula, Howell, Ureño, & Rea, 2004). By age 26 (for women) or 28 (for men), half of individuals have married (Copen, Daniels, Vespa, & Mosher, 2012). As individuals age, romantic partners become an increasing source of emotional support (Seiffge-Krenke, 2003).

The changing nature of social relationships and alcohol use during adolescence and young adulthood makes it important to study these topics during these developmental stages. In order to effectively understand how social relationships are associated with alcohol use and its outcomes, researchers can incorporate developmental knowledge in two key ways. First, researchers can conduct separate studies analyzing social relationships at different developmental periods (e.g., adolescence and young adulthood). Second, researchers can use longitudinal studies to assess how associations between social relationships and alcohol use differ by participants' age. For example, romantic partners may become more influential on alcohol use with age because romantic relationships become more committed. In contrast, because alcohol use becomes both more common and more accepted across adolescence (CDC, 2015; Johnston et al., 2016; Keefe, 1994; O'Malley & Johnston, 2002), close others' attitudes may be less important predictors of alcohol use later in adolescence.

Dissertation Papers

The three papers of this dissertation advance understanding of how relationships shape heavy alcohol use in adolescence and young adulthood. By examining heavy alcohol use and its outcomes across multiple relationship types, I aim to broaden understanding of social influences on heavy alcohol use to encompass a range of social relationships. The papers utilize longitudinal analyses, which address change over time and account for between-person differences that may act as confounding factors. In

addition, Papers 1 and 2 include reports from multiple sources, including participants, their romantic partners, and/or their friends, which enables more accurate descriptions of close others' behavior and attitudes than relying on participants' perceptions of close others.

In Paper 1, I examine the unique associations of close others' frequency of drunkenness, alcohol-related attitudes, and unstructured socializing with adolescents' own frequency of drunkenness. I distinguish between the contributions of romantic partners, friends, and partners' friends. I utilize data from the PROSPER study (Spoth, Greenberg, Bierman, & Redmond, 2004; Spoth et al., 2007), which includes annual social network measures of friendship and romantic relationship ties between 8th-12th grade. This paper advances understanding of social relationships and alcohol use by determining (a) whether multiple relationships contribute to frequency of drunkenness, and (b) whether similar social influence processes operate in different types of relationships. The results improve theoretical understanding of social influences on heavy alcohol use and inform prevention efforts.

In Paper 2, I examine the associations of romantic partners' negative alcohol-related consequences with changes in young adults' own binge drinking. In this paper, I utilize data from Add Health (Harris, 2009), a national longitudinal study of health and health risks in adolescence and young adulthood. I use reports from young adults and their romantic partners to determine whether individuals' and their partners' binge drinking and negative alcohol-related consequences uniquely predict changes in binge drinking. In addition, I determine whether relationship type (dating, cohabiting, or married) moderates these associations. This research advances social learning explanations of heavy alcohol use in young adulthood by testing multiple social learning processes and incorporating diverse types of romantic relationships. In addition, this research has implications for the content of interventions that aim to reduce young adults' heavy alcohol use.

In Paper 3, I examine the associations of sexual behavior, heavy alcohol use, and partner type (committed romantic partner versus casual partner) with changes in daily affect. The paper extends past

research by including the independent and interactive associations of sexual behavior, heavy alcohol use, and partner type with affective outcomes of sexual behavior. In this paper, I utilize data from the University Life Study (Patrick, Maggs, & Lefkowitz, 2015), a longitudinal measurement burst study of college students in which participants report on their affect, sexual behavior, and heavy alcohol use on up to 98 days across seven semesters of college. This paper informs understanding of how outcomes of sexual behavior after alcohol use may reinforce this behavior. In addition, the paper contributes to understanding how diverse sexual partners may influence links between alcohol and sexual behavior. The results of this paper have implications for understanding how alcohol use, partner type, and sexual behavior develop together in young adulthood, which can inform prevention efforts.

References

Adams, R. G., Blieszner, R., & De Vries, B. (2000). Definitions of friendship in the third age: Age, gender, and study location effects. *Journal of Aging Studies, 14*, 117-133.

Akers, R. L., Krohn, M. D., Lanza-Kaduce, L., & Radosevich, M. (1979). Social learning and deviant behavior: A specific test of a general theory. *American Sociological Review, 44*, 636-655.

Arnett, J. J. (2005). The developmental context of substance use in emerging adulthood. *Journal of Drug Issues, 35,* 235-254.

Babor, T. (2010). *Alcohol: No ordinary commodity: Research and public policy*. Oxford, England: Oxford University Press.

Baer, J. S. (1994). Effects of college residence on perceived norms for alcohol consumption: An examination of the first year in college. *Psychology of Addictive Behaviors, 8*, 43-50.

Bandura, A. (1977). *Social learning theories*. Englewood Cliffs, NJ: Practice Hall.

Barnes, G. M., Hoffman, J. H., Welte, J. W., Farrell, M. P., & Dintcheff, B. A. (2007). Adolescents' time use: Effects on substance use, delinquency and sexual activity. *Journal of Youth and Adolescence, 36*, 697-710.

Borsari, B., & Carey, K. B. (2003). Descriptive and injunctive norms in college drinking: A meta-analytic integration. *Journal of Studies on Alcohol, 64*, 331-341.

Brechwald, W. A., & Prinstein, M. J. (2011). Beyond homophily: A decade of advances in understanding peer influence processes. *Journal of Research on Adolescence, 21*, 166-179.

Brown, S. A., McGue, M., Maggs, J., Schulenberg, J., Hingson, R., Swartzwelder, S., ... & Winters, K. C. (2008). A developmental perspective on alcohol and youths 16 to 20 years of age. *Pediatrics, 121*, S290-S310.

Burk, W. J., van der Vorst, H., Kerr, M., & Stattin, H. (2012). Alcohol use and friendship dynamics: Selection and socialization in early-, middle-, and late-adolescent peer networks. *Journal of

Studies on Alcohol and Drugs, 73, 89-98.

Centers for Disease Control. (2015). Youth risk behavior surveillance - United States, 2015. *Surveillance Summaries, 65*, 1-174.

Claxton, S. E., & van Dulmen, M. H. (2013). Casual sexual relationships and experiences in emerging adulthood. *Emerging Adulthood, 1*, 138-150.

Collins, W. A., Welsh, D. P., & Furman, W. (2009). Adolescent romantic relationships. *Annual Review of Psychology, 60*, 631-652.

Copen, C. E., Daniels, K., Vespa, J., & Mosher, W. D. (2012). First marriages in the United States: Data from the 2006–2010 National Survey of Family Growth. *National Health Statistics Reports, 49*, 1-22.

Fielder, R. L., Carey, K. B., & Carey, M. P. (2013). Are hookups replacing romantic relationships? A longitudinal study of first-year female college students. *Journal of Adolescent Health, 52*, 657-659.

Fischer, J. L., & Wiersma, J. D. (2012). Romantic relationships and alcohol use. *Current Drug Abuse Reviews, 5*, 98-116.

Furman, W., & Collibee, C. (2014). A matter of timing: Developmental theories of romantic involvement and psychosocial adjustment. *Development and Psychopathology, 26*, 1149-1160.

Gold, M. (1970). *Delinquent behavior in an American city*. Belmont, CA: Brooks/Cole Publishing Company.

Goldman, M. S. (1994). The alcohol expectancy concept: Applications to assessment, prevention, and treatment of alcohol abuse. *Applied and Preventive Psychology, 3*, 131–144.

Guilamo-Ramos, V., Jaccard, J., Johansson, M., & Turrisi, R. (2004). Binge drinking among Latino youth: Role of acculturation-related variables. *Psychology of Addictive Behaviors, 18*, 135-142.

Harris, K. M. (2009). *The National Longitudinal Study of Adolescent to Adult Health (Add Health), Waves I*

& II, 1994–1996; Wave III, 2001–2002; Wave IV, 2007-2009 [machine-readable data file and

documentation]. Chapel Hill, NC: Carolina Population Center, University of North Carolina at

Chapel Hill.

Hawdon, J. E. (1999). Daily routines and crime using routine activities as measures of Hirschi's

involvement. *Youth & Society, 30*, 395-415.

Hawley, A. (1950). *Human ecology: A theory of community structure*. New York, NY: Ronald.

Haynie, D. L., & Osgood, D. W. (2005). Reconsidering peers and delinquency: How do peers matter?

Social Forces, 84, 1109-1130.

Hirschi, T. (1969). *The causes of delinquency*. Berkeley, CA: The University of California Press.

Hustad, J. T., & Carey, K. B. (2005). Using calculations to estimate blood alcohol concentrations for

naturally occurring drinking episodes: A validity study. *Journal of Studies on Alcohol, 66*, 130-

138.

Iannotti, R. J., & Bush, P. J. (1992). Perceived vs. actual friends' use of alcohol, cigarettes, marijuana, and

cocaine: Which has the most influence? *Journal of Youth and Adolescence, 21*, 375-389.

Jackson, K. M., Sher, K. J., Gotham, H. J., & Wood, P. K. (2001). Transitioning into and out of large-effect

drinking in young adulthood. *Journal of Abnormal Psychology, 110*, 378-391.

Johnston, L., O'Malley, P. M., Miech, R. A., Bachman, J. G., & Schulenberg, J. E. (2016). *Monitoring the*

future: National results on adolescent drug use: Overview of key findings, 2015. Bethesda, MD:

National Institute on Drug Abuse.

Jones, B. T., Corbin, W., & Fromme, K. (2001). A review of expectancy theory and alcohol consumption.

Addiction, 96, 57-72.

Keefe, K. (1994). Perceptions of normative social pressure and attitudes toward alcohol use: Changes

during adolescence. *Journal of Studies on Alcohol, 55*, 46-54.

Kerr, W. C., Greenfield, T. K., & Midanik, L. T. (2006). How many drinks does it take you to feel drunk?

Trends and predictors for subjective drunkenness. *Addiction, 101*, 1428-1437.

Kirke, D. M. (2004). Chain reactions in adolescents' cigarette, alcohol and drug use: Similarity through

peer influence or the patterning of ties in peer networks? *Social Networks, 26*, 3-28.

Kreager, D. A., & Haynie, D. L. (2011). Dangerous liaisons? Dating and drinking diffusion in adolescent

peer networks. *American Sociological Review, 76*, 737-763.

Kreager, D. A., Haynie, D. L., & Hopfer, S. (2013). Dating and substance use in adolescent peer networks:

A replication and extension. *Addiction, 108*, 638-647.

LaBrie, J. W., Hummer, J. F., Neighbors, C., & Larimer, M. E. (2010). Whose opinion matters? The

relationship between injunctive norms and alcohol consequences in college students. *Addictive

Behaviors, 35*, 343-349.

Larimer, M. E., Turner, A. P., Mallett, K. A., & Geisner, I. M. (2004). Predicting drinking behavior and

alcohol-related problems among fraternity and sorority members: Examining the role of

descriptive and injunctive norms. *Psychology of Addictive Behaviors, 18*, 203-212.

Lee, C. M., Maggs, J. L., Neighbors, C., & Patrick, M. E. (2011). Positive and negative alcohol-related

consequences: Associations with past drinking. *Journal of Adolescence, 34*, 87-94.

Lewis, M. A., Neighbors, C., Geisner, I. M., Lee, C. M., Kilmer, R. A., Atkins, D. C. (2010) Examining the

relationship between severity of injunctive drinking norms and alcohol related negative

consequences: The roles of alcohol consumption and identity. *Psychology of Addictive

Behaviors, 24*, 177–189.

Lewis, M. A., Neighbors, C., Oster-Aaland, L., Kirkeby, B. S., & Larimer, M. E. (2007). Indicated prevention

for incoming freshmen: Personalized normative feedback and high-risk drinking. *Addictive

Behaviors, 32*, 2495-2508.

Maggs, J. L., & Schulenberg, J. E. (2004). Trajectories of alcohol use during the transition to adulthood.

Alcohol Research and Health, 28, 195-201.

Maisto, S. A., Carey, M. P., Carey, K. B., & Gordon, C. M. (2002). The effects of alcohol and expectancies on risk perception and behavioral skills relevant to safer sex among heterosexual young adult women. *Journal of Studies on Alcohol, 63*, 476-485.

Maxwell, K. A. (2002). Friends: The role of peer influence across adolescent risk behaviors. *Journal of Youth and Adolescence, 31*, 267-277.

Meier, A., & Allen, G. (2009). Romantic relationships from adolescence to young adulthood: Evidence from the National Longitudinal Study of Adolescent Health. *The Sociological Quarterly, 50*, 308-335.

Midanik, L. T. (1999). Drunkenness, feeling the effects and 5+ measures. *Addiction, 94*, 887-897.

Midanik, L. T. (2003). Definitions of drunkenness. *Substance Use & Misuse, 38*, 1285-1303.

Muthén, B. O., & Muthén, L. K. (2000). The development of heavy drinking and alcohol-related problems from ages 18 to 37 in a U.S. national sample. *Journal of Studies on Alcohol, 61*, 290-300.

National Institute on Alcohol Abuse and Alcoholism. (n.d.) *Recommended alcohol questions*. Retrieved from https://www.niaaa.nih.gov/research/guidelines-and-resources/recommended-alcohol-questions

Neal, D. J., & Fromme, K. (2007). Event-level covariation of alcohol intoxication and behavioral risks during the first year of college. *Journal of Consulting and Clinical Psychology, 75*, 294-306.

Neighbors, C., Lee, C. M., Lewis, M. A., Fossos, N., & Larimer, M. E. (2007). Are social norms the best predictor of outcomes among heavy-drinking college students? *Journal of Studies on Alcohol and Drugs, 68*, 556-565.

Neighbors, C., Lewis, M. A., Atkins, D. C., Jensen, M. M., Walter, T., Fossos, N., ... & Larimer, M. E. (2010). Efficacy of web-based personalized normative feedback: A two-year randomized controlled trial. *Journal of Consulting and Clinical Psychology, 78*, 898-911.

Neighbors, C., O'Connor, R. M., Lewis, M. A., Chawla, N., Lee, C. M., & Fossos, N. (2008). The relative

impact of injunctive norms on college student drinking: The role of reference group. *Psychology of Addictive Behaviors, 22*, 576-581.

Oei, T. P. S., & Baldwin, A. R. (1994). Expectancy theory: A two-process model of alcohol use and abuse. *Journal of Studies on Alcohol, 55*, 525–534.

O'Malley, P. M., & Johnston, L. D. (2002). Epidemiology of alcohol and other drug use among American college students. *Journal of Studies on Alcohol, 14*, S23-S39.

Osgood, D. W., & Anderson, A. L. (2004). Unstructured socializing and rates of delinquency. *Criminology, 42*, 519-550.

Osgood, D. W., Ragan, D. T., Wallace, L., Gest, S. D., Feinberg, M. E., & Moody, J. (2013). Peers and the emergence of alcohol use: Influence and selection processes in adolescent friendship networks. *Journal of Research on Adolescence, 23*, 500-512.

Osgood, D. W., Wilson, J. K., O'Malley, P. M., Bachman, J. G., & Johnston, L. D. (1996). Routine activities and individual deviant behavior. *American Sociological Review, 61,* 635-655.

Park, C. L. (2004). Positive and negative consequences of alcohol consumption in college students. *Addictive Behaviors, 29*, 311-321.

Patrick, M. E., & Maggs, J. L. (2011). College students' evaluations of alcohol consequences as positive and negative. *Addictive Behaviors, 36*, 1148-1153.

Patrick, M. E., Maggs, J. L., & Lefkowitz, E. S. (2015). Daily associations between drinking and sex among college students: A longitudinal measurement burst design. *Journal of Research on Adolescence, 25*, 377–386.

Ragan, D. T. (2014). Revisiting "what they think": Adolescent drinking and the importance of peer beliefs. *Criminology, 52*, 488-513.

Regan, P. C., Durvasula, R., Howell, L., Ureño, O., & Rea, M. (2004). Gender, ethnicity, and the developmental timing of first sexual and romantic experiences. *Social Behavior and Personality:*

An International Journal, 32, 667-676.

Schulenberg, J. E., & Maggs, J. L. (2002). A developmental perspective on alcohol use and heavy drinking

during adolescence and the transition to young adulthood. *Journal of Studies on Alcohol, 14*,

S54-S70.

Seiffge-Krenke, I. (2003). Testing theories of romantic development from adolescence to young

adulthood: Evidence of a developmental sequence. *International Journal of Behavioral*

Development, *27*, 519-531.

Sher, K. J., Wood, M. D., Wood, P. K., & Raskin, G. (1996). Alcohol outcome expectancies and alcohol

use: A latent variable cross-lagged panel study. *Journal of Abnormal Psychology, 105*, 561-574.

Shulman, S., & Connolly, J. (2013). The challenge of romantic relationships in emerging adulthood:

Reconceptualization of the field. *Emerging Adulthood, 1*, 27-39.

Siebenbruner, J. (2013). Are college students replacing dating and romantic relationships with hooking

up? *Journal of College Student Development, 54*, 433-438.

Smith, E. P. (2007). The role of afterschool settings in positive youth development. *The Journal of*

Adolescent Health, 41, 219-220.

Spoth, R., Greenberg, M., Bierman, K., & Redmond, C. (2004). PROSPER community–university

partnership model for public education systems: Capacity-building for evidence-based,

competence-building prevention. *Prevention Science, 5*, 31-39.

Spoth, R., Redmond, C., Shin, C., Greenberg, M., Clair, S., & Feinberg, M. (2007). Substance-use

outcomes at 18 months past baseline: The PROSPER community–university partnership trial.

American Journal of Preventive Medicine, 32, 395-402.

Squeglia, L. M., Jacobus, J., & Tapert, S. F. (2009). The influence of substance use on adolescent brain

development. *Clinical EEG and Neuroscience, 40*, 31-38.

Steinberg, L., & Monahan, K. C. (2007). Age differences in resistance to peer influence. *Developmental*

Psychology, 43, 1531-1543.

Substance Abuse and Mental Health Services Administration. (2014). *Results from the 2013 National Survey on Drug Use and Health: Summary of national findings (NSDUH Series H-48, HHS Publication No. (SMA) 14-4863)*. Rockville, MD: DIANE Publishing.

Sun, I. Y., & Longazel, J. G. (2008). College students' alcohol-related problems: A test of competing theories. *Journal of Criminal Justice, 36*, 554-562.

Sutherland, E. H. (1947). *Principles of criminology*, 4th ed. Philadelphia, PA: Lippincott.

Tebes, J. K., Feinn, R., Vanderploeg, J. J., Chinman, M. J., Shepard, J., Brabham, T., ... & Connell, C. (2007). Impact of a positive youth development program in urban after-school settings on the prevention of adolescent substance use. *Journal of Adolescent Health, 41*, 239-247.

Tittle, C. R., Burke, M. J., & Jackson, E. F. (1986). Modeling Sutherland's theory of differential association: Toward an empirical clarification. *Social Forces, 65*, 405-432.

Valente, T. W., Gallaher, P., & Mouttapa, M. (2004). Using social networks to understand and prevent substance use: A transdisciplinary perspective. *Substance Use & Misuse, 39*, 1685-1712.

Valente, T. W., Ritt-Olson, A., Stacy, A., Unger, J. B., Okamoto, J., & Sussman, S. (2007). Peer acceleration: Effects of a social network tailored substance abuse prevention program among high-risk adolescents. *Addiction, 102*, 1804-1815.

Walters, S. T., & Neighbors, C. (2005). Feedback interventions for college alcohol misuse: What, why and for whom? *Addictive Behaviors, 30*, 1168-1182.

Warr, M., & Stafford, M. (1991). The influence of delinquent peers: What they think or what they do? *Criminology, 29*, 851-866.

Wechsler, H., Dowdall, G. W., Davenport, A., & Rimm, E. B. (1995). A gender-specific measure of binge drinking among college students. *American Journal of Public Health, 85*, 982-985.

Wechsler, H., & Nelson, T. F. (2001). Binge drinking and the American college students: What's five

drinks? *Psychology of Addictive Behaviors, 15*, 287-291.

Wentland, J. J., & Reissing, E. D. (2011). Taking casual sex not too casually: Exploring definitions of casual

sexual relationships. *Canadian Journal of Human Sexuality, 20,* 75-91.

White, H. R., Fleming, C. B., Catalano, R. F., & Bailey, J. A. (2009). Prospective associations among alcohol

use-related sexual enhancement expectancies, sex after alcohol use, and casual sex. *Psychology

of Addictive Behaviors, 23*, 702-707.

Chapter 2

Paper 1

Sources of social influence on adolescents' alcohol use

This paper is a multiple-authored work. Rose Wesche is the first author, who drafted the manuscript.

Drs. Eva Lefkowitz and Derek Kreager are co-authors. They helped revise the final manuscript. We will

submit this paper to *Journal of Research on Adolescence.*

Abstract

The present research examines diverse social influences on frequency of drunkenness in a longitudinal sample of 1,889 adolescents with reports from friends, romantic partners, and romantic partners' friends. We build on past research by addressing multiple mechanisms of social influence—others' frequency of drunkenness, alcohol-related attitudes, and unstructured socializing—across relationship types. When examined separately, others' frequency of drunkenness, alcohol-related attitudes, and unstructured socializing each predicted adolescents' frequency of drunkenness. However, in a combined model including all social relationships and mechanisms of influence, friends' frequency of drunkenness predicted adolescents' increased frequency of drunkenness. Furthermore, unstructured socializing predicted increased frequency of drunkenness for older adolescents. Results advance understanding of the social transmission of alcohol use in adolescence and inform intervention efforts.

Sources of social influence on adolescents' alcohol use

Rates of lifetime drunkenness increase by a factor of four during the teenage years (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016), a concerning statistic given alcohol's potentially life-altering negative effects on health, safety, and development (Murgraff, Parrott, & Bennett, 1999; Neal & Fromme, 2007). Although there are legal consequences of any alcohol use in adolescence, frequent drunkenness is particularly problematic because it raises risks of physical injury, substance dependence, and detrimental neurodevelopmental outcomes (Centers for Disease Control [CDC], 2015; Neal & Fromme, 2007; Squeglia, Jacobus, & Tapert, 2009; Substance Abuse and Mental Health Services Administration [SAMHSA], 2014). Social relationships, such as friendships and romantic relationships, are a major factor in determining adolescents' alcohol use (Fischer & Wiersma, 2012; Kreager, Haynie, & Hopfer, 2013). The goal of this paper is to examine the associations of close others' drunkenness, close others' alcohol-related attitudes, and unstructured socializing with adolescents' self-reported frequency of drunkenness. We distinguish between the contributions of friends, romantic partners, and romantic partners' friends in order to determine whether multiple social relationships uniquely contribute to changes in frequency of drunkenness during adolescence. In addition, exploring multiple social processes (close others' frequency of drunkenness, others' alcohol-related attitudes, and unstructured socializing) allows us to determine whether the possible mechanisms of social influence on frequency of drunkenness apply to a range of social relationships.

Transmission of Alcohol Use in Friendship Groups

Throughout adolescence, friends and romantic partners influence risk behavior through multiple mechanisms. Differential association theory, social learning theory, and social ecological theories of social influence suggest different mechanisms for the social transmission of alcohol use in adolescence. Differential association theory (Sutherland, 1947) proposes that individuals learn deviance by acquiring the attitudes of peers who have favorable attitudes toward deviant behaviors. These attitudes include

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approval/tolerance of deviant behaviors and expectations about reward and punishment for engaging in

delinquent behaviors (Ragan, 2014; Tittle, Burk, & Jackson, 1986). Social learning theory expands on

differential association's emphasis on attitudes, proposing that close others' behaviors also predict

individuals' own behaviors (Akers, Krohn, Lanza-Kaduce, & Radosevich, 1979; Warr & Stafford, 1991).

Others model norms for alcohol use by drinking; individuals internalize these norms after observing

others' behavior and adapt their alcohol use to what they perceive is the norm. In addition, individuals

might mimic others' alcohol use without necessarily internalizing behavior norms.

Close others' alcohol use and alcohol-related attitudes likely serve as mechanisms for the social

transmission of alcohol use. Research in this area examines multiple dimensions of alcohol use, including

any alcohol use, frequency/quantity of alcohol use, heavy alcohol use, and binge drinking. In the present

research we focus on drunkenness, or alcohol-induced cognitive impairment (Kerr, Greenfield, &

Midanik, 2006; Midanik, 2003). However, we summarize past research findings with a range of measures

of alcohol use. In support of social learning theories, adolescents whose friends and romantic partners

use alcohol increase their own alcohol use over time, relative to adolescents whose friends and

romantic partners do not use alcohol (Kirke, 2004; Maxwell, 2002; Osgood et al., 2013). In addition,

friends' alcohol-related attitudes predict changes in individuals' own alcohol use (Ary, Tildesley, Hops, &

Andrews, 1993; Borsari & Carey, 2003; Kandel, 1985).

In contrast to differential association and social learning theories, which emphasize close others'

characteristics as predictors of behaviors, social ecological theories emphasize that the spatial and

temporal organization of daily life creates opportunities to engage in specific behaviors (Hawley, 1950;

Haynie & Osgood, 2005). Social ecological theories of alcohol use and other deviant behaviors draw

from both social control and routine activities theories to explain deviant behaviors (Barnes, Hoffman,

Welte, Farrell, & Dintcheff, 2007; Gold, 1970; Hawdon, 1999; Hirschi, 1969; Osgood, Wilson, O'Malley,

Bachman, & Johnston, 1996). According to social ecological theories of deviance, several characteristics

of unstructured socializing in adolescence increase opportunities for engaging in alcohol use and other deviant behaviors (Osgood et al., 1996): (1) The presence of peers makes engaging in these behaviors easier and more rewarding, (2) the absence of authority figures reduces the potential for punishment for engaging in these behaviors, and (3) the lack of structured activities means that individuals have time to engage in these behaviors. In support of social ecological explanations of alcohol use, unstructured socializing with friends predicts alcohol use in adolescence (Haynie & Osgood, 2005; Osgood & Anderson, 2004; Sun & Longazel, 2008).

Romantic Partners and Alcohol Use

The bulk of research and interventions related to social influences on adolescents' alcohol use has focused on friends as influential figures. However, despite their importance (Brechwald & Prinstein, 2011; Steinberg & Monahan, 2007), friends are not adolescents' only close and potentially influential relationships. Examining how multiple mechanisms of social influence are associated with changes in alcohol use across a range of social relationships will advance understanding of adolescent alcohol use in two key ways. First, the results of this research will extend theories of social influence on alcohol use, advancing understanding of how social influence processes may be similar and different across social relationships. Second, the results of this research can inform the content and target audience of alcohol use interventions by determining whether and how to intervene with a range of social relationships.

Romantic relationships are mutually acknowledged, ongoing interactions involving distinctive emotional intensity and current or anticipated sexual behavior (Collins, Welsh, & Furman, 2009) that serve as important sources of influence and support in adolescence. These relationships become increasingly common across adolescence—by age 18, the majority of adolescents have had a romantic relationship (Regan, Durvasula, Howell, Ureño, & Rea, 2004). Romantic relationships are similar to and different from friendships in key ways that may influence their association with alcohol use and the possible mechanisms for this association. Both friendships and romantic relationships are close

relationships that provide emotional support and affiliation (Collins et al., 2009; Stanton-Salazar, & Spina, 2005). However, romantic relationships are marked by a distinctive emotional intensity and physical intimacy (Collins et al., 2009), and become increasingly committed and emotionally intimate across adolescence (Connolly & McIsaac, 2011; Meier & Allen, 2009; Shulman & Connolly, 2013). Because of the intensity, intimacy, and commitment of romantic relationships, adolescents may be particularly motivated to decrease discrepancies between their own and their romantic partners' alcohol-related behavior and attitudes. Therefore, romantic partners' alcohol-related behavior and attitudes may predict changes in adolescents' own alcohol use.

Although friendships tend to be gender-segregated (McPherson, Smith-Lovin, & Cook, 2001), romantic relationships are often marked by gender heterophily. Thus, individuals may not prioritize aligning their behavior with their romantic partners' attitudes. Because individuals perceive different alcohol use norms for men than women (Lewis & Neighbors, 2004; Neighbors et al., 2008), they may not believe that the other gender's norms apply to them. Therefore, an alternate possibility is that romantic partners' alcohol-related behavior and attitudes do not predict changes in adolescents' own alcohol use. There is mixed evidence about whether individuals' alcohol use becomes more congruent with their romantic partners' alcohol use over time (Kreager et al., 2013; Kreager & Haynie, 2011). In addition to inconclusive findings on romantic partners' behavior, to our knowledge, no research has explored how adolescents' romantic partners' attitudes correspond to changes in individuals' alcohol use.

In addition to romantic partners' behavior and attitudes, unstructured socializing with romantic partners may also relate to adolescents' alcohol use. On the one hand, because unstructured socializing creates opportunities for risk behavior, unstructured socializing with romantic partners may be positively associated with adolescents' alcohol use. On the other hand, unstructured socializing with romantic partners may involve other behaviors, such as intimate and/or sexual behavior (Barnes et al., 2007; Cohen, Farley, Taylor, Martin, & Schuster, 2002), instead of alcohol use. Therefore, unstructured

socializing with romantic partners may not be associated with adolescents' own alcohol use.

Romantic Partners' Friends and Alcohol Use

Romantic partners often serve as bridges or liaisons that connect different groups of friends (Kreager & Haynie, 2011). Although adolescents' romantic relationships typically do not begin as friendships (Kreager, Molloy, Moody, & Feinberg, 2016), the friends of one's dating partners may become one's own friends and acquaintances. Upon exposure to these new peers, individuals may alter their own behavior to match their partners' friends, either to enhance status with new peers, to please their romantic partners, or to forge friendships with their partners' friends. Therefore, the alcohol-related behavior and attitudes of romantic partners' friends may influence individuals' own alcohol use. When adolescents' romantic partners' friends drink more, adolescents increase their own alcohol use over time (Kreager & Haynie, 2011), indicating that friends of romantic partners contribute to social learning of alcohol use. However, to our knowledge, it is unknown whether romantic partners' friends' alcohol-related attitudes predict adolescents' own alcohol use. Becoming integrated into romantic partners' social networks may motivate individuals to adopt behavior consistent with their partners' friends' attitudes, and therefore change their alcohol use to be more congruent with these attitudes.

In addition to normative social influence on behavior, the friends of an adolescent's romantic partner may influence opportunities to use alcohol through unstructured socializing. The time that romantic partners spend socializing with their friends may organize adolescents' own social opportunities in a way that promotes alcohol use. If romantic partners include each other in unstructured socializing with their friends, adolescents may find themselves in situations where they are able and encouraged to drink alcohol. However, to our knowledge, it is unknown whether romantic partners' unstructured socializing with friends predicts adolescents' alcohol use.

The Present Research

In this paper we examine diverse social influences on adolescents' self-reported frequency of

drunkenness. We build on past research by addressing multiple relationship types: friends, romantic partners, and friends of romantic partners. We also explore multiple potential mechanisms of social influence: others' frequency of drunkenness, alcohol-related attitudes, and unstructured socializing. We use a longitudinal design, which strengthens conclusions about the possibility of a causal association between variables by assessing within-person change. We also use social network measures, collected from participants and individuals they nominate as friends or romantic partners. By relying on first-hand reports rather than adolescents' perceptions of their peers' behaviors and attitudes, social network measures reduce perception biases, providing more accurate estimates of close others' behaviors and attitudes.

In addition to these predictors, we control for variables that are associated with more frequent/heavier alcohol use in adolescence: age (wave of data collection), school grades, SES (receiving free/reduced price school lunch), and living in a two-parent household (Cox, Zhang, Johnson, & Bender, 2007; Dube et al., 2006; Hanson & Chen, 2007; Iannotti & Bush, 1992). Because norms for alcohol use and susceptibility to social influence change across adolescence (Brechwald & Prinstein, 2011; CDC, 2015; Johnston et al., 2016; Keefe, 1994; Steinberg & Monahan, 2007), we explore whether age moderates each association we examine. We propose the following research questions:

1. Are close others' frequency of drunkenness, alcohol-related attitudes, and unstructured socializing uniquely associated with within-person changes in adolescents' own frequency of drunkenness?

2. Do associations between alcohol-related behavior and attitudes and unstructured socializing, and adolescents' changes in frequency of drunkenness, apply to friends, romantic partners, and romantic partners' friends?

Method

Participants and Procedure

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The longitudinal PROSPER study (Spoth, Greenberg, Bierman, & Redmond, 2004; Spoth et al., 2007) follows two successive cohorts of students from 28 rural communities in Iowa (n = 14) and Pennsylvania (n = 14), with 1,300 to 5,200 enrolled public school students per community. The communities were predominantly White (61% to 97%) and had a median household income of $37,000. Students were surveyed in their classrooms in the fall and spring of grade 6 (W1 and W2) and then every spring thereafter until grade 12 (W8). All study procedures were approved by the supervising institutions' Institutional Review Boards. Participation rates ranged from 86-90% across waves for all eligible students, with an average of 87.2% participation and about 11,000 students responding at each wave. Enrollment in the study was open at each wave, drawing the sample from the entire student body at each occasion (Osgood et al., 2013). The present research focuses on waves 4-8 (8th-12th grade).

Criteria for inclusion were that students participated in at least two waves of data collection between waves 4 and 8, provided data on friendships and romantic relationships, and reported an other-gender romantic partner who could be matched to another participant in the study during at least two waves of data collection. Thus, we excluded approximately 9,200 of the 14,000 PROSPER participants who provided data between waves 4-8 because they did not report a matched romantic partner at any wave (although some reported a romantic partner in a different grade or school), approximately 2,400 for reporting a romantic partner at only one wave, and 74 because they did not report any friends at any wave of data collection. An additional 10 participants were excluded because they reported same-sex matched romantic partner(s). We excluded same-sex romantic partnerships for two key reasons. First, it was necessary to conduct analyses separately by gender in order to account for interdependence in the data. Second, the effects of friends and romantic partners on heavy alcohol use may differ for people in heterosexual versus same-sex romantic relationships. For example, romantic partners may be less influential for heterosexual than same-sex relationships because individuals perceive different alcohol use norms for men than women (Lewis & Neighbors, 2004; Neighbors et al.,

2008), and therefore may not believe that the other gender's norms apply to them. However, the small number of same-sex romantic relationships in the sample prevented us from testing these differences. Finally, 374 participants were excluded because they were missing at least one variable included in the regression at every wave of data collection. The final sample included 1,889 adolescents and 3,744 measurement occasions, with 2-5 measurement occasions per participant.

The sample was 49% female. Regarding race/ethnicity, 89% of participants were White, 4% were Hispanic, 2% were Black, 1% were Asian, less than 1% were American Indian, and 3% reported another race or more than one race/ethnicity. On average, the sample was 14.27 years old (SD = 0.39) in 8th grade (W4). Twenty-nine percent received free/reduced price school lunch on at least one data collection occasion (a proxy for socioeconomic disadvantage). We performed four χ^2 tests and three t-tests comparing the analytic sample to the rest of the PROSPER sample on demographic and friendship variables. Six of these tests were significant. Participants in the analytic sample were more likely to live in a two-parent household at W4 ($p < .01$), less likely to receive free/reduced lunch on at least one occasion ($p < .05$), and tended to have more friends at each wave ($p < .001$ at each wave). The distribution of race/ethnicity differed between the analytic and non-analytic samples ($p < .001$). Follow-up comparisons between White/Caucasian and each other race/ethnicity revealed that participants in the analytic sample were less likely to be Hispanic ($p < .01$) or to report other/multiple race/ethnicities ($p < .01$), but did not differ in their likelihood of being Black, Asian, or American Indian (ps > .05). Participants in the analytic sample did not differ from the rest of the PROSPER sample in gender ($p > .05$) or age ($p > .05$).

Measures

Friends, romantic partners, and romantic partners' friends. At each wave, participants nominated up to seven same-grade friends. Participants responded to the question, "Who are your best and closest friends in your grade? Spell out the names the best you can." Project staff matched the

names that participants reported to the names of other participants in the PROSPER study, creating ties between participants. For the present analyses, outdegree (number of outgoing friendship nominations) indicated friendships. If a participant nominated someone as a friend, their relationship was recorded as a friendship, even if this friendship nomination was not reciprocated. Thus, in this paper, an individual's network of friends is composed of every student s/he nominated as a friend. Descriptive statistics for outdegree by wave and gender are reported in Table 1-1.

Participants also reported the name of their current or most recent boyfriend or girlfriend, if they had any within the past year. Project staff matched these romantic nominations to the names of other participants in the PROSPER study, creating ties between participants. Like friendship ties, romantic ties were based on outgoing nominations. Romantic partners' friends refer to the individuals that a participant's romantic partner nominated as friends.

Some individuals reported out-of-grade or out-of-school friends and romantic partners; these nominations are not included in analyses because there are no data from these friends and partners. Of the entire PROSPER sample, 96% of friendship nominations made were matched to an in-grade friend. On 78% of occasions when individuals indicated that they had a romantic partner, the romantic partner was a matched in-grade romantic partner.

Frequency of drunkenness. At each wave, participants responded to the question, "During the past year, how many times have you been drunk from drinking beer, wine, wine coolers, or other liquor?" Response options ranged from 1 (*Not at all*) to 5 (*More than 12 times*). For each participant, friends' frequency of drunkenness was the average response across all of the participant's nominated friends. Romantic partner's frequency of drunkenness was the response of the participant's nominated romantic partner. Romantic partner's friends' frequency of drunkenness was the average response across all the nominated friends of a participant's romantic partner. We report descriptive statistics by wave and gender in Table 1-1. We use a self-reported measure of drunkenness rather than other

measures of heavy alcohol use (such as number of drinks, having more than 4/5 drinks, or estimates of

blood alcohol content) because it emphasizes the subjective state of intoxication, and therefore may be

more strongly associated with negative outcomes of alcohol use than measures that rely on quantity of

alcohol consumed (Midanik, 1999). However, we recognize that a drawback of this measure is that it

does not account for differing levels of drunkenness, and that one person's subjective state of

drunkenness may differ from others' perceptions of what it means to be drunk.

      Alcohol-related attitudes. Participants answered a 6-item measure of alcohol-related attitudes

at each wave (Shin, 2011). The scale included one question about how wrong participants think it is for

someone their age to drink beer, wine, or liquor, on a scale of 1 (*Not at all wrong*) to 4 (*Very wrong*);

one question about likelihood of saying no when someone tried to get them to drink beer, wine, or

liquor, on a scale of 1 (*Definitely would say no*) to 5 (*Definitely would not say no*); and four questions

about their beliefs about alcohol consequences (e.g., "Drinking alcohol lets you have more fun,") on a

scale of 1 (*Strongly disagree*) to 5 (*Strongly agree*). The average of these six items composed a

composite measure of alcohol-related attitudes, with higher scores indicating more positive alcohol-

related attitudes. We calculated friends', romantic partners' and partners' friends' attitudes in the same

manner as frequency of drunkenness. Table 1-1 includes descriptive statistics by wave and gender.

Reliability was acceptable for both boys (α ranged from .70 to .80 across waves) and girls (α ranged from

.70 to .77 across waves).

      Unstructured socializing. At each wave, for each nominated friend and romantic partner,

participants responded to the question, "How often do you spend time just hanging out with this person

outside of school (without adults around)?" (Siennick & Osgood, 2012). Response options ranged from 1

(*Never*) to 5 (*Almost every day*). This measure captures the three components of unstructured socializing

that Osgood et al. (1996) proposed are important for predicting delinquency: a lack of structure, the

presence of peers, and the absence of authority figures. This measure and similar measures of

unstructured socializing are associated with deviant behaviors in adolescence (Goldstein, Davis-Kean, Eccles, & 2005; Haynie & Osgood, 2005; Hoeben & Weerman, 2016; Osgood et al., 1996).

For unstructured socializing with friends, we averaged responses averaged across each nominated friend to create a measure of how frequently participants engaged in unstructured socializing with all of their friends, on average. Unstructured socializing with romantic partners refers to how frequently participants reported unstructured socializing with the person they nominated as a romantic partner. For romantic partners' unstructured socializing with friends, we calculated the average frequency that an individual's reported romantic partner spent socializing with each of his/her nominated friends, creating a measure of how frequently participants' romantic partners engaged in unstructured socializing with friends. (The measure for partners' friends' unstructured socializing differs conceptually from participants' unstructured socializing with friends and romantic partners; the participant may or may not be present for romantic partners' unstructured socializing with friends. However, the data do not allow us to create a measure of participants' unstructured socializing with partners' friends.) We report descriptive statistics by wave and gender in Table 1-1.

School grades. At each wave, participants reported what grades they usually get in school, on a scale of 1 [*Mostly A's (90-100)*] to 5 [*Mostly lower than D's (below 60-69)*]. We reverse coded these responses so that higher scores indicate higher grades (see Table 1-1).

Free/reduced price lunch. At each wave, participants responded to the question, "What do you usually do for lunch on school days?" We coded participants as 1 (*Receives free/reduced price lunch*) or 0 (*Does not receive free/reduced price lunch*). We combined these responses across waves to create a variable indicating whether a participant received free/reduced price lunch on at least one wave (see Table 1-1).

Two-parent household. At each wave, participants responded to the question, "Who do you live with most of the year?" We coded students who responded that they lived with both parents as 1

(*Living in a two-parent household*). We coded students who responded that they live with a parent and a step-parent, only their mother, only their father, or in another type of household at W4 as 0 (*Not living in a two-parent household*). Because this measure was highly stable over time, we used participants' response to this question at W4. We report the proportion of participants who lived in a two-parent household at W4 in Table 1-1.

Analytic Plan

The data are interdependent in several ways. First, measurement occasions are nested within individuals, and participants' responses are not independent across measurement occasions—for example, one person's response at W4 is likely associated with their response at W5. Second, individuals are nested within schools. It is likely that there is interdependence within schools—that is, students' behaviors and attitudes are more similar to other students in their school than to students at other schools. Third, the relationships between students introduce interdependence in responses. For example, if A and B are romantic partners, A's value for partners' friends' attitudes is equal to B's value for friends' attitudes. In addition, if C and D are friends, C's friends' attitudes are likely similar to D's friends' attitudes because of overlap in friendship networks.

It is necessary to account for these multiple layers of interdependence to produce accurate estimates of associations. Therefore, we assess change in alcohol use using fixed and random effects models in STATA (the xtreg procedure) with bootstrapped standard errors (50 iterations) clustered by community and study cohort. The models assess within-person changes in frequency of drunkenness, accounting for the nesting of measurement occasions within individuals. This strategy for analyzing longitudinal data measures within-person variability in frequency of drunkenness, essentially treating each participant as his/her own control. With this strategy, we are able to rule out time-stable confounding factors, bringing researchers closer to understanding causal associations between close others' characteristics and adolescents' frequency of drunkenness. Bootstrapping accounts for the

nesting of students within schools within measurement occasions and mitigates the problems posed by

the interdependence of friendship networks. We conduct all analyses separately for boys and girls to

avoid the interdependence of romantic partners' responses. In addition to these steps to reduce

interdependence, we control for wave of data collection, school grades, whether the participant

received free lunch at any wave and whether the participant lived in a two-parent household at W4. We

also control for between-person effects of close others' frequency of drunkenness, alcohol-related

attitudes, and unstructured socializing. In order to create these variables, we took the average value of

each variable for the participant across measurement occasions. Finally, we examine wave interactions

with the independent variables by multiplying the value of each independent variable by wave of data

collection (which is coded so that W4 = 0, W5 = 1, etc.).

The data pose an additional challenge in that measures of romantic partners' and partners'

friends' attitudes, frequency of drunkenness, and unstructured socializing only exist when an individual

reports a romantic partner. Therefore, the analyses focus on waves in which participants report a

romantic partner. The analyses assess the question, "When participants have a romantic partner, are

the characteristics of friends, romantic partners, and romantic partners' friends associated with changes

in frequency of drunkenness, compared to the last time they reported a romantic partner?"

In Model 1, we predict within-person differences in adolescents' frequency of drunkenness from

their friends', romantic partners', and romantic partners' friends' frequency of drunkenness. In Model 2,

we predict within-person differences in adolescents' frequency of drunkenness from their friends',

romantic partners', and romantic partners' friends' alcohol-related attitudes. In Model 3, we predict

within-person differences in adolescents' frequency of drunkenness from their unstructured socializing

with friends, unstructured socializing with romantic partners, and romantic partners' unstructured

socializing with friends. Models 1-3 allow us to test whether different social relationships are uniquely

associated with adolescents' frequency of drunkenness. In Model 4 (the comprehensive model), we

predict within-person differences in adolescents' frequency of drunkenness from all others' frequency of

drunkenness, alcohol-related attitudes, and unstructured socializing. This model allows us to test

whether others' frequency of drunkenness, attitudes, and unstructured socializing all contribute

uniquely to adolescents' frequency of drunkenness. Appendix 1 includes the equations for Model 1,

predicting adolescents' frequency of drunkenness from others' frequency of drunkenness, and Model 4,

the full model. The equations for Models 2 and 3 are similar to Model 1, but replace the terms for

others' drunkenness with others' attitudes or unstructured socializing, respectively.

Results

Results for all fixed and random effects analyses are reported in Tables 1-2 (for boys) and 1-3

(for girls). We report the results by predictor. For each type of predictor (others' frequency of

drunkenness, attitudes, or unstructured socializing), we present the model that is specific to each

predictor (Model 1, 2, or 3) followed by the comprehensive model (Model 4). Regarding others'

drunkenness, In Model 1, which tested the associations between close others' frequency of

drunkenness, boys were drunk more frequently at waves when their friends and romantic partners'

friends were drunk more frequently. In Model 4 (the full model), the effect of boys' friends' frequency of

drunkenness remained significant, but boys' partners' friends' frequency of drunkenness did not. Girls

were drunk more frequently at waves when their friends were drunk more frequently; this association

was significant in both Models 1 and 4.

In Model 2, which examined close others' alcohol-related attitudes and adolescents' own

frequency of drunkenness, boys were drunk more frequently at waves when their friends held more

positive alcohol-related attitudes. Although there was no main effect of romantic partners' attitudes

(indicating that there was no significant association between romantic partners' alcohol-related

attitudes and boys' frequency of drunkenness at W4 [8th grade]), there was a wave*romantic partners'

attitudes interaction. This interaction indicates that the association between romantic partners' alcohol-

related attitudes and boys' own frequency of drunkenness increased over time. Thus, older boys were drunk more frequently when their romantic partners held more positive alcohol-related attitudes. In Model 4, these associations were no longer significant, signifying that the associations between close others' alcohol-related attitudes and boys' frequency of drunkenness were not independent of the associations of close others' frequency of drunkenness and unstructured socializing with close others.

In Model 2, girls were drunk more frequently at waves when their romantic partners held more positive alcohol-related attitudes. Although there were no main effects of friends' or partners' friends' attitudes, there were significant wave interactions for both of these variables. These interactions indicate that, although there was no association between friends'/partners' friends' alcohol-related attitudes and girls' own frequency of drunkenness at W4, these associations increased over time. Thus, older girls were drunk more frequently when their friends and partners' friends held more positive alcohol-related attitudes. In Model 4, all of the significant associations of close others' attitudes with girls' frequency of drunkenness found in Model 2 became nonsignificant.

In Model 3, which examined unstructured socializing, there were no main effects of unstructured socializing on boys' frequency of drunkenness. However, there was a significant wave*unstructured socializing with friends interaction indicating that, although the association of unstructured socializing with boys' frequency of drunkenness was not significant at W4, this association increased over time. Thus, older boys were drunk more frequently when they engaged in more frequent unstructured socializing with friends. In Model 4, this interaction remained statistically significant.

In Model 3, there were main effects and wave interactions for unstructured socializing as a predictor of girls' frequency of drunkenness. The main effect of unstructured socializing with friends indicated that, in 8th grade, girls were drunk less frequently at waves when they engaged in more frequent unstructured socializing with friends. However, the significant wave interaction indicated that in subsequent years, the direction of this association reversed; girls were drunk more frequently when

they engaged in more frequent unstructured socializing with friends. Both of these associations remained significant in Model 4.

A similar pattern existed for romantic partners' unstructured socializing with their friends in Model 3. In 8th grade, girls were drunk less frequently when their romantic partners engaged in more frequent unstructured socializing with friends. However, the significant wave interaction indicated that in subsequent years, the direction of this association reversed; girls were drunk more frequently when their romantic partners engaged in more frequent unstructured socializing with friends. In Model 4, the main effect of partners' unstructured socializing with friends became nonsignificant; however, the wave interaction remained significant.

In Model 3, there was a main effect of unstructured socializing with romantic partners, such that girls were drunk more frequently when they engaged in more frequent unstructured socializing with romantic partners. In Model 4, this association was no longer significant, but the wave*unstructured socializing with romantic partners interaction became significant. This interaction indicated that, over time, unstructured socializing with romantic partners was associated with greater decreases in frequency of drunkenness.

Additional Analyses

It was possible that issues of multicollinearity would arise in Model 4 due to the large number of main effects and wave interactions included in the model. A potential problem is that including nonsignificant interactions in the model may have artificially inflated the standard errors of other variables, reducing our ability to identify significant findings. Therefore, in additional analyses located in Appendix B, we introduced an additional model (Model 5) in which we removed the wave interactions that were not significant in Model 4. We do not interpret this model in the current paper, but present it for consideration.

<div align="center">

Discussion

</div>

In the present paper, we examined how multiple social relationships and mechanisms of social influence are associated with changes in adolescents' frequency of drunkenness. When examined separately, close others' frequency of drunkenness, alcohol-related attitudes, and unstructured socializing each predicted adolescents' own frequency of drunkenness. However, in a combined model, only friends' frequency of drunkenness had a unique main effect on both boys' and girls' frequency of drunkenness. For girls, there was a main effect of unstructured socializing with friends, and for both genders, unstructured socializing with close others increasingly predicted frequency of drunkenness as adolescents aged. The results expand understanding of the social transmission of alcohol use in adolescence and inform future intervention efforts.

Diverse Social Relationships and Drunkenness in Adolescence

Past research on social influences on alcohol use in adolescence has typically examined one relationship type (Ary et al., 1993; Haynie & Osgood, 2005; Iannotti & Bush, 1992; Kirke, 2004; Maxwell, 2002; Osgood et al., 2013; Osgood & Anderson, 2004) and/or one mechanism of social influence (Kreager et al., 2013; Kreager & Haynie, 2011). Examining multiple social relationships and mechanisms of social influence indicates both who is important for alcohol use and how they are important.

Regarding who is important, the findings of the present research indicate that friends have a particularly important role in determining frequency of drunkenness. Although each type of social relationship (friends, romantic partners, and romantic partners' friends) had at least one main effect on adolescents' frequency of drunkenness when mechanisms of alcohol use were examined separately, only friends' alcohol-related behavior uniquely predicted both boys' and girls' frequency of drunkenness when multiple social relationships and mechanisms of social influence were considered together. This result extends past research that has separately demonstrated that characteristics of friends, romantic partners, and partners' friends predict adolescents' alcohol use (e.g., Ary et al., 1993; Haynie & Osgood, 2005; Iannotti & Bush, 1992; Kreager et al., 2013; Maxwell, 2002; Osgood et al., 2013). Although

romantic partners' and partners' friends contribute to adolescents' frequency of drunkenness, these associations are accounted for by friends' alcohol-related behavior.

Regarding how social relationships matter for alcohol use, the findings of the present research highlight that friends' frequency of drunkenness has a robust association with adolescents' own frequency of drunkenness that accounts for effects of close others' attitudes and, to some extent, unstructured socializing. Although past research indicates that close others' alcohol use and alcohol-related attitudes both predict adolescents' alcohol use (Ary, Tildesley, Hops, & Andrews, 1993; Borsari & Carey, 2003; Kandel, 1985), we found that the effect of friends' frequency of drunkenness accounted for the effect of others' attitudes. These findings support social learning explanations of alcohol use in adolescence, but raise questions about how differential association processes, particularly the transmission of alcohol-related attitudes, play a role in determining adolescent alcohol use (Akers et al., 1979; Sutherland, 1947). One possible explanation for these findings is that the influence of close others' attitudes on heavy alcohol use depends on whether these close others also drink heavily. An additional explanation is that adolescents attend more to peers' behavior than to peers' attitudes. When using social information to decide whether to drink heavily, close others' past behavior may be easier to recall than others' attitudes, and therefore may have a stronger influence on behavior.

Developmental Changes in the Mechanisms of Social Influence

However, we also found support for social ecological theories of alcohol use later in adolescence. Unstructured socializing may promote alcohol use more strongly as adolescents age. In 8th grade, girls were drunk less frequently when they engaged in unstructured socializing with friends more frequently. However, over time, the direction of this association reversed; by 12th grade, girls were drunk more frequently when they engaged in more frequent unstructured socializing with friends. Although unstructured socializing with friends was not associated with boys' frequency of drunkenness in 8th grade, unstructured socializing with friends predicted increased frequency of drunkenness later in

adolescence. In addition, girls' romantic partners' unstructured socializing with friends increasingly predicted girls' frequency of drunkenness over time. As adolescents age and opportunities for alcohol use become more frequent, alcohol use becomes more normative (CDC, 2015; Office of the Surgeon General, 2007). Therefore, unstructured socializing may increase opportunities for alcohol use later in adolescence. In contrast, we found that for girls, unstructured socializing with romantic partners was associated with less frequent drunkenness as girls aged. A possible explanation for this finding is that, because older adolescents are more likely to be sexually active (CDC, 2015), older adolescents may be more likely to use unstructured socializing time with a romantic partner to engage in sexual behavior.

Prevention Implications

The results of this research can inform the targets and content of alcohol use interventions. Regarding targets, the results suggest that interventions aimed at reducing social influence on alcohol use should continue to focus on friends' influence (e.g., Valente et al., 2004). Although romantic partners and partners' friends may influence adolescents' frequency of drunkenness, most of these effects are not independent of the effect of friends' frequency of drunkenness. For example, romantic partners may influence adolescents' frequency of drunkenness only because they introduce adolescents to new friends. Therefore, targeting norms and unstructured socializing within romantic relationships may be less important for reducing adolescent alcohol use than targeting friendships.

In addition to a focus on friendship, the results of the present research suggest that focusing on friends' alcohol-related behavior (including friends' frequency of drunkenness and unstructured socializing), rather than alcohol-related attitudes, may be beneficial. For example, interventions that alter the structure of friendship networks to discourage ties between individuals who would promote each other's alcohol use (e.g., Valente, Gallaher, & Mouttapa, 2004; Valente et al., 2007) may be sufficient to produce change in frequency of drunkenness; altering the attitudes of central people to be less favorable toward alcohol use may not produce additional change in drunkenness. Intervention

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strategies should also be tailored according to participants' ages. In particular, interventions to reduce

opportunities for unstructured socializing (e.g., Smith, 2007; Tebes et al., 2007) may be more effective in

reducing drunkenness if they are conducted later in adolescence.

Limitations

The results of this research must be interpreted in light of its limitations. First, it is impossible to

determine the extent to which covariation between close others' drunkenness, alcohol-related

attitudes, and unstructured socializing and adolescents' own drunkenness is due to selection (individuals

choose friends who are similar to them in alcohol use) versus influence (individuals become more similar

in alcohol use to their friends over time). Selection of friends and romantic partners may partially

account for any associations between close others' behaviors/ attitudes/ unstructured socializing and

individuals' alcohol use (e.g., Brechwald & Prinstein, 2011; Dishion & Owen, 2002; Kreager & Haynie,

2011; Rhule-Louie & McMahon, 2007). The fact that individuals may have had different romantic

partners and friends at each wave of data collection increases the possibility of selection effects.

Although some statistical tools can help distinguish selection and influence processes within social

networks (e.g., SIENA; Steglich, Snijders, & West, 2006), we were unable to use these tools because of

the sparseness of romantic connections within the networks. Without accounting for selection effects,

estimates of friends', partners', and partners' friends' influence may be inflated. Thus, although

theoretical discussions about close others' behavior, attitudes, and unstructured socializing propose that

these are mechanisms of social influence, the present research does not offer concrete evidence that

these mechanisms are responsible for changes in adolescents' alcohol use.

Second, the sample and data collection method limit the extent to which we can generalize our

findings. The participants in this study are adolescents who reported a romantic partner in their same

school and grade. Adolescents who have more frequent romantic relationships may differ in their

susceptibility to peer or partner influence, compared to adolescents who have less frequent romantic

relationships. For example, susceptibility to peer influence on alcohol use is associated with reduced stability in adolescent friendships (Allen, Porter, & McFarland, 2006). If this process is also true for romantic relationships, individuals who are more susceptible to partners' influence on alcohol use may be less likely to be in a romantic relationship at any given point. Because we focused on individuals who reported a romantic partner on at least two waves of data collection, individuals who are more susceptible to partners' influence, and therefore have less stable romantic relationships, may be underrepresented in the present analyses. In addition, the romantic relationships captured in this study may not be representative of adolescent romantic relationships because boyfriends tend to be older than their girlfriends (Carver, Joyner, & Udry, 2003). Furthermore, the age difference between romantic partners may matter for social influence processes; older boyfriends may be more influential on their girlfriends' risk behaviors, including substance use (Halpern, Kaestle, & Hallfors, 2006). Similarly, due to the data collection strategy, we do not know about the influence of out-of-school or out-of-grade friends on adolescents' frequency of drunkenness.

Third, sample characteristics limit the generalizability of results. The PROSPER study sampled predominantly White adolescents in rural communities. In addition, the data analysis approach used to account for interdependence precluded us from including same-gender romantic relationships. Future research should examine how social relationships are associated with alcohol use in diverse samples.

Finally, the variables collected during the PROSPER study provide a useful understanding of how social relationships are associated with alcohol use. However, different measures may capture this process more comprehensively. For example, instead of measuring romantic partners' unstructured socializing with friends, researchers might collect measures of adolescents' unstructured socializing with their romantic partners' friends. In addition, researchers might examine additional dimensions of alcohol use (such as frequency of any alcohol use, binge drinking, and alcohol-related consequences) and other risk behaviors (such as risky sexual behavior and other substance use) in order to determine

whether the same social influence processes account for multiple outcomes.

Conclusion

Despite its limitations, the present research offers valuable contributions to understanding how diverse social relationships are associated with alcohol use during adolescence. The results highlight that, although multiple social relationships are associated with alcohol use, these associations are not equally strong. Friends' frequency of drunkenness was the most robust predictor of changes in alcohol use throughout adolescence, supporting social learning explanations of alcohol use. These findings also support ecological explanations of alcohol use, adding that unstructured socializing may predict alcohol use more as adolescents age. Regarding prevention, the findings suggest that expanding prevention efforts to focus on romantic relationships may not be necessary, and that focusing on changing alcohol-related behavior (rather than attitudes) of adolescents who are central in friendship networks may be key to intervention success.

References

Akers, R. L., Krohn, M. D., Lanza-Kaduce, L., & Radosevich, M. (1979). Social learning and deviant

behavior: A specific test of a general theory. *American Sociological Review, 44*, 636-655.

Allen, J. P., Porter, M. R., & McFarland, F. C. (2006). Leaders and followers in adolescent close

friendships: Susceptibility to peer influence as a predictor of risky behavior, friendship

instability, and depression. *Development and Psychopathology, 18*, 155-172.

Ary, D. V., Tildesley, E., Hops, H., & Andrews, J. (1993). The influence of parent, sibling, and peer

modeling and attitudes on adolescent use of alcohol. *International Journal of the Addictions, 28*,

853-880.

Baer, J. S., Stacy, A., & Larimer, M. (1991). Biases in the perception of drinking norms among college

students. *Journal of Studies on Alcohol, 52*, 580-586.

Barnes, G. M., Hoffman, J. H., Welte, J. W., Farrell, M. P., & Dintcheff, B. A. (2007). Adolescents' time

use: Effects on substance use, delinquency and sexual activity. *Journal of Youth and*

Adolescence, 36, 697-710.

Borsari, B., & Carey, K. B. (2003). Descriptive and injunctive norms in college drinking: A meta-analytic

integration. *Journal of Studies on Alcohol, 64*, 331-341.

Brechwald, W. A., & Prinstein, M. J. (2011). Beyond homophily: A decade of advances in understanding

peer influence processes. *Journal of Research on Adolescence, 21*, 166-179.

Carver, K., Joyner, K., & Udry, J. R. (2003). National estimates of adolescent romantic relationships. In P.

Florsheim (Ed.), *Adolescent romantic relations and sexual behavior: Theory, research, and*

practical implications (pp. 23–56). Mahwah, NJ: Erlbaum.

Centers for Disease Control. (2015). Youth risk behavior surveillance - United States, 2015. *Surveillance*

Summaries, 65, 1-174.

Cohen, D. A., Farley, T. A., Taylor, S. N., Martin, D. H., & Schuster, M. A. (2002). When and where do

youths have sex? The potential role of adult supervision. *Pediatrics, 110*, e66-e72.

Collins, W. A., Welsh, D. P., & Furman, W. (2009). Adolescent romantic relationships. *Annual Review of Psychology, 60*, 631-652.

Connolly, J., & McIsaac, C. (2011). Romantic relationships in adolescence. In M. K. Underwood & L. H. Rosen (Eds.), *Social development: Relationships in infancy, childhood, and adolescence* (pp. 180-206). New York, NY: Guilford Press.

Cox, R. G., Zhang, L., Johnson, W. D., & Bender, D. R. (2007). Academic performance and substance use: Findings from a state survey of public high school students. *Journal of School Health, 77*, 109-115.

Dishion, T. J., & Owen, L. D. (2002). A longitudinal analysis of friendships and substance use: Bidirectional influence from adolescence to adulthood. *Developmental Psychology, 38*, 480-491.

Dube, S. R., Miller, J. W., Brown, D. W., Giles, W. H., Felitti, V. J., Dong, M., & Anda, R. F. (2006). Adverse childhood experiences and the association with ever using alcohol and initiating alcohol use during adolescence. *Journal of Adolescent Health, 38*, 444.e1-444.e10.

Fischer, J. L., & Wiersma, J. D. (2012). Romantic relationships and alcohol use. *Current Drug Abuse Reviews, 5*, 98-116.

Gold, M. (1970). *Delinquent behavior in an American city*. Belmont, CA: Brooks/Cole Publishing Company.

Halpern, C. T., Kaestle, C. E., & Hallfors, D. D. (2007). Perceived physical maturity, age of romantic partner, and adolescent risk behavior. *Prevention Science, 8*, 1-10.

Hanson, M. D., & Chen, E. (2007). Socioeconomic status and health behaviors in adolescence: A review of the literature. *Journal of Behavioral Medicine, 30*, 263-285.

Hawdon, J. E. (1999). Daily routines and crime using routine activities as measures of Hirschi's involvement. *Youth & Society, 30*, 395-415.

Hawley, A. (1950). *Human ecology: A theory of community structure*. New York, NY: Ronald.

Haynie, D. L., & Osgood, D. W. (2005). Reconsidering peers and delinquency: How do peers matter?

       Social Forces, 84, 1109-1130.

Hirschi, T. (1969). *The causes of delinquency*. Berkeley, CA: The University of California Press.

Iannotti, R. J., & Bush, P. J. (1992). Perceived vs. actual friends' use of alcohol, cigarettes, marijuana, and

       cocaine: Which has the most influence? *Journal of Youth and Adolescence, 21*, 375-389.

Johnston, L. D., O'Malley, P. M., Miech, R. A., Bachman, J. G., & Schulenberg, J. E. (2016). *Monitoring the*

       Future national survey results on drug use, 1975-2015: Overview, key findings on adolescent

       drug use. Ann Arbor, MI: Institute for Social Research, The University of Michigan.

Kandel, D. B. (1985). On processes of peer influences in adolescent drug use: A developmental

       perspective. *Advances in Alcohol & Substance Abuse, 4*, 139-162.

Keefe, K. (1994). Perceptions of normative social pressure and attitudes toward alcohol use: Changes

       during adolescence. *Journal of Studies on Alcohol, 55*, 46-54.

Kerr, W. C., Greenfield, T. K., & Midanik, L. T. (2006). How many drinks does it take you to feel drunk?

       Trends and predictors for subjective drunkenness. *Addiction, 101*, 1428-1437.

Kirke, D. M. (2004). Chain reactions in adolescents' cigarette, alcohol and drug use: Similarity through

       peer influence or the patterning of ties in peer networks? *Social Networks, 26*, 3-28.

Kreager, D. A., & Haynie, D. L. (2011). Dangerous liaisons? Dating and drinking diffusion in adolescent

       peer networks. *American Sociological Review, 76*, 737-763.

Kreager, D. A., Haynie, D. L., & Hopfer, S. (2013). Dating and substance use in adolescent peer networks:

       A replication and extension. *Addiction, 108*, 638-647.

Kreager, D. A., Molloy, L. E., Moody, J., & Feinberg, M. E. (2016). Friends first? The peer network origins

       of adolescent dating. *Journal of Research on Adolescence, 26*, 257-269.

Lewis, M. A., & Neighbors, C. (2004). Gender-specific misperceptions of college student drinking norms.

Psychology of Addictive Behaviors, 18, 334-339.

Maxwell, K. A. (2002). Friends: The role of peer influence across adolescent risk behaviors. *Journal of*

Youth and Adolescence, 31, 267-277.

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks.

Annual Review of Sociology, 27, 415-444.

Meier, A., & Allen, G. (2009). Romantic relationships from adolescence to young adulthood: Evidence

from the National Longitudinal Study of Adolescent Health. *The Sociological Quarterly, 50*, 308-

335.

Midanik, L. T. (2003). Definitions of drunkenness. *Substance Use & Misuse, 38*, 1285-1303.

Midanik, L. T. (1999). Drunkenness, feeling the effects and 5+ measures. *Addiction, 94*, 887-897.

Murgraff, V., Parrott, A., & Bennett, P. (1999). Risky single-occasion drinking amongst young people--

definition, correlates, policy, and intervention: A broad overview of research findings. *Alcohol*

and Alcoholism, 34, 3-14.

Neal, D. J., & Fromme, K. (2007). Event-level covariation of alcohol intoxication and behavioral risks

during the first year of college. *Journal of Consulting and Clinical Psychology, 75*, 294-306.

Neighbors, C., O'Connor, R. M., Lewis, M. A., Chawla, N., Lee, C. M., & Fossos, N. (2008). The relative

impact of injunctive norms on college student drinking: The role of reference group. *Psychology*

of Addictive Behaviors, 22, 576-581.

Office of the Surgeon General (2007). *The surgeon general's call to action to prevent and reduce*

underage drinking, section 2: Alcohol use and adolescent development. Rockville, MD: Office of

the Surgeon General.

Osgood, D. W., & Anderson, A. L. (2004). Unstructured socializing and rates of delinquency. *Criminology,*

42, 519-550.

Osgood, D. W., Ragan, D. T., Wallace, L., Gest, S. D., Feinberg, M. E., & Moody, J. (2013). Peers and the

emergence of alcohol use: Influence and selection processes in adolescent friendship networks. *Journal of Research on Adolescence, 23*, 500-512.

Ragan, D. T. (2014). Revisiting "what they think": Adolescent drinking and the importance of peer beliefs. *Criminology, 52*, 488-513.

Regan, P. C., Durvasula, R., Howell, L., Ureño, O., & Rea, M. (2004). Gender, ethnicity, and the developmental timing of first sexual and romantic experiences. *Social Behavior and Personality: An International Journal, 32*, 667-676.

Rhule-Louie, D. M., & McMahon, R. J. (2007). Problem behavior and romantic relationships: Assortative mating, behavior contagion, and desistance. *Clinical Child and Family Psychology Review, 10*, 53-100.

Shin, C. (2011). *PROSPER technical report*. Unpublished manuscript.

Shulman, S., & Connolly, J. (2013). The challenge of romantic relationships in emerging adulthood: Reconceptualization of the field. *Emerging Adulthood, 1*, 27-39.

Siennick, S. E., & Osgood, D. W. (2012). Hanging out with which friends? Friendship-level predictors of unstructured and unsupervised socializing in adolescence. *Journal of Research on Adolescence, 22*, 646-661.

Smith, E. P. (2007). The role of afterschool settings in positive youth development. *The Journal of Adolescent Health, 41*, 219-220.

Spoth, R., Greenberg, M., Bierman, K., & Redmond, C. (2004). PROSPER community–university partnership model for public education systems: Capacity-building for evidence-based, competence-building prevention. *Prevention Science, 5*, 31-39.

Spoth, R., Redmond, C., Shin, C., Greenberg, M., Clair, S., & Feinberg, M. (2007). Substance-use outcomes at 18 months past baseline: The PROSPER community–university partnership trial. *American Journal of Preventive Medicine, 32*, 395-402.

Squeglia, L. M., Jacobus, J., & Tapert, S. F. (2009). The influence of substance use on adolescent brain

        development. *Clinical EEG and Neuroscience, 40*, 31-38.

Stanton-Salazar, R. D., & Spina, S. U. (2005). Adolescent peer networks as a context for social and

        emotional support. *Youth & Society, 36*, 379-417.

Steglich, C., Snijders, T. A., & West, P. (2006). Applying SIENA. *Methodology, 2*, 48-56.

Steinberg, L., & Monahan, K. C. (2007). Age differences in resistance to peer influence. *Developmental*

        Psychology, 43, 1531-1543.

Substance Abuse and Mental Health Services Administration. (2014). *Results from the 2013 National*

        Survey on Drug Use and Health: Summary of national findings (NSDUH Series H-48, HHS

        Publication No. (SMA) 14-4863). Rockville, MD: DIANE Publishing.

Sun, I. Y., & Longazel, J. G. (2008). College students' alcohol-related problems: A test of competing

        theories. *Journal of Criminal Justice, 36*, 554-562.

Sutherland, E. H. (1947). *Principles of criminology*, 4th ed. Philadelphia, PA: Lippincott.

Tebes, J. K., Feinn, R., Vanderploeg, J. J., Chinman, M. J., Shepard, J., Brabham, T., ... & Connell, C. (2007).

        Impact of a positive youth development program in urban after-school settings on the

        prevention of adolescent substance use. *Journal of Adolescent Health, 41*, 239-247.

Valente, T. W., Gallaher, P., & Mouttapa, M. (2004). Using social networks to understand and prevent

        substance use: A transdisciplinary perspective. *Substance Use & Misuse, 39*, 1685-1712.

Valente, T. W., Ritt-Olson, A., Stacy, A., Unger, J. B., Okamoto, J., & Sussman, S. (2007). Peer

        acceleration: Effects of a social network tailored substance abuse prevention program among

        high-risk adolescents. *Addiction, 102*, 1804-1815.

Warr, M., & Stafford, M. (1991). The influence of delinquent peers: What they think or what they do?

        Criminology, 29, 851-866.

Table 1-1. *Descriptive Statistics by Wave and Gender*

	Boys		Girls	
	Mean or proportion	*SD*	Mean or proportion	*SD*
Outdegree (number of friendship nominations made in school)				
8th grade (W4)	4.60	1.76	5.21	1.51
9th grade (W5)	4.27	1.92	4.95	1.74
10th grade (W6)	3.83	1.89	4.29	1.79
11th grade (W7)	3.60	1.96	4.12	1.85
12th grade (W8)	3.51	1.96	3.71	1.88
Frequency of drunkenness				
8th grade	1.33	0.78	1.29	0.72
9th grade	1.72	1.23	1.56	0.98
10th grade	1.91	1.32	1.57	1.03
11th grade	2.07	1.34	1.81	1.05
12th grade	2.39	1.48	2.03	1.21
Friends' frequency of drunkenness				
8th grade	1.38	0.51	1.33	0.47
9th grade	1.69	0.82	1.64	0.70
10th grade	1.92	0.88	1.88	0.92
11th grade	2.20	0.97	2.13	0.96
12th grade	2.38	1.04	2.25	1.00
Partners' frequency of drunkenness				
8th grade	1.33	0.79	1.38	0.88
9th grade	1.56	1.04	1.80	1.24
10th grade	1.68	1.11	1.76	1.24
11th grade	1.84	1.13	2.04	1.34
12th grade	2.07	1.25	2.32	1.49
Partners' friends' frequency of drunkenness				
8th grade	1.35	0.49	1.41	0.57
9th grade	1.66	0.76	1.76	0.90
10th grade	1.84	0.87	1.94	0.99
11th grade	2.08	0.98	2.15	1.02
12th grade	2.24	1.09	2.43	1.09
Friends' alcohol-related attitudes				
8th grade	1.79	0.52	1.69	0.46
9th grade	2.09	0.62	2.00	0.54
10th grade	2.19	0.60	2.12	0.62
11th grade	2.33	0.69	2.17	0.61
12th grade	2.41	0.80	2.24	0.64

Partners' alcohol-related attitudes				
8th grade	1.68	0.72	1.82	0.82
9th grade	1.96	0.87	2.13	0.96
10th grade	1.93	0.83	2.16	0.96
11th grade	1.97	0.84	2.31	1.01
12th grade	2.12	0.85	2.40	1.04
Partners' friends' alcohol-related attitudes				
8th grade	1.71	0.48	1.85	0.56
9th grade	2.05	0.59	2.17	0.65
10th grade	2.11	0.62	2.20	0.72
11th grade	2.16	0.60	2.34	0.74
12th grade	2.24	0.66	2.46	0.76
Unstructured socializing with friends				
8th grade	3.08	1.03	2.91	0.99
9th grade	3.16	1.02	2.87	0.90
10th grade	3.16	0.99	2.89	0.91
11th grade	3.31	0.92	2.91	0.90
12th grade	3.49	0.93	3.00	0.90
Unstructured socializing with partners				
8th grade	3.12	1.31	2.92	1.39
9th grade	3.15	1.38	3.16	1.36
10th grade	3.38	1.43	3.56	1.34
11th grade	3.70	1.40	3.89	1.15
12th grade	4.10	1.28	4.20	1.12
Partners' unstructured socializing with friends				
8th grade	2.95	0.97	3.17	1.06
9th grade	2.95	0.95	3.29	1.01
10th grade	2.99	0.91	3.30	0.95
11th grade	2.96	0.95	3.37	0.90
12th grade	2.99	0.89	3.47	0.92
School grades				
8th grade	4.08	0.86	4.32	0.77
9th grade	3.98	0.89	4.23	0.82
10th grade	4.01	0.93	4.29	0.75
11th grade	4.08	0.85	4.37	0.72
12th grade	4.19	0.79	4.55	0.62
Free/reduced price school lunch at any wave	.29		.29	
Two-parent household W4	.70		.64	

Table 1-2. *Fixed and Random Effects Model Results for Boys*

	Model 1 Others' drunkenness		Model 2 Others' attitudes		Model 3 Unstructured socializing		Model 4 Full Model	
	coefficient	bootstrapped SE	coefficient	bootstrapped SE	coefficient	bootstrapped SE	coefficient	bootstrapped SE
Within-person effects								
Friends' drunkenness	.371***	.075					.390***	.098
Partners' drunkenness	.043	.057					.018	.063
Partners' friends' drunkenness	.125*	.058					.116	.107
Wave*Friends' drunkenness	-.037	.023					-.057	.034
Wave*Romantic partners' drunkenness	.041	.028					.028	.027
Wave*Partners' friends' drunkenness	.030	.035					.041	.039
Friends' attitudes			.204**	.074			-.055	.090
Partners' attitudes			.055	.055			.061	.051
Partners' friends' attitudes			.058	.072			.063	.112
Wave*Friends' attitudes			.019	.026			.027	.035
Wave*Romantic partners' attitudes			.063**	.024			.006	.021
Wave*Partners' friends' attitudes			.051	.032			-.050	.044
Unstructured socializing with friends					-.092	.052	-.071	.041
Unstructured socializing with partners					-.020	.027	-.007	.017
Romantic partners' unstructured socializing with friends					-.046	.046	-.017	.048
Wave*Unstructured socializing with friends					.087***	.024	.051*	.022
Wave*Unstructured socializing with romantic partners					.010	.012	.003	.011
Wave*Partners' unstructured socializing with friends					.045	.025	.014	.021

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	Model 1		Model 2		Model 3		Model 4	
Wave	.048	.041	-.087	.060	-.192*	.079	-.098	.084
School grades	-.129**	.041	-.137***	.029	-.203	.029	-.120***	.032
Between-person effects								
Free/reduced lunch	-.025	.086	-.007	.072	.018	.081	-.018	.077
Two-parent family	-.009	.078	.024	.070	.003	.089	.040	.068
Average friends' drunkenness	.168*	.085					.109	.123
Average partners' drunkenness	-.004	.068					.016	.086
Average partners' friends' drunkenness	.101	.081					.071	.082
Average friends' attitudes			.234**	.077			.027	.088
Average Partners' attitudes			.015	.078			-.072	.086
Average Partners' friends' attitudes			.181	.105			.069	.120
Average Unstructured socializing with friends					.272***	.057	.175***	.045
Unstructured socializing with partners					-.009	.047	-.010	.042
Romantic partners' unstructured socializing with friends					.120*	.046	.066	.064
Variance components								
Within-person	.671		.722		.735		.646	
Between-person	.791		.812		.846		.784	
ICC	.418		.441		.430		.405	
Number of participants	791		791		790		780	
Number of observations	1706		1704		1708		1603	

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 1-3. *Fixed and Random Effects Model Results for Girls*

	Model 1 Others' drunkenness		Model 2 Others' attitudes		Model 3 Unstructured socializing		Model 4 Full Model	
	coefficient	bootstrapped SE	coefficient	bootstrapped SE	coefficient	bootstrapped SE	coefficient	bootstrapped SE
Within-person effects								
Friends' drunkenness	.227**	.083					.257*	.101
Partners' drunkenness	.013	.040					-.027	.043
Partners' friends' drunkenness	.011	.064					.029	.074
Wave*Friends' drunkenness	.028	.033					.004	.040
Wave*Romantic partners' drunkenness	.034	.017					.036	.020
Wave*Partners' friends' drunkenness	.043	.029					.039	.038
Friends' attitudes			.080	.072			-.016	.079
Partners' attitudes			.062*	.030			.081	.043
Partners' friends' attitudes			-.025	.056			.004	.080
Wave*Friends' attitudes			.075*	.035			.020	.033
Wave*Romantic partners' attitudes			.028	.020			-.003	.025
Wave*Partners' friends' attitudes			.064*	.027			-.011	.040
Unstructured socializing with friends					-.140**	.049	-.087*	.043
Unstructured socializing with partners					.067*	.030	.054	.028
Romantic partners' unstructured socializing with friends					-.090**	.030	-.023	.031
Wave*Unstructured socializing with friends					.087***	.020	.054**	.019
Wave*Unstructured socializing with romantic partners					-.015	.013	-.021*	.010
Wave*Partners' unstructured socializing with friends					.084***	.013	.034*	.017
Wave	-.102**	.037	-.206***	.049	-.283***	.057	-.268**	.081

School grades	-.086***	.053	-.177**	.052	-.199***	.054	-.168***	.040
Between-person effects								
Free/reduced lunch	-.053	.065	-.058	.089	-.060	.086	-.062	.070
Two-parent family	-.142*	.065	-.153	.088	-.195*	.081	-.129*	.063
Average friends' drunkenness	.140*	.060					.111	.066
Average partners' drunkenness	.063	.046					.093	.053
Average partners' friends' drunkenness	.052	.052					.045	.076
Average friends' attitudes			.294**	.088			.041	.125
Average Partners' attitudes			-.007	.053			-.095	.080
Average Partners' friends' attitudes			.095	.065			.006	.082
Average Unstructured socializing with friends					.116*	.057	.051	.042
Unstructured socializing with partners					.010	.037	-.006	.032
Romantic partners' unstructured socializing with friends					.165***	.042	.026	.041
Variance components								
Within-person	.518		.585		.602		.507	
Between-person	.579		.602		.667		.586	
ICC	.444		.486		.449		.423	
Number of participants	675		675		678		659	
Number of observations	1414		1418		1469		1340	

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$.

Chapter 3

Paper 2

Young adults' and romantic partners' alcohol-related consequences as predictors of future binge

drinking

This paper is a multiple-authored work. Rose Wesche is the first author, who will draft the manuscript.

Drs. Eva Lefkowitz and Derek Kreager are co-authors. They helped revise the final manuscript. We will

submit this paper to *Personal Relationships.*

Abstract

Drawing on a social learning and expectancy models of alcohol use, we examined how young adults' own alcohol-related consequences and their romantic partners' binge drinking and alcohol-related consequences are associated with changes in binge drinking. In a longitudinal sample of 1,139 romantic couples, young adults increased their binge drinking over six years if they experienced more negative alcohol-related consequences at baseline. Although individuals increased their binge drinking frequency if their partners experienced more negative alcohol-related consequences at baseline, this association was no longer significant after controlling for additional variables. These associations did not differ by relationship type (dating, cohabitating, married). The results support social learning explanations of binge drinking and inform understanding of mechanisms of partners' influence on binge drinking.

Young adults' and romantic partners' alcohol-related consequences as predictors of future binge

drinking

Romantic partners can inhibit or exacerbate each other's binge drinking in young adulthood

(Fleming, White, & Catalano, 2010; Leonard & Mudar, 2003), with serious implications for long-term

physical and psychological health (Murgraff, Parrott, & Bennett, 1999; Neal & Fromme, 2007; Orchowski

& Barnett, 2012). Although past findings demonstrate that individuals may not decrease their binge

drinking after experiencing negative alcohol-related consequences (Patrick & Maggs, 2008; White & Ray,

2014), it is possible that observing romantic partners' binge drinking and alcohol-related consequences

may lead young adults to change their binge drinking behavior. The association of alcohol-related

consequences with binge drinking may differ by relationship type, with stronger associations for married

individuals than for their cohabitating or dating peers. In the present paper, we have two objectives: (1)

to examine how young adults' own alcohol-related consequences and their romantic partners' binge

drinking and alcohol-related consequences are associated with changes in binge drinking over time, and

(2) to determine whether relationship type (dating, cohabitating, or married) moderates these

associations.

Negative Alcohol-related Consequences and Binge Drinking

Negative alcohol-related consequences are common in young adulthood; upwards of 75% of

young adults have experienced at least one negative alcohol-related consequence in their lifetime

(Kahler, Strong, & Read, 2005; Perkins, 2002). These consequences can be intrapersonal (i.e., damage to

self), interpersonal (i.e., damage to others/relationships), or social (i.e., institutional costs). In addition,

negative alcohol-related consequences can be in the domains of physical health, such as illness;

psychological health, such as regret; safety, such as driving under the influence; and financial health,

such as problems at work (Kahler et al., 2005; Perkins, 2002).

Although young adults experience both positive and negative consequences of binge drinking

(Lee et al., 2011; Patrick & Maggs, 2008), the negative consequences are particularly problematic

because of their impacts on individuals and society. In order to inform prevention and policy related to

binge drinking, researchers have examined how negative alcohol-related consequences shape future

binge drinking. According to models of consequences and behavior such as operant conditioning and the

feed-forward model of alcohol use (Lee, Maggs, Neighbors, & Patrick, 2011; Sdao-Jarvie & Vogel-Sprott,

1991), the consequences of binge drinking influence expectancies for future binge drinking; in turn,

these expectancies influence future behavior. From these perspectives, negative consequences should

increase negative alcohol-related expectancies, leading to decreases in alcohol use. Based on these

models, interventions using techniques such as motivational interviewing aim to make the negative

consequences of alcohol use salient to young adults in order to decrease binge drinking (e.g., Dimeff,

1999).

However, many young adults may not see negative alcohol-related consequences as

problematic. Many young adults perceive alcohol-related consequences (e.g. blacking out) as neutral or

positive, even when these consequences are objectively detrimental to health and safety (Logan, Henry,

Vaughn, Luk, & King, 2012; Patrick & Maggs, 2011). Perhaps because young adults perceive negative

alcohol-related consequences as desirable or unproblematic, these consequences may not lead to

decreases in binge drinking. Instead, research indicates that negative consequences are unrelated to

changes in plans to drink (Patrick & Maggs, 2008) or even associated with increases in alcohol use over

time (White & Ray, 2014). This finding presents problems for binge drinking interventions, suggesting

that highlighting the negative consequences of alcohol use may not produce the desired reductions in

binge drinking.

Romantic Relationships and Binge Drinking in Young Adulthood

Acknowledging that binge drinking occurs within social contexts is important for understanding

how negative alcohol-related consequences correspond to changes in binge drinking. A feed-forward

model of alcohol use draws on social learning and expectancy theories to explain how social

relationships may influence alcohol use (Lee et al., 2011). According to this model, norms (social

expectations that guide behavior) and expectancies (beliefs about the consequences of a behavior)

related to alcohol use determine alcohol use. Both direct and vicarious experiences with alcohol (i.e.,

individuals' own experiences and their observations of others' experiences, respectively) shape alcohol-

related norms and alcohol-related expectancies (Goldman, 1994; Oei & Baldwin, 1994). Thus, observing

close others' binge drinking and alcohol-related consequences determines individuals' cognitions about

binge drinking, shaping future binge drinking.

Romantic relationships are an important context for young adults' binge drinking. Romantic

relationships are mutually acknowledged, ongoing interactions involving distinctive emotional intensity

and current or anticipated sexual behavior (Collins, Welsh, & Furman, 2009). Between the ages of 18

and 30, romantic partners become an increasingly important source of emotional support, while friends

and parents become less important (Seiffge-Krenke, 2003). Simultaneously, romantic relationships

become more committed, with many individuals choosing to cohabitate with or marry their partners

during this period (Meier & Allen, 2009; Shulman & Connolly, 2013).

Given that romantic relationships increase in importance in young adulthood (Arnett, 2000;

Furman & Collibee, 2014; Meier & Allen, 2009), partners' binge drinking and negative alcohol-related

consequences may influence individuals' own binge drinking. Regarding partners' binge drinking, past

research indicates that having a partner who drinks more is associated with increases over time in

individuals' own alcohol use and binge drinking (Fleming et al., 2010; Kim, Tiberio, Pears, Capaldi, &

Washburn, 2013; Mushquash et al., 2013; Wiersma et al., 2011). Social learning theory (Akers, Krohn,

Lanza-Kaduce, & Radosevich, 1979) offers an explanation of the mechanisms for these associations.

Individuals can observe and mimic others' behavior, and/or learn norms for behavior by observing close

others (Akers et al., 1979; Bandura, 1977). Thus, observing a romantic partner binge drink could lead to

mimicking this behavior. In addition, observing a partner binge drink normalizes this behavior; internalizing this norm leads individuals to drink more in order to conform to the norm within their environment.

In addition to romantic partners' binge drinking, romantic partners' negative alcohol-related consequences may influence individuals' binge drinking in a similar way. A feed-forward model of alcohol use might suggest that observing a romantic partner's negative alcohol-related consequences normalizes experiencing these consequences, which in turn may lead individuals to continue to binge drink despite experiencing negative consequences themselves. However, an alternate possibility is that witnessing others' negative alcohol-related consequences leads to negative alcohol-related expectancies and therefore decreased binge drinking. Individuals may be better able to recognize alcohol-related consequences as problematic when witnessed in others, compared to when experienced oneself. Reactions to one's own alcohol-related consequences may be minimized by the fact that they are often experienced while intoxicated. In contrast, individuals do not have "rose-colored beer goggles" (Logan et al., 2012) when observing a romantic partner experience negative alcohol-related consequences. Furthermore, individuals may better be able to recognize others' alcohol-related consequences as problematic, compared to others' binge drinking. Romantic partners' consequences may directly affect individuals' own well-being (Perkins, 2002). For example, individuals may be exposed to aggression from their partners when they are drunk, or they may have to care for their romantic partners when they are sick from drinking. Therefore, observing romantic partners' negative alcohol-related consequences may lead individuals to recognize these consequences as problematic, which in turn may lead them to avoid experiencing them personally by reducing their alcohol use.

Understanding how romantic partners' negative alcohol-related consequences are uniquely associated with changes in binge drinking will help inform binge drinking interventions aimed at young adults. Multiple prevention programs target college student binge drinking by informing students that

their peers' alcohol use is more moderate than students realize (Lewis, Neighbors, Oster-Aaland, Kirkeby, & Larimer, 2007; Neighbors et al., 2010; Walters & Neighbors, 2005). In these normative feedback interventions, correcting misperceptions about others' binge drinking leads students to drink less. These interventions are limited in scope because they focus on peers and typically target college students. Additional interventions target binge drinking in romantic relationships, but typically focus on married couples (Powers, Vedel, & Emmelkamp, 2008). However, interventions may also consider addressing binge drinking within diverse romantic relationships in young adulthood. Such interventions may be viable in non-educational settings such as relationship education programs, because many young adults continue to binge drink after college (McCarty et al., 2004; Windle, Mun, & Windle, 2005), and many do not attend college in the first place (National Center for Education Statistics, 2016). Furthermore, the results of the present research can inform the content of interventions to reduce alcohol use. For example, if we find that partners' negative alcohol-related consequences predict changes in individuals' own binge drinking, intervention designers may consider incorporating norms for experiencing alcohol-related consequences into normative feedback interventions, in addition to addressing norms for binge drinking.

The Importance of Relationship Type

Romantic relationships are diverse, and partners' influence on each other's binge drinking may depend on relationship characteristics. For instance, relationship type may moderate the association between partners' alcohol-related consequences and individuals' behavior. Past research on partner influence on alcohol use in young adulthood typically focuses on one type of relationship: either married or dating couples (Homish & Leonard, 2007; Leonard & Homish, 2008; Leonard & Mudar, 2003; Levitt & Leonard, 2013). Limited research has explored differences in partner influence on alcohol use across relationship type with mixed results (Bartel et al., 2017; Wiersma, Fischer, Cleveland, Reifman, & Harris, 2011), leading scientists to call for more research to investigate partner influence on binge drinking in

romantic relationships of varying types (Fischer & Wiersma, 2012; Mushquash et al., 2013).

Dating, cohabitating, and married romantic relationships differ from each other in partner commitment and frequency of interaction. Married couples have made a legal commitment to each other, whereas dating and cohabitating couples have not. Marital relationships are characterized by more commitment, satisfaction, and stability than cohabitating and/or dating relationships (Cutrona, Russell, Burzette, Wesner, & Bryant, 2011; Shafer, Jensen, & Larsen, 2014; Stanley & Markman, 1992). The increased commitment and frequency of interaction in marital relationships may increase exposure to partners' binge drinking and partner influences on individuals' own binge drinking. Thus, married romantic partners may have more influence on each other's binge drinking than partners in dating and/or cohabitating relationships do.

It is important to acknowledge that relationship type is typically confounded with other variables such as relationship length and age. Married couples are likely to be older and be in longer relationships than couples who are dating or cohabitating (Nock, 1995; Roisman, Clausell, Holland, Fortuna, & Elieff, 2008). Older individuals binge drink less frequently and may be less susceptible to social influences (Naimi et al., 2003; Steinberg & Monahan, 2007), which may affect partner influences on binge drinking. Individuals in more established relationships may have already experienced partner influence on binge drinking. This history may affect their current similarity in binge drinking and their current degree of partner influence on binge drinking. Therefore, it is important to control for relationship length and age when examining relationship type as a moderator of associations between partners' alcohol-related consequences and binge drinking.

The Present Research

In the present paper, we aim to examine the associations of individuals' negative alcohol-related consequences and their romantic partners' binge drinking and negative alcohol-related consequences with changes in young adults' binge drinking. A second goal of this paper is to examine how romantic

relationship type (dating, cohabitating, or married) moderates the association between partners' alcohol-related consequences and changes in binge drinking. In summary, we propose the following research questions and hypotheses:

1. Do individuals' alcohol-related consequences predict changes in their frequency of binge drinking? We predict that, consistent with past research, individuals who experience more negative alcohol-related consequences will increase their binge drinking.

2. Do romantic partners' binge drinking and alcohol-related consequences predict changes in individuals' own frequency of binge drinking? We predict that, consistent with past research, romantic partners' binge drinking will predict increases in individuals' own binge drinking. Due to multiple possibilities regarding partners' negative alcohol-related consequences, we do not make a directional hypothesis for this question.

3. Does relationship type moderate the associations of partners' binge drinking and negative alcohol-related consequences with changes in binge drinking? We predict that these associations will be stronger for married individuals than individuals in dating or cohabitating relationships.

Method

Participants

The present paper is a secondary analysis of data on romantic couples collected for the National Longitudinal Study of Adolescent to Adult Health (Add Health; Harris, 2009). We use data from waves 3 and 4 of the Add Health study, collected when participants were ages 18-26 and six years later when they were 24-32 years old. At waves 3 and 4, all original participants in the Add Health study were contacted to participate. In addition to the original Add Health sample, at wave 3, a subset of about 500 each of dating, cohabitating, and married partners of the original participants were also recruited and provided data. These romantic partners were not original Add Health participants, but completed the

wave 3 Add Health survey. Inclusion criteria for original participants to be contacted to be in the

Romantic Pairs sample were having a current, opposite sex partner who was at least 18 years old at

wave 3 and having been in that relationship for at least three months.

The present research includes all participants in the Add Health Romantic Pairs sample who

were part of a romantic couple at wave 3 and provided data on all measures (N = 1,139). About half

(56%) of the analytic sample was female. Regarding race/ethnicity, 77% of Add Health participants in the

analytic sample were White/Caucasian, 16% were Black/African American, 7% were Asian, 5% were

American Indian/Native American, and 13% reported Hispanic ethnicity. The responses to items about

race/ethnicity were not mutually exclusive; participants could select more than one category. Of

participants' wave 3 romantic partners, 76% were White/Caucasian, 16% were Black/African American,

6% were Asian, 6% were American Indian/Native American, and 14% reported Hispanic ethnicity.

Regarding sexual identity, 91% of participants identified as heterosexual, 7% were mostly heterosexual,

1% were bisexual, and less than 1% were gay or asexual. Ninety-three percent of romantic partners

identified as heterosexual, 6% as mostly heterosexual, and 1% as bisexual. Participants were, on

average, 22.03 years old at wave 3 (SD = 1.71). Their romantic partners were, on average, 23.24 years

old at wave 3 (SD = 3.71). On average, participants had completed 13.01 years of school at wave 3 (SD =

1.95). Their romantic partners had completed, on average 13.01 years of school (SD = 3.20).

We compared the demographic information of participants in the analytic sample to Add Health

wave 3 participants who were excluded from the analytic sample using five χ^2 tests and two

independent samples t-tests. The analytic sample was more likely to be female (p < .05) and had fewer

years of education at wave 3 (p < .01). We conducted race comparisons by comparing the likelihood of

belonging to each racial category to the likelihood of not belonging to that category. Participants in the

analytic sample were less likely to be Black/African American (p < .001) or White/Caucasian (p < .001)

than were those in the larger sample. The samples did not differ in their likelihood of being Asian (p >

.05) or American Indian/Native American (p > .05). Regarding ethnicity, participants in the analytic

sample were less likely to be Hispanic (p < .001) than individuals not in the analytic sample. The samples

did not differ in their likelihood of being heterosexual (p > .05) or in their age at wave 3 (p > .05).

Measures

      Frequency of binge drinking. Participants responded to the question, "During the past 12

months, on how many days did you drink five or more drinks in a row?" Response options ranged from 0

(*None*) to 6 (*Every day or almost every day*). At wave 3, both participants and their romantic partners

responded to this question (participant mean = 1.05 [*SD* = 1.48]; partner mean = 1.10 [*SD* = 1.52]). At

wave 4, only original Add Health participants responded to this question (mean = 1.15 [*SD* = 1.54]). After

the alcohol use questionnaire used in Add Health was designed, it became common to use separate

criteria to identify binge drinking in men and women (Wechsler, Dowdall, Davenport, & Rimm, 1995;

Wechsler & Nelson, 2001). However, many published studies have used Add Health's measure of binge

drinking (e.g., Guilamo-Ramos, Jaccard, Johansson, & Turrisi, 2004; Hahm, Lahiff, & Guterman, 2004;

Tucker, Pollard, De La Haye, Kennedy, & Green, 2013) and researchers have used similar measures in

other national studies of alcohol use (e.g., Centers for Disease Control, 2015; Johnston, O'Malley, Miech,

Bachman, & Schulenberg, 2016).

      Negative alcohol-related consequences. At wave 3, both participants and their romantic

partners who reported having drunk alcohol in the past 12 months responded to 8 questions about the

frequency with which they had experienced different negative consequences of drinking (e.g., had

problems with friends, were sick to your stomach or threw up) in the past 12 months. Response options

ranged from 0 (*Never*) to 4 (*5 or more times*). We calculated the mean of these items and coded

individuals who did not drink in the past 12 months as 0 for this measure (participant mean = 0.26 [*SD* =

0.41]; partner mean = 0.27 [*SD* = 0.43]). The reliability for this measure was adequate (α = .74 for

participants, α = .72 for romantic partners).

Relationship type. At wave 3, participants reported whether they were married to their current romantic partner. If they were not married, they reported whether they currently live in the same residence. The responses to these questions informed the categorization of participants as dating (39%), cohabitating (27%), or married (34%).

Relationship length. At wave 3, participants reported the month and year that their relationship began. We computed the length of the relationship, in months, by subtracting the relationship beginning date from the interview date. On average, participants had been with their current partner for 37.53 months (SD = 24.46) at wave 3. Relationship length differed significantly between married (mean = 51.74 months, SD = 25.92), cohabitating (mean = 32.69 months, SD = 21.47), and dating couples (mean = 28.06 months, SD = 21.74), F = 116.90, p < .001). We used this measure of relationship length as a control variable in the analyses.

Education level. At wave 3, participants reported the highest grade or year of regular school that they completed. Responses ranged from 6 (6th *grade*) to 22 (*5 or more years of graduate school*), mean = 13.01 (SD = 1.95). We used this continuous measure of education as a control variable in the analyses.

Analytic Plan

Although both participants and romantic partners reported their binge drinking frequency and negative alcohol-related consequences at wave 3, only original Add Health participants reported their alcohol use at wave 4. Therefore, the original Add Health participants are the units of analysis in the current paper. We used a six-step multiple regression to predict binge drinking at wave 4. In Model 1, we predicted binge drinking at wave 4 from control variables and participants' binge drinking at wave 3. In Models 2-4, we separately added partners' binge drinking at wave 3, participants' alcohol-related consequences, and partners' alcohol-related consequences. These models predicted whether each variable predicted changes in participants' binge drinking between waves 3 and 4, net of control

variables. In Model 5, we included all of the variables assessed in Models 2-4 in order to determine whether each variable uniquely predicted changes in participants' binge drinking, net of control variables. In Model 6, we added interaction terms for dating and cohabiting with partners' binge drinking and alcohol-related consequences. We computed these four interaction terms by first centering partners' alcohol-related consequences, then multiplying dating*partners' binge drinking, cohabitating*partners' binge drinking, dating*partners' consequences, and cohabitating*partners' consequences. In all analyses, we controlled for participants' binge drinking at wave 3, relationship length at wave 3, participants' education level, age, gender, and race/ethnicity (four variables for Black/African American, American Indian/Native American, Asian, and Hispanic).

<p style="text-align:center">Results</p>

Regression results. Multiple regression results are presented in Table 2-1. In Model 1, participants' binge drinking at wave 3 predicted their binge drinking at wave 4. That is, participants who binge drank more frequently at wave 3 binge drank more frequently at wave 4. In Model 2, partner binge drinking frequency at wave 3 predicted participant binge drinking at wave 4, controlling for participant binge drinking at wave 3. Participants increased their binge drinking frequency if their romantic partners binge drank more frequently at wave 3. This association remained significant in Model 5, which included additional predictors for participants' and partners' negative alcohol-related consequences.

In Model 3, participants' negative alcohol-related consequences predicted binge drinking at wave 4, controlling for participant binge drinking at wave 3. That is, participants increased their binge drinking frequency if they experienced more negative alcohol-related consequences at wave 3. This association remained significant in Model 5.

In Model 4, partners' negative alcohol-related consequences predicted binge drinking at wave 4, controlling for participant binge drinking at wave 3. That is, participants increased their binge drinking

frequency if their romantic partners experienced more negative alcohol-related consequences at wave 3. This association was no longer significant in Model 5; thus, the association between partners' negative alcohol-related consequences and participants' binge drinking was accounted for by partners' binge drinking at wave 3 and participants' negative alcohol-related consequences.

In Model 6, we added interactions of relationship type by partners' binge drinking and negative alcohol-related consequences. None of these interactions were statistically significant. Therefore, the associations of participants' and partners' binge drinking and negative alcohol-related consequences with future binge drinking did not differ by relationship type.

Additional Analyses

As others have found (Bartel et al., 2017; Fleming et al, 2010; Mushquash et al., 2013), frequency of binge drinking was positively skewed, which violates the assumptions of linear regression. In the current paper, we used a similar measure of binge drinking as other scholars (e.g., Bartel et al., 2017; Fleming et al., 2010). However, to further explore these associations with a non-skewed variable, we conducted additional logistic regression analyses predicting dichotomized binge drinking at wave 4 (0 = did not binge drink, 51% of the sample; 1 = did binge drink, 49% of the sample) from our controls and predictors at wave 3. These results are available in Appendix C, although we do not interpret them in the present paper.

<div align="center">

Discussion

</div>

In the present study, we examined how individuals' own negative alcohol-related consequences and their romantic partners' binge drinking and negative alcohol-related consequences predicted changes in binge drinking. The results partially supported the idea that romantic partners' negative alcohol-related consequences would be associated with young adults' binge drinking. Individuals increased their binge drinking if they experienced more negative alcohol-related consequences and if their romantic partners experienced more negative alcohol-related consequences. However, the

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association of romantic partners' consequences with individuals' binge drinking was no longer significant

in the context of other predictors. The associations did not differ by relationship type (dating,

cohabitating, married). The results inform understanding of the role of romantic relationships in

determining young adult binge drinking from a social learning perspective.

Negative Alcohol-related Consequences, Romantic Relationships, and Binge Drinking

A central question of this paper was whether individuals might change their alcohol use after

observing their romantic partners' binge drinking and negative alcohol-related consequences. The

hypotheses for this question draw on social learning and expectancy theories. The results support social

learning explanations of binge drinking and raise questions about whether romantic relationships shape

alcohol expectancies. Regarding social learning theory, social learning explanations of behavior propose

that individuals mimic others' behavior, and that individuals learn norms for behavior by observing

others (Akers et al., 1974; Bandura, 1977). Through these processes, observing partners' binge drinking

may lead to increases in individuals' own binge drinking. Similarly, partners' alcohol-related

consequences may also lead to increases in individuals' binge drinking. Consistent with past research

(e.g., Fleming et al., 2010; Kim et al., 2013; Mushquash et al., 2013), individuals whose romantic

partners' binge drank more frequently increased their own binge drinking. In addition, when partners'

negative alcohol-related consequences were examined separately from other predictors, individuals

whose romantic partners experienced more negative alcohol-related consequences increased their

binge drinking. However, in a combined model, this association was accounted for by other predictors.

These findings advance social learning explanations of alcohol use in young adulthood.

Specifically, individuals may mimic partners' behavior or learn norms of behavior from observing their

romantic partners, which influence future alcohol use. Because the associations of partners' negative

alcohol-related consequences with changes in alcohol use were accounted for by other predictors,

observing partners' alcohol-related consequences may not be a primary method of social learning of

alcohol-related norms. Instead, norms may be based more strongly on partners' binge drinking than partners' negative alcohol-related consequences. One possible explanation for why partners' behavior uniquely predicts binge drinking, but partners' consequences do not, is that drinking behavior is more easily observed than drinking consequences. For example, it is easier to observe how many drinks someone has consumed than to observe whether they feel hungover after drinking. Another explanation is that individuals may witness their partners' alcohol-related consequences without also observing their binge drinking; for example, an individual may have to care for a sick partner the day after the partner goes out drinking with friends. In this scenario, the individual may not know how much their partner drank, and therefore may not perceive that reducing alcohol use is necessary to solve the problem of negative alcohol-related consequences. Observing both a romantic partner's binge drinking and its consequences may be necessary in order for partners' negative alcohol-related consequences to effect change in individuals' own behavior.

An alternate hypothesis for the question of whether romantic partners' alcohol-related consequences were associated with binge drinking drew on expectancy theory (Goldman, 1994; Oei & Baldwin, 1994). According to this theory, experiences with alcohol shape expectations for the consequences of alcohol use. Negative experiences may lead to negative expectancies, which in turn are associated with decreases in binge drinking. We proposed that individuals may be better able to recognize negative alcohol-related consequences as problematic when they observe them in romantic partners rather than experiencing them personally. In turn, individuals may reduce their alcohol use after observing partners' consequences. The results did not support this hypothesis, instead revealing that young adults *increased* their binge drinking if their romantic partners experienced more negative alcohol-related consequences (although this association was accounted for by other variables). Similarly, individuals increased their binge drinking after experiencing negative alcohol-related consequences personally. This finding adds to the body of literature demonstrating that young adults often discount

their own negative experiences after using alcohol or perceive these consequences as positive despite

their objective health risks (Logan et al., 2012; Mallett, Lee, Neighbors, Larimer, & Turrisi, 2006; Patrick

& Maggs, 2008; White & Ray, 2014). It appears that individuals either discount their romantic partners'

negative experiences after using alcohol, or may perceive them as positive. These findings challenge

expectancy explanations of alcohol use in young adulthood.

Relationship Type

In addition to examining how partners' negative alcohol-related consequences predict changes

in young adults' binge drinking, we assessed whether relationship type moderated this association. Past

work on partners' influences on young adults' alcohol use has typically used samples that are

homogeneous in relationship type (dating, cohabitating, or marital; Fischer & Wiersma, 2012);

therefore, less is known about how diverse relationships may be associated with binge drinking (for

exceptions, see Bartel et al., 2017; Wiersma et al., 2011). We hypothesized that individuals in marital

relationships may be more susceptible to partner influences on binge drinking than individuals in dating

or cohabitating relationships due to the increased commitment of marital relationships. In contrast to

our hypothesis, relationship type did not moderate the associations of partners' binge drinking or

partners' negative alcohol-related consequences and changes in individuals' binge drinking. One

explanation for these findings is that even less committed/stable romantic relationships are associated

with young adults' binge drinking. Past research indicates that even dating relationships are marked by

high levels of emotional intimacy and commitment in young adulthood (Banker, Kaestle, & Allen, 2010;

Meier & Allen, 2009). Therefore, dating relationships may be equally influential on binge drinking as

cohabitating and marital relationships. Alternatively, our measure of relationship type may not have

captured the relationship factors that make some romantic relationships more influential than others.

Our findings add to the limited body of research examining partner type as a moderator of partner

influence on alcohol use, supporting findings that multiple types of romantic relationships are associated

with young adults' alcohol use (Bartel et al., 2017; Wiersma et al., 2011). Future research should continue to explore what qualities of romantic relationships may affect partner influences on binge drinking and other risk behaviors. For example, our interest in relationship type was based on the assumption that dating, cohabitating, and marital relationships differed in commitment. However, measuring relationship commitment would be a more direct way to assess this construct than measuring relationship type. An additional potential area of focus is relative power within the relationship; partners with more power may be more influential on their partners' behavior than partners who have less power.

Prevention Implications

The results have implications for interventions to reduce binge drinking within young adult romantic couples. Couples-based behavioral alcohol treatments exist, and they typically focus on married couples and assess one partner's alcohol use as an outcome (Powers et al., 2008). The results suggest that addressing the binge drinking of the higher-drinking partner may result in decreases in binge drinking for both partners; therefore, future interventions should assess both partners' binge drinking as outcomes. Although including additional information on alcohol consequences may be an effective strategy in reducing individuals' own binge drinking, changes in individuals' alcohol-related consequences may not directly influence their partners' binge drinking. In addition, the findings regarding relationship type suggest that couple-focused interventions that address drinking norms may be viable with dating and cohabitating couples as well as married couples.

The results also highlight the challenges of using individuals' own negative consequences to intervene on binge drinking. Consistent with past research (White & Ray, 2014), individuals' binge drinking increased when they experienced more negative alcohol-related consequences. This finding may reflect the fact that individuals discount negative consequences and attend to positive consequences of binge drinking (Lee et al., 2011; Park, 2004; Patrick & Maggs, 2008). Despite these

findings, television ad campaigns and intervention programs to reduce binge drinking tend to highlight the negative outcomes associated with alcohol use (Dimeff, 1999; Fachini, Aliane, Martinez, & Furtado, 2012; Labrie, Huchting, Clayton, & Neighbors, 2009). If these programs do not reflect young adults' experiences, they may not be effective in reducing binge drinking. However, these programs are effective (Fachini et al., 2012); it is possible that the focus on negative alcohol-related consequences may not contribute to the success of these programs. Future research should examine what qualities of these programs make them effective.

Limitations and Future Directions

It is important to recognize the limitations of this paper, which provide directions for future research. One limitation is our focus on negative alcohol-related consequences. Although young adults tend to discount negative alcohol-related consequences, positive consequences of alcohol use often outweigh negative consequences in frequency and importance (Lee et al., 2011; Patrick & Maggs, 2008). Therefore, positive consequences may drive future decision-making with respect to alcohol use. Because we did not have a measure of positive alcohol-related consequences, we were unable to address the possibility that positive consequences explained our findings. For example, romantic partners who experienced many negative consequences may also have experienced many positive consequences (Lee et al., 2011; Park, 2004). In turn, these positive consequences may influence norms for binge drinking consequences and expectancies that binge drinking leads to positive consequences, encouraging individuals to binge drink more frequently. Researchers should continue to examine how both positive and negative alcohol-related consequences combine to influence future behavior.

In addition to being unable to measure positive consequences, we were unable to measure mechanisms by which partners' binge drinking and negative alcohol-related consequences may have influenced future binge drinking. Possible mechanisms include evaluations of alcohol-related consequences and alcohol expectancies/alcohol-related attitudes. Regarding evaluations of

consequences, individuals who evaluate their consequences of alcohol use more negatively are more

likely to decrease their alcohol use (Barnett, Merrill, Kahler, & Colby, 2015; Merrill, Read, & Colder,

2013). Similarly, individuals' evaluations of their partners' alcohol-related consequences may influence

their own future binge drinking. Regarding alcohol expectancies, a feed-forward model of alcohol use

drawing on social learning theory (Lee et al., 2011) proposes that observing others' behaviors and

attitudes leads to changes in expectancies, or expectations about what will happen as a result of

drinking. In turn, these expectancies influence future alcohol use. Our hypothesis that observing others'

negative alcohol-related consequences may lead to changes in alcohol use utilizes this model. Future

research should aim to understand how observing others' alcohol-related consequences influences

evaluations, and expectancies, which may explain changes in future binge drinking. In addition, other

partner characteristics may affect partners' associations with binge drinking. For example, romantic

partners' alcohol-related attitudes may influence young adults' binge drinking.

It is important to acknowledge that the results of this study do not necessarily suggest causal

associations between variables. Using longitudinal data helps to eliminate the possibility that time-

stable confounding factors such as personality explain the results; however, it does not eliminate the

possibility that time-varying factors may simultaneously influence partners' alcohol-related

consequences and individuals' own alcohol use. For example, negative alcohol-related consequences

may lead to mental health problems for individuals and their romantic partners, which in turn cause

increases in both partners' binge drinking over time.

In addition to addressing the limitations of the present research, researchers can build on the

present findings to answer related research questions. A strength of this paper was its sample, which

was diverse in terms of educational status. Much research on social influences on alcohol use/binge

drinking relies on college student samples (e.g., Borsari & Carey, 2003; LaBrie et al., 2010; Lewis et al.,

2007; Neighbors et al., 2008). However, alcohol use and binge drinking also occur among young adults

who do not attend college, and often extend beyond the traditional college years for college-attending and non-college-attending young adults alike (Naimi et al., 2003; McCarty et al., 2004; Windle et al., 2005). The present paper replicated findings related to partners' binge drinking, young adults' negative alcohol-related consequences, and future binge drinking in an educationally diverse sample. Future research should continue to address alcohol use and alcohol-related consequences in diverse populations.

In addition to exploring diverse populations, researchers may consider addressing diverse social relationships as predictors of binge drinking. The results of the present study strengthened evidence of romantic partners' potential influence on binge drinking. Other social relationships may also influence binge drinking; for example, friends' characteristics are important determinants young adults' alcohol use (Leonard & Mudar, 2003). Therefore, researchers may consider understanding how these diverse social relationships uniquely predict binge drinking in young adulthood.

Conclusion

This paper advances understanding of how romantic partners are associated with young adults' binge drinking. Individuals increased their binge drinking if their romantic partner binge drank more frequently, even after controlling for own drinking. Although romantic partners' negative alcohol-related consequences were also associated with young adults' binge drinking, this association was no longer significant after controlling for other variables. In addition, these associations did not differ by relationship type. The results inform social learning explanations of romantic partners' influence on binge drinking in young adulthood, suggesting that social learning of behavior is more influential on binge drinking than social learning of consequences.

References

Akers, R. L., Krohn, M. D., Lanza-Kaduce, L., & Radosevich, M. (1979). Social learning and deviant

behavior: A specific test of a general theory. *American Sociological Review, 44*, 636-655.

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the

twenties. *American Psychologist, 55*, 469-480.

Bandura, A. (1977). *Social learning theories*. Englewood Cliffs, NJ: Practice Hall.

Banker, J. E., Kaestle, C. E., & Allen, K. R. (2010). Dating is hard work: A narrative approach to

understanding sexual and romantic relationships in young adulthood. *Contemporary Family*

Therapy, 32, 173-191.

Barnett, N. P., Merrill, J. E., Kahler, C. W., & Colby, S. M. (2015). Negative evaluations of negative alcohol

consequences lead to subsequent reductions in alcohol use. *Psychology of Addictive Behaviors,*

29, 992–1002.

Borsari, B., & Carey, K. B. (2003). Descriptive and injunctive norms in college drinking: A meta-analytic

integration. *Journal of Studies on Alcohol, 64*, 331-341.

Centers for Disease Control. (2015). Youth risk behavior surveillance - United States, 2015. *Surveillance*

Summaries, 65, 1-174.

Collins, W. A., Welsh, D. P., & Furman, W. (2009). Adolescent romantic relationships. *Annual Review of*

Psychology, 60, 631-652.

Cutrona, C. E., Russell, D. W., Burzette, R. G., Wesner, K. A., & Bryant, C. M. (2011). Predicting

relationship stability among midlife African American couples. *Journal of Consulting and Clinical*

Psychology, 79, 814-825.

Dimeff, L. A. (Ed.). (1999). *Brief alcohol screening and intervention for college students (BASICS): A harm*

reduction approach. New York, NY: Guilford Press.

Fachini, A., Aliane, P. P., Martinez, E. Z., & Furtado, E. F. (2012). Efficacy of brief alcohol screening

intervention for college students (BASICS): A meta-analysis of randomized controlled trials. *Substance Abuse Treatment, Prevention, and Policy, 7*, 1-20.

Fleming, C. B., White, H. R., & Catalano, R. F. (2010). Romantic relationships and substance use in early adulthood: An examination of the influences of relationship type, partner substance use, and relationship quality. *Journal of Health and Social Behavior, 51*, 153-167.

Furman, W., & Collibee, C. (2014). A matter of timing: Developmental theories of romantic involvement and psychosocial adjustment. *Development and Psychopathology, 26*, 1149-1160.

Goldman, M. S. (1994). The alcohol expectancy concept: Applications to assessment, prevention, and treatment of alcohol abuse. *Applied and Preventive Psychology, 3*, 131–144.

Guilamo-Ramos, V., Jaccard, J., Johansson, M., & Turrisi, R. (2004). Binge drinking among Latino youth: Role of acculturation-related variables. *Psychology of Addictive Behaviors, 18*, 135-142.

Hahm, H. C., Lahiff, M., & Guterman, N. B. (2004). Asian American adolescents' acculturation, binge drinking, and alcohol-and tobacco-using peers. *Journal of Community Psychology, 32*, 295-308.

Harris, K. M. (2009). *The National Longitudinal Study of Adolescent to Adult Health (Add Health), Waves I & II, 1994–1996; Wave III, 2001–2002; Wave IV, 2007-2009 [machine-readable data file and documentation]*. Chapel Hill, NC: Carolina Population Center, University of North Carolina at Chapel Hill.

Homish, G. G., & Leonard, K. E. (2007). Alcohol use and partner expectations among newly married couples. *Substance Use & Misuse, 42*, 1427-1441.

Johnston, L., O'Malley, P. M., Miech, R. A., Bachman, J. G., & Schulenberg, J. E. (2016). *Monitoring the future: National results on adolescent drug use: Overview of key findings, 2015*. Bethesda, MD: National Institute on Drug Abuse.

Kahler, C. W., Strong, D. R., & Read, J. P. (2005). Toward efficient and comprehensive measurement of the alcohol problems continuum in college students: The Brief Young Adult Alcohol

Consequences Questionnaire. *Alcoholism: Clinical and Experimental Research, 29*, 1180-1189.

Kim, H. K., Tiberio, S. S., Pears, K. C., Capaldi, D. M., & Washburn, I. J. (2013). Growth of men's alcohol use in early adulthood: Intimate partners' influence. *Psychology of Addictive Behaviors, 27*, 1167-1174.

LaBrie, J. W., Hummer, J. F., Huchting, K. K., & Neighbors, C. (2009). A brief live interactive normative group intervention using wireless keypads to reduce drinking and alcohol consequences in college student athletes. *Drug and Alcohol Review, 28*, 40-47.

LaBrie, J. W., Hummer, J. F., Neighbors, C., & Larimer, M. E. (2010). Whose opinion matters? The relationship between injunctive norms and alcohol consequences in college students. *Addictive Behaviors, 35*, 343-349.

Lee, C. M., Maggs, J. L., Neighbors, C., & Patrick, M. E. (2011). Positive and negative alcohol-related consequences: Associations with past drinking. *Journal of Adolescence, 34*, 87-94.

Leonard, K. E., & Homish, G. G. (2008). Predictors of heavy drinking and drinking problems over the first 4 years of marriage. *Psychology of Addictive Behaviors, 22*, 25-35.

Leonard, K. E., & Mudar, P. (2003). Peer and partner drinking and the transition to marriage: A longitudinal examination of selection and influence processes. *Psychology of Addictive Behaviors, 17*, 115-125.

Levitt, A., & Leonard, K. E. (2013). Relationship-specific alcohol expectancies and relationship-drinking contexts: Reciprocal influence and gender-specific effects over the first 9 years of marriage. *Psychology of Addictive Behaviors, 27*, 986-996.

Lewis, M. A., Neighbors, C., Oster-Aaland, L., Kirkeby, B. S., & Larimer, M. E. (2007). Indicated prevention for incoming freshmen: Personalized normative feedback and high-risk drinking. *Addictive Behaviors, 32*, 2495-2508.

Logan, D. E., Henry, T., Vaughn, M., Luk, J. W., & King, K. M. (2012). Rose-colored beer goggles: The

relation between experiencing alcohol consequences and perceived likelihood and valence.

Psychology of Addictive Behaviors, 26, 311-317.

Mallett, K. A., Lee, C. M., Neighbors, C., Larimer, M. E., & Turrisi, R. (2006). Do we learn from our

mistakes? An examination of the impact of negative alcohol-related consequences on college

students' drinking patterns and perceptions. *Journal of Studies on Alcohol, 67*, 269-276.

McCarty, C. A., Ebel, B. E., Garrison, M. M., DiGiuseppe, D. L., Christakis, D. A., & Rivara, F. P. (2004).

Continuity of binge and harmful drinking from late adolescence to early adulthood. *Pediatrics,*

114, 714-719.

Meier, A., & Allen, G. (2009). Romantic relationships from adolescence to young adulthood: Evidence

from the National Longitudinal Study of Adolescent Health. *The Sociological Quarterly, 50*, 308-

335.

Merrill, J. E., Read, J. P., & Colder, C. R. (2013). Normative perceptions and past-year consequences as

predictors of subjective evaluations and weekly drinking behavior. *Addictive Behaviors, 38*,

2625-2634.

Murgraff, V., Parrott, A., & Bennett, P. (1999). Risky single-occasion drinking amongst young people--

definition, correlates, policy, and intervention: a broad overview of research findings. *Alcohol*

and Alcoholism, 34, 3-14.

Mushquash, A. R., Stewart, S. H., Sherry, S. B., Mackinnon, S. P., Antony, M. M., & Sherry, D. L. (2013).

Heavy episodic drinking among dating partners: A longitudinal actor–partner interdependence

model. *Psychology of Addictive Behaviors, 27*, 178-183.

Naimi, T. S., Brewer, R. D., Mokdad, A., Denny, C., Serdula, M. K., & Marks, J. S. (2003). Binge drinking

among US adults. *Journal of the American Medical Association, 289*, 70-75.

Neal, D. J., & Fromme, K. (2007). Event-level covariation of alcohol intoxication and behavioral risks

during the first year of college*. Journal of Consulting and Clinical psychology, 75*, 294-306.

Neighbors, C., Lewis, M. A., Atkins, D. C., Jensen, M. M., Walter, T., Fossos, N., ... & Larimer, M. E. (2010). Efficacy of web-based personalized normative feedback: A two-year randomized controlled trial. *Journal of Consulting and Clinical Psychology, 78*, 898-911.

Neighbors, C., O'Connor, R. M., Lewis, M. A., Chawla, N., Lee, C. M., & Fossos, N. (2008). The relative impact of injunctive norms on college student drinking: The role of reference group. *Psychology of Addictive Behaviors, 22*, 576-581.

Nock, S. L. (1995). A comparison of marriages and cohabiting relationships. *Journal of Family Issues, 16*, 53-76.

Oei, T. P. S., & Baldwin, A. R. (1994). Expectancy theory: A two-process model of alcohol use and abuse. *Journal of Studies on Alcohol, 55*, 525–534.

Orchowski, L. M., & Barnett, N. P. (2012). Alcohol-related sexual consequences during the transition from high school to college. *Addictive Behaviors, 37*, 256-263.

Park, C. L. (2004). Positive and negative consequences of alcohol consumption in college students. *Addictive Behaviors, 29*, 311-321.

Patrick, M. E., & Maggs, J. L. (2008). Short-term changes in plans to drink and importance of positive and negative alcohol consequences. *Journal of Adolescence, 31*, 307-321.

Patrick, M. E., & Maggs, J. L. (2011). College students' evaluations of alcohol consequences as positive and negative. *Addictive Behaviors, 36*, 1148-1153.

Perkins, H. W. (2002). Surveying the damage: A review of research on consequences of alcohol misuse in college populations. *Journal of Studies on Alcohol, 14*, S91–S100.

Powers, M. B., Vedel, E., & Emmelkamp, P. M. (2008). Behavioral couples therapy (BCT) for alcohol and drug use disorders: A meta-analysis. *Clinical Psychology Review, 28*, 952-962.

Roisman, G. I., Clausell, E., Holland, A., Fortuna, K., & Elieff, C. (2008). Adult romantic relationships as contexts of human development: A multimethod comparison of same-sex couples with

opposite-sex dating, engaged, and married dyads. *Developmental Psychology, 44, 91-101*.

Sdao-Jarvie, K., & Vogel-Sprott, M. (1991). Response expectancies affect the acquisition and display of

behavioral tolerance to alcohol. *Alcohol, 8*, 491-498.

Seiffge-Krenke, I. (2003). Testing theories of romantic development from adolescence to young

adulthood: Evidence of a developmental sequence. *International Journal of Behavioral

Development*, *27*, 519-531.

Shafer, K., Jensen, T. M., & Larson, J. H. (2014). Relationship effort, satisfaction, and stability: Differences

across union type. *Journal of Marital and Family Therapy, 40*, 212-232.

Shulman, S., & Connolly, J. (2013). The challenge of romantic relationships in emerging adulthood:

Reconceptualization of the field. *Emerging Adulthood, 1*, 27-39.

Stanley, S. M., & Markman, H. J. (1992). Assessing commitment in personal relationships. *Journal of

Marriage and the Family*, 54, 595-608.

Steinberg, L., & Monahan, K. C. (2007). Age differences in resistance to peer influence. *Developmental

Psychology, 43*, 1531-1543.

Substance Abuse and Mental Health Services Administration. (2014). *Results from the 2013 National

Survey on Drug Use and Health: Summary of national findings (NSDUH Series H-48, HHS

Publication No. (SMA) 14-4863)*. Rockville, MD: DIANE Publishing.

Tucker, J. S., Pollard, M. S., De La Haye, K., Kennedy, D. P., & Green, H. D. (2013). Neighborhood

characteristics and the initiation of marijuana use and binge drinking. *Drug and Alcohol

Dependence, 128*, 83-89.

Walters, S. T., & Neighbors, C. (2005). Feedback interventions for college alcohol misuse: What, why and

for whom? *Addictive Behaviors, 30*, 1168-1182.

Wechsler, H., Dowdall, G. W., Davenport, A., & Rimm, E. B. (1995). A gender-specific measure of binge

drinking among college students. *American Journal of Public Health, 85*, 982-985.

Wechsler, H., & Nelson, T. F. (2001). Binge drinking and the American college student: What's five drinks? *Psychology of Addictive Behaviors, 15*, 287-291.

White, H. R., & Ray, A. E. (2014). Differential evaluations of alcohol-related consequences among emerging adults. *Prevention Science, 15*, 115-124.

Wiersma, J. D., Fischer, J. L., Harrington Cleveland, H., Reifman, A., & Harris, K. S. (2011). Selection and socialization of drinking among young adult dating, cohabiting, and married partners. *Journal of Social and Personal Relationships, 28*, 182-200.

Windle, M., Mun, E. Y., & Windle, R. C. (2005). Adolescent-to-young adulthood heavy drinking trajectories and their prospective predictors. *Journal of Studies on Alcohol, 66*, 313-322.

Table 2-1. *Regression Results Predicting Wave 4 Binge Drinking (N = 1,139)*

	Model 1	Model 2 (partner binge drinking)	Model 3 (participant consequences)	Model 4 (partner consequences)	Model 5 (combined model)	Model 6 (partner type interaction)
R^2	.24***	.25***	.24***	.24***	.25***	.25***
Change in R^2 from Model 1		.01***	.01**	<.01*	.01***	.01
Standardized *β*						
Cohabitating	.03	.02	.02	.02	.02	.01
Dating	.06	.05	.05	.05	.04	.03
Relationship length	-.01	-.01	-.01	-.01	-.01	<-.01
Participant age at wave 3	-.07*	-.07*	-.07*	-.07*	-.06*	-.07*
Years of education	-.04	-.05	-.05	-.05	-.05	-.05
Gender (male = 1)	.12***	.14***	.12***	.12***	.14***	.14***
Black	-.02	-.01	-.02	-.02	-.01	-.01
American Indian/Native American	<-.01	<-.01	<-.01	<-.01	<-.01	-.01
Asian	<-.01	<.01	<-.01	<.01	<-.01	<-.01
Hispanic	.03	.02	.03	.03	.03	.03
Participant binge drinking wave 3	.41***	.39***	.35***	.40***	.34***	.29***
Partner binge drinking wave 3		.10***			.09**	.12**
Participant alcohol consequences wave 3			.10**		.08*	.15
Partner alcohol consequences wave 3				.06*	<.01	.03
Dating*Partner alcohol consequences						.02
Cohabitating*Partner alcohol consequences						-.06
Dating*Partner binge drinking						-.03
Cohabitating*Partner binge drinking						<.01

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

Chapter 4

Paper 3

College students' sexual behavior and daily affect: Differences across alcohol use and partner type

This paper is a multiple-authored work. Rose Wesche is the first author, who drafted the manuscript.

Drs. Eva Lefkowitz and Jennifer Maggs are co-authors. They helped revise the final manuscript. We will

submit this paper to *Archives of Sexual Behavior.*

Abstract

Engaging in oral and/or penetrative sex on a given day is associated with increases in positive affect and decreases in negative affect among adolescents and emerging adults. However, contextual factors such as heavy alcohol use (>4 drinks for women and >5 drinks for men), sexual partner type (casual partner versus committed romantic partner), and semester in college may influence the association between sexual behavior and affect. Using data from US college students (N = 718; 52% female; 44% White, 30% Asian American, 26% Hispanic/Latino American, and 22% Black/African American, multiple responses permitted) who reported oral or penetrative sex on at least one out of 98 days across seven semesters, multi-level models demonstrated that participants reported more positive and less negative affect following days they engaged in sexual behavior compared to days they did not. These within-person associations did not differ by heavy alcohol use, sexual partner type, or semester in college. These findings contrast with prior findings on sexual partner type, heavy alcohol use, and short-term outcomes of sexual behavior. The results suggest that, when using within-person analyses and measuring daily affect as an outcome, college students experience positive outcomes of sexual behavior, even when sex is after heavy drinking or with casual partners. Findings highlight the positive nature of sexual behavior in diverse context and emphasize the challenges of intervening on behaviors that are both risky and rewarding.

College students' sexual behavior and daily affect: Differences across alcohol use and partner type

Sexual behavior in young adulthood is associated with increased positive affect and decreased negative affect at the daily level (Burleson, Trevathan, & Todd, 2009; Fortenberry, Temkit, Tu, Katz, & Orr, 2005; Vasilenko & Lefkowitz, in press). These short-term outcomes may offer positive reinforcement and influence longer-term sexuality development outcomes (Dawson, Shih, de Moor, & Shrier, 2008). However, the associations between sexual behavior and affect may differ based on characteristics of sexual experiences, such as heavy alcohol use and partner type. The goal of the present paper is to examine the associations between sexual behavior, heavy alcohol use, sexual partner type, and daily affect using longitudinal measurement burst data.

Sexual Behavior and Affect

Engaging in sexual behavior, including oral and penetrative sex, is linked to short-term improvements in adolescents' and young adults' emotional health. Some research on this topic addresses positive and negative affect as outcomes of sexual behavior. The results of this research indicate that individuals report more positive affect and less negative affect during months when they engage in sexual behavior (Dalton & Galambos, 2009) and on days with or following sexual behavior (Burleson et al., 2009; Fortenberry et al., 2005; Shrier, Shih, Hacker, & de Moor, 2007; Vasilenko & Lefkowitz, in press).

Sexual behavior may improve affect for both psychosocial and biological reasons. From a psychosocial perspective, engaging in sexual behavior can facilitate emotional bonding, relieve stress, and be pleasurable (Meston & Buss, 2007; Vasilenko, Lefkowitz, & Maggs, 2012). Related to these psychosocial effects, sexual intercourse and orgasm result in the release of oxytocin, dopamine, and other hormones and neurotransmitters that are associated with improved affect (Carter, 1992; Krüger, Hartmann, & Schedlowski, 2005; Meston, Levin, Sipski, Hull, & Heiman, 2004).

The link between sexual behavior and affect is important because experiencing positive affect

following sexual behavior may influence future behavior. A feed-forward model of alcohol use proposes that experiences with alcohol shape alcohol-related expectancies, which in turn shape future behavior (Goldman, 1994; Lee, Maggs, Neighbors, & Patrick, 2011; Oei & Baldwin, 1994). Improved affect following sexual behavior may strengthen positive sexual expectancies (beliefs that sexual behavior will lead to positive outcomes), increasing the likelihood that individuals will continue engaging in sexual behavior in the future (Dawson et al., 2008). However, sexual experiences are diverse; assessing the contextual factors under which the association between sexual behavior and affect might differ will improve understanding of the affective outcomes associated with sexual behavior. Two factors that may influence these associations are heavy alcohol use and the relationship context of sexual behavior.

Heavy Alcohol Use and Outcomes of Sexual Behavior

Heavy alcohol use in conjunction with sexual behavior is problematic. Some researchers define heavy alcohol use as having more than 4 (for women) or 5 (for men) drinks in one day (Wechsler & Nelson, 2001); this cutoff represents the number of drinks that leads to cognitive impairment for many individuals (Wechsler & Austin, 1998). Compared to sexual behavior without heavy alcohol use, sex after heavy alcohol use increases the risk that individuals will experience a range of negative sexual outcomes, from regret to unprotected sexual intercourse to sexual assault (Cooper, 2002; Fisher, Daigle, & Cullen, 2010; Orchowski & Barnett, 2012). Despite these problematic outcomes, many young adults have positive perceptions of sexual behavior after alcohol use (Maisto, Carey, Carey, & Gordon, 2002; Patrick & Maggs, 2011; White, Fleming, Catalano, & Bailey, 2009). Furthermore, engaging in sexual behavior after alcohol use is common in young adulthood. Between 19% and 30% of college students drank alcohol before their most recent sexual experience and many of these experiences involved heavy drinking (Cooper, 2002; Eaton et al., 2015).

Sexual behavior after either any alcohol use or after heavy alcohol use may be associated with negative short-term outcomes. For instance, individuals who drink alcohol at all, or who drink heavily,

prior to engaging in casual sex evaluate their experiences more negatively than individuals who do not

(LaBrie, Hummer, Ghaidarov, Lac, & Kenney, 2014; Lewis, Granato, Blayney, Lostutter, & Kilmer, 2012).

However, other research has found no association between alcohol use and evaluations of casual sexual

experiences (Owen, Rhoades, Stanley, & Fincham, 2010). Although researchers have explored the

associations between alcohol use and outcomes of sexual behavior, the majority of this research has

used cross-sectional designs. In cross-sectional studies, it is often difficult to determine whether

between-person differences such as personality or depressive symptoms act as confounding factors. For

example, individuals who are less agreeable and more neurotic tend to drink more (Malouff,

Thorsteinsson, Rooke, & Schutte, 2007), and these personality traits may also lead them to evaluate

their sexual experiences negatively. Exploring associations between sexual behavior, heavy alcohol use,

and affect using a within-person, longitudinal research design will advance knowledge of alcohol's role

in short-term outcomes of sexual behavior. In the present research, we compare individuals' own affect

following days with versus without sexual behavior, thereby eliminating between-person confounding

factors by treating each person as his/her own control. If heavy alcohol use makes sexual behavior less

enjoyable, as past research suggests (LaBrie et al., 2014; Lewis et al., 2012; Oswalt, Cameron, & Koob,

2005), then variation in affect following sexual behavior will be smaller when sexual behavior occurs

after heavy alcohol use compared to sexual behavior without heavy alcohol use.

Sexual Partner Type

Young adulthood is a time of competing goals related to romantic and sexual relationships

(Shulman & Connolly, 2013). Although many young adults hope to meet their future spouse during

college (Glenn & Marquardt, 2001), individuals struggle to balance romantic commitments with other

pursuits such as education and career (Lyons, Manning, Longmore, & Giordano, 2014; Shulman &

Connolly, 2013). Some young adults find that casual sexual partnerships provide a useful source of

sexual pleasure that does not interfere with educational and career goals (Lyons et al., 2014; Shulman,

Scharf, Livne, & Barr, 2013). Although committed romantic relationships are the most common context for sexual behavior during young adulthood (Fielder, Carey, & Carey, 2013; Siebenbruner, 2013), the majority of young adults also engage in sexual behavior with casual partners at some point (Claxton & van Dulmen, 2013; Wentland & Reissing, 2011).

The diverse sexual experiences and competing goals of young adulthood raise the question of whether young adults experience more positive emotional outcomes of sexual behavior in the context of committed romantic relationships or casual sexual partnerships. Characteristics of romantic relationships, such as greater emotional support and sexual communication (Jonason, Li, & Richardson, 2011; Paul & Hayes, 2002), may improve sexual experiences. In cross-sectional studies, young adults who engage in sexual behavior with casual partners report more negative short-term evaluations of sexual behavior and lower sexual satisfaction, compared to individuals who engage in sexual behavior with committed romantic partners (Birnie-Porter & Hunt, 2015; Lehmiller, VanderDrift, & Kelly, 2014; Wesche, Lefkowitz, & Vasilenko, 2017). Thus, committed romantic relationships may be more positive contexts for sexual behavior than casual sexual partnerships. Longitudinal research, on the other hand, has produced conflicting findings. Although some findings indicate that sexual behavior with casual partners is associated with greater declines in mental health than sexual behavior with committed romantic partners (Furman & Collibee, 2014), other research does not show an association between casual sex and mental health (Eisenberg, Ackard, Resnick, & Neumark-Sztainer, 2009; Monahan & Lee, 2008).

Assessing whether the within-person association between sexual behavior and affect differs by partner type (committed romantic versus casual) will clarify prior conflicting results. In addition, the results of this research will inform developmental understandings of romantic and sexual relationships. If sexual behavior in the context of committed romantic relationships enhances the emotion regulatory functions of sexual behavior, individuals may be motivated to choose romantic relationships over casual

sex, as some research findings suggest (Fielder et al., 2013; Siebenbruner, 2013).

Limited research has explored whether relationship type (e.g., committed romantic versus casual partner) moderates the association between sexual behavior and affect. Vasilenko and Lefkowitz (in press), using data from the same sample as the current analyses, found that young adults reported more negative affect on days that they engaged in sexual behavior with casual partners than with romantic partners. The present research will further clarify the nature of these associations. First, Vasilenko and Lefkowitz measured sexual behavior and affect on the same day—essentially, they asked whether affect was more or less positive on days with sexual behavior versus days without sexual behavior. In contrast, we use lagged measures of affect, allowing us to determine whether affect is more or less positive on days *following* sexual behavior (Burleson et al., 2009; Fortenberry et al., 2005; Shrier et al., 2007), compared to days that do not follow sexual behavior. This strategy further clarifies the temporal ordering of sexual behavior and within-person variation in affect and allows us to understand whether within-person variation in affect may persist up to a day after engaging in sexual behavior. Second, in addition to addressing sexual partner type, we also address the role of heavy alcohol use in the association between sexual behavior and daily affect.

Heavy Alcohol Use Across Sexual Partner Types

Research on alcohol use and short-term outcomes of sexual behavior focuses predominantly on sexual behavior with casual partners, finding that individuals may report worse outcomes of casual sex if the event occurred after heavy alcohol use (LaBrie et al., 2014; Oswalt et al., 2005). Heavy alcohol use may be less detrimental to sexual experiences with committed romantic partners than with casual partners. Knowing a partner well and communicating about sex and relationship issues contribute to decreased risk of negative alcohol-related sexual outcomes (LaBrie et al., 2014; Owen & Fincham, 2011), and these factors more frequently characterize sex with committed romantic partners than with casual partners (Lehmiller et al., 2014). Therefore, sexual behavior after heavy alcohol use may be associated

with smaller variations in affect when it occurs with casual partners than committed romantic partners.

Change Across the College Years

Developmental changes in alcohol use and sexual relationships make it important to explore how the associations between heavy alcohol use, partner type, and affect change across the college years. Heavy alcohol use becomes increasingly prevalent during the college years (Jackson, Sher, Gotham, & Wood, 2001; Muthén & Muthén, 2000; O'Malley & Johnston, 2002), and in the U.S. drinking alcohol becomes legal during college when students turn 21 years old. Because of the increasing normativity of heavy alcohol use with age, sexual behavior after heavy alcohol use may not be as influential on affect later in college. In addition, as college students age and become closer to the median age of first marriage (Copen, Daniels, Vespa, & Mosher, 2012), sexual behavior with casual partners may be less fulfilling; therefore, partner type may be more influential on affect later in college.

The Present Research

In the present paper, we examine the associations of sexual behavior, heavy alcohol use, and partner type with variation in daily affect. This paper extends past research by addressing how the affective outcomes of sexual behavior differ according to heavy alcohol use and sexual partner type. We use data from a longitudinal measurement burst study in which participants report on their affect, sexual behavior, and alcohol use on up to 98 days across seven semesters of college. These intensive longitudinal data permit inferences about the within-person associations between sexual behavior, heavy alcohol use, partner type, and daily affect, ruling out between-person characteristics that may act as confounding factors. In addition, we use lagged measures of affect, facilitating understanding of the temporal ordering of sexual behavior and variation in positive and negative affect. The results of this research will inform understanding of how alcohol use, partner type, and sexual behavior develop together in young adulthood.

Specifically, we have the following hypotheses:

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1. Engaging in sexual behavior will be associated with increased positive affect and decreased negative affect the following day, compared to days without sexual behavior, consistent with past research.

2. Sexual behavior after heavy alcohol use will be associated with smaller variations in affect, compared to sexual behavior without heavy alcohol use.

3. Sexual behavior with casual partners will be associated with smaller variations in affect, compared to sexual behavior with committed romantic partners.

4. Sexual behavior after heavy alcohol use will be associated with smaller variations in affect when it occurs with a casual partner than with a committed romantic partner.

5. The difference between sexual behavior with versus without heavy alcohol use will become smaller across the college years (Hypothesis 5a). The difference between sexual behavior with romantic versus casual partners will become larger across the college years (Hypothesis 5b).

Method

Sample

Participants are from the University Life Study (ULS), a longitudinal measurement burst study assessing college student alcohol use and sexual behavior across seven semesters of college (Patrick, Maggs, & Lefkowitz, 2015). ULS participants were first-time, traditionally-aged college students, US citizens or permanent residents, and living within 25 miles of campus. The investigators recruited participants from Registrar lists using a stratified random sampling procedure designed to achieve a sample that was diverse with respect to gender and race/ethnicity. Selected students received a letter containing a description of the study, a pen, and a $5 cash incentive early in their first semester at the university. Five days later, students received an email with a personal, secure link to the Semester 1 (S1) baseline survey. The day after completing the baseline survey, students received an invitation by email to begin 14 consecutive daily web-based surveys. Participants received $20 for completing the S1

baseline survey and $3 per day for each of the 14 days of the daily survey, plus a bonus of $8 for completing all 14 days. Incentives for semester baseline surveys increased across semesters to $40 at S7. Of the 1,135 students who received an invitation to the survey, a total of 744 participants provided informed consent and completed the S1 baseline survey, a response rate of 66%. The analytic sample consisted of participants who completed the baseline survey and at least one daily survey for at least one semester of data collection (N = 735, 51,314 person-days of data). Of these participants, 87% responded to daily surveys at S2, 89% at S3, 91% at S4, 85% at S5, 83% at S6, and 82% at S7. The majority of participants (approximately 86% across semesters) completed at least 12 out of 14 in any given semester.

The analytic sample was 52% female, aged 16-20 years at S1 (M = 18.4 years, SD = 0.4), and predominantly (97%) heterosexual at S1. Participants could identify as more than one race/ethnicity. From student responses, 44% of participants described themselves as White/European American, 30% Asian/Asian American/Hawaiian/Pacific Islander, 26% Hispanic/Latino American, and 22% Black/African American. We used one t-test and three χ^2 tests to determine whether participants in the analytic sample (n = 718) differed from participants not in the analytic sample (n = 26) on S1 variables. Participants in the analytic sample were more likely to be female (χ^2 = 4.3, p < .05). Groups did not differ on age, race/ethnicity, or relationship status (in a committed romantic relationship or not, reported at baseline). We did not have the statistical power to explore differences in sexual orientation because the vast majority of participants were heterosexual.

Measures

Affect. Participants completed the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) in each daily survey. Participants responded to the prompt regarding the previous day, "To what extent did you feel the following different emotions and feelings?" Response options ranged from 1 (V*ery slightly or not at all*) to 5 (*Extremely*) for each item. Positive affect was the mean of 10

items (e.g., "interested," "proud"). Negative affect was the mean of 10 items (e.g., "irritable," "lonely").

Cronbach's α (across days, calculated separately by semester) was high across semesters for both

positive affect (range from .92 to .93) and negative affect (range from .85 to .90). In order to measure

affect the day following sexual behavior, we lagged the measures of positive and negative affect by one

day, so that measures of the current day's affect were matched with the previous day's sexual behavior.

We report the mean and standard deviation of positive and negative affect across days and participants

in Table 3-1.

Sexual behavior. In each daily survey, participants reported on whether they had engaged in

sexual behaviors the previous day. Participants who reported engaging in oral, vaginal, or anal sex with a

partner the previous day were recorded as having engaged in sexual behavior. We report the proportion

of days that included sexual behavior in Table 3-1.

Sexual behavior after heavy alcohol use. Each day, participants reported how many alcoholic

drinks they consumed on the previous day and were reminded that one drink is equivalent to a 12-

ounce can or bottle of beer or cooler, a five-ounce glass of wine, or a drink containing one shot of liquor

or spirits. In addition, on each day that participants reported any sexual behavior, they responded to the

question, "Did you or your partner consume alcohol before or during this most recent sexual

experience?" We coded participants who responded "We both did" or "Just I did," and who consumed

at least four (women) or five (men) alcoholic beverages that day as having engaged in sexual behavior

after heavy alcohol use. We coded participants who reported fewer than four or five drinks, or who

responded "Neither of us did" or "Just my partner did" to the question about consuming alcohol before

a sexual experience, as having engaged in sexual behavior without heavy alcohol use. We report the

proportion of sexual behavior days in which participants drank heavily before sexual behavior in Table 3-

1.

Partner type. Participants who reported at least one sexual behavior responded to the question,

"How would you describe this partner?" We categorized the seven mutually exclusive response options

into casual partners (stranger, friend, or casual dating partner) and committed romantic partners

(regular dating partner, living with, engaged, or married). We report the proportion of sexual behavior

days in which sexual behavior occurred with romantic partners in Table 3-1.

Analytic Plan

Because of the longitudinal nature of the data, with days nested within semesters nested within

participants, a multilevel modeling strategy is necessary to account for interdependence in the data. We

used PROC MIXED in SAS to examine the associations between sexual behavior and daily affect. In order

to measure associations between the previous day's sexual behavior and the current day's affect, we

lagged the measure of affect by one day. The equations for each model are listed in Appendix D. In all

models, we controlled for gender (with female as the reference category), race/ethnicity (three

variables for Black, Hispanic, and Asian), and semester of college (with S1 coded as 0, S2 coded as 1,

etc.). We also controlled for semester- and person-level effects of sexual behavior/partner type/heavy

alcohol use, when appropriate. We calculated semester-level effects by computing the average value for

each participant within each semester. We calculated person-level effects by computing the average

value for each participant across semesters. (For example, the semester-level variable for sexual

behavior is the proportion of days within each semester that each participant engaged in sexual

behavior, whereas the person-level variable is the proportion of days across all seven [or all available]

semesters that each participant engaged in sexual behavior.)

<div align="center">**Results**</div>

Hypothesis 1: Sexual Behavior and Daily Affect

In Model 1, we examined the associations between engaging in oral/penetrative sex the

previous day and positive and negative affect (Hypothesis 1). These results are summarized in Table 3-2.

Positive affect was higher and negative affect was lower (γ_{100}) on days following oral/penetrative sex

than days without oral/penetrative sex, consistent with Hypothesis 1.

Hypothesis 2: Differences by Heavy Alcohol Use

In Model 2, we separated the association of sexual behavior with affect into two terms. The terms compared days following no sexual behavior (the reference category) to days following sexual behavior with heavy alcohol use (γ_{100}) and days following sexual behavior without heavy alcohol use (γ_{200}) respectively. These results are summarized in Table 3-3. In order to determine whether sexual behavior after heavy alcohol use was associated with less variation in affect, compared to sexual behavior that without heavy alcohol use (Hypothesis 2), we compared these coefficients to each other using the ESTIMATE command in PROC MIXED.

For positive affect, both the coefficients for sexual behavior after heavy alcohol use and sexual behavior without heavy alcohol use were statistically significant. Thus, compared to days without sexual behavior, positive affect was higher following days with sexual behavior both after heavy alcohol use and without heavy alcohol use. There was no significant difference between the coefficients for sexual behavior after versus without heavy alcohol use for (difference = 0.04, standard error = 0.05, p > .05). Thus, the association between sexual behavior and positive affect did not differ significantly when sexual behavior occurred after heavy alcohol use, compared to sexual behavior without heavy alcohol use.

For negative affect, the coefficient for sexual behavior without heavy alcohol use was statistically significant, but the coefficient for sexual behavior after heavy alcohol use was not significant. Thus, compared to days without sexual behavior, negative affect was significantly lower following days with sexual behavior without heavy alcohol use but not following days with sexual behavior after heavy alcohol use. Although only the coefficient for sexual behavior with romantic partners was significantly different from zero, the coefficients for sexual behavior after versus without heavy alcohol use were not significantly different from each other (difference = 0.01, standard error =

0.03, $p > .05$). Thus, the association between sexual behavior and negative affect did not differ when sexual behavior occurred after heavy alcohol use, compared to sexual behavior without heavy alcohol use. Because there was no difference in the coefficients for either positive or negative affect, contrary to Hypothesis 2, sexual behavior after heavy alcohol use was not associated with less variation in affect, compared to sexual behavior without heavy alcohol use.

Hypothesis 3: Differences by Sexual Partner Type

In Model 3, we again separated the association of sexual behavior with affect into two terms. The terms compared days following no sexual behavior (the reference category) to days following sexual behavior with committed romantic partners (γ_{100}) and days following sexual behavior with casual partners (γ_{200}) respectively. These results are summarized in Table 3-4. As with Model 2, we compared these coefficients to each other using the ESTIMATE command in PROC MIXED (Hypothesis 3).

For positive affect, both the coefficients for sexual behavior with committed romantic partners and sexual behavior with casual partners were statistically significant. Positive affect was higher on days following sexual behavior with both committed romantic and casual sexual partners, compared to days without sexual behavior. There was no significant difference in the coefficients for committed romantic versus casual partners (difference = -0.01, standard error = 0.05, $p > .05$). Thus, the association between sexual behavior and positive affect did not differ by sexual partner type.

For negative affect, the coefficient for sexual behavior with committed romantic partners was statistically significant, but the coefficient for sexual behavior with casual partners was not. Compared to days without sexual behavior, negative affect was significantly lower following days with sexual behavior with romantic partners but not following days with sexual behavior with casual partners. Although only the coefficient for sexual behavior with romantic partners was significantly different from zero, the coefficients for committed romantic versus casual partners were not significantly different from each other (difference = 0.01, standard error = 0.03, $p > .05$). Thus, the association between sexual

behavior and negative affect did not differ by sexual partner type. Because there was no difference in the coefficients for either positive or negative affect, contrary to Hypothesis 3, sexual behavior with casual partners was not associated with less variation in affect than sexual behavior with committed romantic partners.

Hypothesis 4: Differences by Sexual Partner Type After Heavy Alcohol Use

In Model 4, we split sexual behavior into four variables: sexual behavior after heavy alcohol use/with committed romantic partners (γ_{100}); without heavy alcohol use/with committed romantic partners (γ_{200}); after heavy alcohol use/with casual partners (γ_{300}); and without heavy alcohol use/with casual partners (γ_{400}). The reference category was days without sexual behavior. Results of multilevel models predicting next-day positive and negative affect are summarized in Table 3-5. In order to determine whether sexual behavior after heavy alcohol use was associated with less variation in affect when it occurs with casual partners than committed romantic partners (Hypothesis 4), we compared the terms for sexual behavior after heavy alcohol use/with romantic partners and sexual behavior after heavy alcohol use/with casual partners to each other using the ESTIMATE command in SAS PROC MIXED.

Predicting positive affect, all four coefficients were statistically significant. Compared to days without sexual behavior, positive affect was higher following sexual behavior after heavy alcohol use/with committed romantic partners, without heavy alcohol use/with committed romantic partners, after heavy alcohol use/with casual partners, and without heavy alcohol use/with casual partners. For negative affect, the coefficients for sexual behavior without heavy alcohol use/with committed romantic partners and sexual behavior without heavy alcohol use/with casual partners were statistically significant. That is, compared to days without sexual behavior, negative affect was lower following days with sexual behavior without heavy alcohol use, with committed romantic partners or with casual partners. However, compared to days without sexual behavior, negative affect did not differ following

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days with sexual behavior after heavy alcohol use, with committed romantic partners or with casual partners. There was no significant difference between the coefficients for sexual behavior after heavy alcohol use/with romantic partners versus sexual behavior after heavy alcohol use/with casual partners for either positive (difference = -0.04, standard error = 0.08, $p > .05$) or negative affect (difference = 0.03, standard error = 0.03, $p > .05$). Thus, contrary to Hypothesis 4, sexual behavior after heavy alcohol use was not associated with less variation in affect when it occurred with casual partners than committed romantic partners.

Hypothesis 5: Change Across the College Years

To test whether the difference between sexual behavior with versus without heavy alcohol use became smaller across the college years (Hypothesis 5a), we compared the sexual behavior after heavy alcohol use*semester interaction (γ_{110}) to the sexual behavior without heavy alcohol use*semester (γ_{210}) in Model 2 using the ESTIMATE command within SAS PROC MIXED. These two semester interactions test whether the association between sex after (or without) heavy alcohol use and affect changed throughout college. The difference between the interaction coefficients represents whether the rate of change differed for sexual behavior with versus without heavy alcohol use. The two interaction coefficients did not differ significantly (difference = 0.01, standard error = 0.01, $p > .05$). Therefore, the difference between sexual behavior with versus without heavy alcohol use did not decrease across the college years, contrary to Hypothesis 5a.

To test whether the difference between sexual behavior with committed romantic versus without casual partners became larger across the college years (Hypothesis 5b), we compared the sexual behavior with romantic partners*semester interaction (γ_{110}) to the sexual behavior casual partners*semester interaction (γ_{210}) in Model 3 using the ESTIMATE command within SAS PROC MIXED. The two interaction coefficients did not differ significantly (difference = 0.01, standard error = 0.01, $p > .05$). Therefore, the difference between sexual behavior with committed romantic versus

casual partners did not become larger across the college years, contrary to Hypothesis 5b.

<div align="center">**Discussion**</div>

The results of the present research align with past research findings that sexual behavior is associated with increases in positive affect and, less consistently, decreases in negative affect. We build on past research by establishing that these improvements in affect did not differ according to heavy alcohol use, sexual partner type (committed romantic partners versus casual partners), or interactions of these variables with each other or with semester in college. Findings regarding heavy alcohol use and partner type contrast with previous research, informing understanding of the short-term outcomes of sexual behavior in young adulthood.

Heavy Alcohol Use, Sexual Partner Type, and Affect

Similar to previous research (Burleson et al., 2009; Fortenberry et al., 2005; Shrier et al., 2007), we found that individuals experienced more positive and less negative affect on days following oral/penetrative sex than days not following oral/penetrative sex. However, in contrast to our hypotheses, this variation did not differ by heavy alcohol use or partner type. Sexual behavior was associated with greater next-day positive affect regardless of whether it occurred after heavy alcohol use and whether it occurred with committed romantic partners or casual partners. This finding adds to a body of literature that has produced conflicting findings on how alcohol use and partner type may influence the short-term outcomes of sexual behavior.

The results of the present research contrast with findings that any/heavy alcohol use prior to sexual behavior (LaBrie et al., 2012; Lewis et al., 2012; Oswalt et al., 2005) and engaging in sexual behavior with casual partners versus romantic partners (Birnie-Porter & Hunt, 2015; Lehmiller et al., 2014; Wesche, Lefkowitz, et al., 2017) are associated with negative short-term emotional outcomes of sexual behavior. However, other research indicates that, despite differences across partner type and alcohol use, young adults generally report positive outcomes of their sexual experiences (Labrie et al.,

2014; Lewis et al., 2012; Wesche, Claxton, Lefkowitz, & van Dulmen, 2017). The findings of the present

research contribute additional evidence that young adults experience sexual behavior positively

regardless of whether they drink heavily beforehand or who their partners are.

The discrepancies between past and present findings may be due to cross-sectional versus

longitudinal designs or differences in the variables assessed. In the present study, we measured within-

person differences using longitudinal data. Past research on links between alcohol use, partner type, and

outcomes of sexual behavior has typically measured between-person differences using cross-sectional

data (e.g., Eshbaugh & Gute, 2008; Lewis et al., 2012; Owen & Fincham 2011; Townsend & Wasserman,

2011). Thus, it is possible that some prior cross-sectional findings that alcohol use or casual sexual

partners are associated with worse outcomes of sexual behavior were a result of unmeasured between-

person differences. For example, individuals who are in committed romantic relationships tend to be

happier and have better mental health (Braithwaite, Delevi, & Fincham, 2010; Diener & Seligman, 2002).

Happier individuals, then, may both be more likely to be in committed romantic relationships, and be

more likely to react positively to their sexual experiences than less happy individuals.

Another explanation for discrepancies between the present findings and past research on

alcohol use, partner type, and outcomes of sexual behavior is differences in the outcome variables

assessed. Past research on these topics has addressed a variety of outcomes of sexual behavior, such as

sexual regret (Eshbaugh & Gute, 2008; Oswalt et al., 2005), positive and negative evaluations of the

experience (Jonason et al., 2011; Lewis et al., 2012; Owen & Fincham, 2011; Townsend & Wasserman,

2011), health concerns (Vasilenko et al., 2012), and relationship concerns (Lewis et al., 2012; Vasilenko

et al., 2012; Wesche, Claxton, et al., 2017). Whereas these outcomes are conscious evaluations that are

directly related to sexual experiences, affect is a distinct outcome that may be influenced by multiple

factors other than conscious evaluations of sexual experiences. It is possible that, although heavy

alcohol use and partner type are associated with other outcomes, they do not influence affective

responses to sexual behavior.

However, some research has addressed sexual partner type and daily affect. Using the same sample, Vasilenko and Lefkowitz (in press) found that participants reported more negative affect on days they engaged in vaginal sex with non-dating partners (stranger or friend), compared to dating partners (casual dating, serious romantic relationship, cohabitating, engaged, or married). In this case, the discrepancy between findings may be due to different definitions of partner type, sexual behavior (we include oral sex and penetrative sex), or the use of lagged measures of daily affect in the present paper.

Change Over Time

Due to the increasing prevalence of heavy alcohol use across the college years (Jackson et al., 2001; Muthén & Muthén, 2000; O'Malley & Johnston, 2002) and the increasing commitment of young adults' romantic relationships (Copen et al., 2012), we explored the possibility that the associations between alcohol use, partner type, and affect would change across the college years. Regarding alcohol use, we hypothesized that the increasing normativity of heavy alcohol use with age would mean that sexual behavior after heavy alcohol use may not be as influential on affect later in college. Regarding partner type, we hypothesized that sexual behavior with casual partners may become less fulfilling as committed romantic relationships become increasingly common, with students moving closer to the median age of first marriage (Copen et al., 2012). The results did not support either hypothesis. One explanation for this finding is that heavy alcohol use and sexual behavior with casual partners are normative throughout college (Muthén & Muthén, 2000; Lefkowitz, Wesche, Vasilenko, & Maggs, 2017). Thus, small changes in the prevalence of heavy alcohol use and sexual behavior with casual partners may not make a difference in people's affective responses to diverse sexual encounters.

Implications

Overall, days following sexual behavior were associated with more positive affect compared to

days without sexual behavior, regardless of relationship to partner, heavy alcohol use, and semester in

college. We proposed that if having casual partners and/or drinking heavily before sexual encounters

mitigated the beneficial affective outcomes of sexual behavior, then young adults might be less

motivated to have sex with casual partners and/or after heavy alcohol use in the future. However, heavy

alcohol use and having a casual partner did not mitigate the affective benefits of sexual behavior. Some

additional research has produced similar findings; in one study, drinking more on days with sexual

behavior was associated with worse evaluations of casual sexual experiences, but more plans for

additional casual sexual experiences (Wesche, Claxton, et al., 2017). Given present and past findings, it is

not likely that unsatisfying sexual encounters due to heavy alcohol use or casual partners drive changes

in future sexual decision-making. In addition, although we observed a slight descriptive trend for

decreases in sexual behavior with casual partners, rates of sexual behavior after heavy alcohol use

increased slightly.

The present results highlight challenges for researchers interested in preventing the negative

outcomes associated with sexual behavior. Sexual behavior after heavy alcohol use, particularly with

casual partners, is associated with health risks such as failure to use condoms (Brown & Vanable, 2007;

Cooper, 2002). Sexual behavior with casual partners is linked to STI diagnosis (Lyons, 2017). However,

our findings are consistent with other research indicating that individuals have positive responses to

these experiences (Labrie et al., 2014; Lewis et al., 2012; Wesche, Claxton, et al., 2017), which may

encourage them to engage in future sexual encounters involving heavy alcohol use and/or casual

partners. A challenge for designers of intervention programs will be to identify ways to intervene on risk

factors for negative sexual health outcomes when these risk factors are positive and normative.

Focusing on alcohol use broadly may be one strategy to reduce sexual behavior after heavy alcohol use

because effective alcohol-reduction interventions may also reduce negative sexual consequences of

alcohol use (Lewis et al., 2014; Tait & Lenton, 2015). In addition, taking a harm reduction approach to

prevention can be effective when risk behaviors are reinforcing, difficult to change, and embedded in

normative social contexts (Marlatt, Larimer, & Witkiewitz, 2011). Therefore, an alternative to

discouraging young adults from having sex after heavy alcohol use and/or with casual partners is to

attempt to make these behaviors less risky by encouraging protective strategies such as condom use.

For example, interventions may aim to make condom use a salient behavior by stamping bar patrons'

hands with safer sex-related messages (MacDonald, Fong, Zanna, & Martineau, 2000).

Harm reduction strategies related to sexual behavior after heavy alcohol use may also help

prevent sexual assault. Alcohol use increases the risk of both sexual assault victimization and

perpetration (Abbey, Zawacki, Buck Clinton, & McAuslan, 2004). However, our results align with past

findings that many individuals engage in wanted sexual behavior after heavy alcohol use (Muehlenhard,

Humphreys, Jozkowski, & Peterson, 2016). Therefore, intervention approaches that tell young adults

never to engage in sexual behavior after heavy alcohol use may be impractical because they do not

reflect the primarily positive consequences of this behavior (Jozkowski & Wiersma, 2015). Instead,

educators may focus on other sexual assault prevention strategies that make sexual behavior after

heavy alcohol use less risky: bystander interventions, addressing rape attitudes, rape knowledge, and

self-defense are some examples (Anderson & Whiston, 2005; Söchting, Fairbrother, & Koch, 2004,

Salazar, Vivolo-Kantor, Hardin, & Berkowitz, 2014).

Limitations and Future Directions

The results of the present research must be interpreted in light of its limitations. First, the

occurrence of sexual behavior after heavy alcohol use, and with casual partners, was relatively

infrequent, which makes finding statistically significant results challenging. Therefore, it is important to

be cautious in interpreting the interactions and null results we presented above. Second, although the

longitudinal measurement strategy of the present paper reduces the possibility that unmeasured

between-person differences act as confounding factors, it is still possible that time-varying factors

covary with sexual behavior and account for our findings. For example, days with sexual behavior may also be characterized by more leisure time, which could potentially account for the sexual behavior-daily affect link. Therefore, we cannot make causal inferences about the associations observed.

Our sample was composed entirely of college students. The association between heavy alcohol use, sexual partner type, and daily affect may differ in other young adult populations. For example, heavy alcohol use is especially normative in college environments (Brown et al., 2008; Carter, Brandon, & Goldman, 2010), and hookup culture may be pronounced on college campuses (Bogle, 2008). This normativity of heavy alcohol use and casual sex may mean that these variables do not moderate the affective outcomes of sexual behavior for college students, although they may do so for non-college-attending young adults. Future research should continue to explore the role of education status in explaining outcomes of sexual behavior.

The use of daily data in the present research is both a strength and a limitation. Daily assessment allowed us to capture the short-term outcomes of sexual behavior while limiting recall bias. However, because we were only able to assess individuals who engaged in sexual behavior during the study period (14-day bursts across seven college semesters), our results may not reflect the experiences of individuals who are sexually active but engage in sex infrequently. Furthermore, by focusing on daily affective outcomes of sexual behavior, we cannot make conclusions about corresponding long-term outcomes. For example, short-term outcomes may influence expectancies, which influence future behavior (Lee et al., 2011). In addition, short-term emotional health outcomes of sexual behavior may affect long-term outcomes such as depression and anxiety (Strokoff, Owen, & Fincham, 2015). Additional research measuring outcomes of sexual behavior on multiple time scales is necessary to thoroughly understand how sexual experiences shape short-term and long-term behavior and emotional health.

In addition to other ways of exploring links between sexual behavior and affect, the results of

the present study suggest further research questions to understand why, and under what circumstances, sexual behavior is linked to emotional and physical health outcomes. Regarding why sexual behavior is linked to health outcomes, the present findings offer limited understanding of the mechanisms by which sexual behavior may influence affect. For example, is this process mediated by sexual pleasure, emotional connection, or some other variable?

Regarding the circumstances under which sexual behavior is associated with health outcomes, the present findings suggest that, on average, college students experience positive emotional outcomes of sexual behavior regardless of whether it occurs after heavy alcohol use or with a casual partner. However, there is also variation in young adults' emotional responses to these sexual experiences (Lewis et al., 2012; Owen & Fincham, 2011), which means that other characteristics of sexual experiences may affect emotional responses to them. Therefore, one direction of future research is to understand what relationship processes contribute to positive and negative emotional outcomes of sexual behavior after heavy alcohol use and/or with casual partners. For example, communication about sexual behaviors may improve the quality of sexual experiences (Byers, 2005), thereby improving affective outcomes of sexual behavior. Communication may be especially important in determining outcomes of sexual behavior after alcohol use or with casual partners because these characteristics of sexual experiences increase the risk of misunderstanding partners' wants (Backstrom, Armstrong, & Puentes, 2012; Steele & Josephs, 1990).

Conclusion

The present research contributes to understanding of short-term emotional outcomes of college students' sexual behavior by demonstrating that sexual behavior is associated with improvements in affect regardless of whether it occurs with a romantic or casual partner, after heavy alcohol use, or at later semesters of college. These findings raise questions for understanding what factors shape developmental change in sexual experiences, informing future research on short- and long-term

outcomes of sexual behavior in young adulthood.

References

Abbey, A., Zawacki, T., Buck, P. O., Clinton, A. M., & McAuslan, P. (2004). Sexual assault and alcohol

consumption: What do we know about their relationship and what types of research are still

needed? *Aggression and Violent Behavior, 9*, 271-303.

Anderson, L. A., & Whiston, S. C. (2005). Sexual assault education programs: A meta-analytic

examination of their effectiveness. *Psychology of Women Quarterly, 29*, 374-388.

Bachman, J. G., Wadsworth, K. N., O'Malley, P. M., Johnston, L. D., & Schulenberg, J. E. (1997). *Smoking,*

drinking, and drug use in young adulthood: The impacts of new freedoms and new

responsibilities. Mahwah, NJ: Lawrence Erlbaum Associates.

Backstrom, L., Armstrong, E. A., & Puentes, J. (2012). Women's negotiation of cunnilingus in college

hookups and relationships. *Journal of Sex Research, 49*, 1-12.

Birnie-Porter, C., & Hunt, M. (2015). Does relationship status matter for sexual satisfaction? The roles of

intimacy and attachment avoidance in sexual satisfaction across five types of ongoing sexual

relationships. *The Canadian Journal of Human Sexuality, 24*, 174-183.

Bogle, K. (2008). *Hooking up: Sex, dating, and relationships on campus.* New York, NY: New York

University Press.

Braithwaite, S. R., Delevi, R., & Fincham, F. D. (2010). Romantic relationships and the physical and

mental health of college students. *Personal Relationships, 17*, 1-12.

Brown, S. A., McGue, M., Maggs, J., Schulenberg, J., Hingson, R., Swartzwelder, S., ... & Murphy, S.

(2008). A developmental perspective on alcohol and youths 16 to 20 years of age. *Pediatrics,*

121, S290-S310.

Brown, J. L., & Vanable, P. A. (2007). Alcohol use, partner type, and risky sexual behavior among college

students: Findings from an event-level study. *Addictive Behaviors, 32*, 2940-2952.

Burleson, M. H., Trevathan, W. R., & Todd, M. (2007). In the mood for love or vice versa? Exploring the

relations among sexual activity, physical affection, affect, and stress in the daily lives of mid-

aged women. *Archives of Sexual Behavior, 36*, 357-368.

Carter, C. S. (1992). Oxytocin and sexual behavior. *Neuroscience & Biobehavioral Reviews, 16*, 131-144.

Carter, A. C., Brandon, K. O., & Goldman, M. S. (2010). The college and noncollege experience: A review

of the factors that influence drinking behavior in young adulthood. *Journal of Studies on Alcohol

and Drugs, 71*, 742-750.

Claxton, S. E., & van Dulmen, M. H. (2013). Casual sexual relationships and experiences in emerging

adulthood. *Emerging Adulthood, 1*, 138-150.

Cooper, M. L. (2002). Alcohol use and risky sexual behavior among college students and youth:

Evaluating the evidence. *Journal of Studies on Alcohol, 14*, S101-S117.

Copen, C. E., Daniels, K., Vespa, J., & Mosher, W. D. (2012). First marriages in the United States: Data

from the 2006–2010 National Survey of Family Growth. *National Health Statistics Reports, 49*, 1-

22.

Dalton, A. L., & Galambos, N. L. (2009). Affect and sexual behavior in the transition to university.

Archives of Sexual Behavior, 38, 675-687.

Dawson, L. H., Shih, M. C., de Moor, C., & Shrier, L. (2008). Reasons why adolescents and young adults

have sex: Associations with psychological characteristics and sexual behavior. *Journal of Sex

Research, 45*, 225-232.

Diener, E., & Seligman, M. E. (2002). Very happy people. *Psychological Science, 13*, 81-84.

Eaton, N. R., Thompson Jr., R. G., Hu, M. C., Goldstein, R. B., Saha, T. D., & Hasin, D. S. (2015). Regularly

drinking alcohol before sexual activity in a nationally representative sample: Prevalence,

sociodemographics, and associations with psychiatric and substance use disorders. *American

Journal of Public Health, 105*, 1387-1393.

Eisenberg, M. E., Ackard, D. M., Resnick, M. D., & Neumark-Sztainer, D. (2009). Casual sex and

psychological health among young adults: Is having "friends with benefits" emotionally

damaging? *Perspectives on Sexual and Reproductive Health, 41*, 231-237.

Eshbaugh, E. M., & Gute, G. (2008). Hookups and sexual regret among college women. *Journal of Social Psychology, 148*, 77-89.

Fielder, R. L., Carey, K. B., & Carey, M. P. (2013). Are hookups replacing romantic relationships? A longitudinal study of first-year female college students. *Journal of Adolescent Health, 52*, 657-659.

Fisher, B. S., Daigle, L. E., & Cullen, F. T. (2010). *Unsafe in the ivory tower: The sexual victimization of college women*. Thousand Oaks, CA: Sage Publications.

Fortenberry, J. D., Temkit, M. H., Tu, W., Graham, C. A., Katz, B. P., & Orr, D. P. (2005). Daily mood, partner support, sexual interest, and sexual activity among adolescent women. *Health Psychology, 24*, 252-257.

Furman, W., & Collibee, C. (2014). Sexual activity with romantic and nonromantic partners and psychosocial adjustment in young adults. *Archives of Sexual Behavior, 43*, 1327-1341.

Glenn, N., & Marquardt, E. (2001). *Hooking up, hanging out, and hoping for Mr. Right: College women on dating and mating today*. New York, NY: Institute for American Values.

Goldman, M. S. (1994). The alcohol expectancy concept: Applications to assessment, prevention, and treatment of alcohol abuse. *Applied and Preventive Psychology, 3*, 131–144.

Jackson, K. M., Sher, K. J., Gotham, H. J., & Wood, P. K. (2001). Transitioning into and out of large-effect drinking in young adulthood. *Journal of Abnormal Psychology, 110*, 378-391.

Jonason, P. K., Li, N. P., & Richardson, J. (2011). Positioning the booty-call relationship on the spectrum of relationships: Sexual but more emotional than one-night stands. *Journal of Sex Research, 48*, 486-495.

Jozkowski, K. N., & Wiersma, J. D. (2015). Does drinking alcohol prior to sexual activity influence college

students' consent? *International Journal of Sexual Health, 27*, 156-174.

Krüger, T. H., Hartmann, U., & Schedlowski, M. (2005). Prolactinergic and dopaminergic mechanisms underlying sexual arousal and orgasm in humans. *World Journal of Urology, 23*, 130-138.

LaBrie, J. W., Hummer, J. F., Ghaidarov, T. M., Lac, A., & Kenney, S. R. (2014). Hooking up in the college context: The event-level effects of alcohol use and partner familiarity on hookup behaviors and contentment. *Journal of Sex Research, 51*, 62-73.

Lee, C. M., Maggs, J. L., Neighbors, C., & Patrick, M. E. (2011). Positive and negative alcohol-related consequences: Associations with past drinking. *Journal of Adolescence, 34*, 87-94.

Lefkowitz, E. S., Wesche, R., Vasilenko, S. A., & Maggs, J. L. (2017). *Longitudinal changes in diverse sexual behaviors across the college years.* Manuscript submitted for publication.

Lehmiller, J. J., VanderDrift, L. E., & Kelly, J. R. (2014). Sexual communication, satisfaction, and condom use behavior in friends with benefits and romantic partners. *Journal of Sex Research, 51*, 74-85.

Lewis, M. A., Granato, H., Blayney, J. A., Lostutter, T. W., & Kilmer, J. R. (2012). Predictors of hooking up sexual behaviors and emotional reactions among US college students. *Archives of Sexual Behavior, 41*, 1219-1229.

Lewis, M. A., Patrick, M. E., Litt, D. M., Atkins, D. C., Kim, T., Blayney, J. A., ... & Larimer, M. E. (2014). Randomized controlled trial of a web-delivered personalized normative feedback intervention to reduce alcohol-related risky sexual behavior among college students. *Journal of Consulting and Clinical Psychology, 82*, 429-440.

Lyons, H. A. (2017). Heterosexual casual sex and STI diagnosis: A latent class analysis. *International Journal of Sexual Health, 29*, 32-47.

Lyons, H. A., Manning, W. D., Longmore, M. A., & Giordano, P. C. (2014). Young adult casual sexual behavior: Life-course-specific motivations and consequences. *Sociological Perspectives, 57*, 79-101.

MacDonald, T. K., Fong, G. T., Zanna, M. P., & Martineau, A. M. (2000). Alcohol myopia and condom use: Can alcohol intoxication be associated with more prudent behavior? *Journal of Personality and Social Psychology, 78*, 605-619.

Maisto, S. A., Carey, M. P., Carey, K. B., & Gordon, C. M. (2002). The effects of alcohol and expectancies on risk perception and behavioral skills relevant to safer sex among heterosexual young adult women. *Journal of Studies on Alcohol, 63*, 476-485.

Marlatt, G. A., Larimer, M. E., & Witkiewitz, K. (Eds.). (2011). *Harm reduction: Pragmatic strategies for managing high-risk behaviors*. New York, NY: Guilford Press.

Malouff, J. M., Thorsteinsson, E. B., Rooke, S. E., & Schutte, N. S. (2007). Alcohol involvement and the Five-Factor Model of personality: A meta-analysis. *Journal of Drug Education, 37*, 277-294.

Meston, C. M., & Buss, D. M. (2007). Why humans have sex. *Archives of Sexual Behavior, 36*, 477-507.

Meston, C. M., Levin, R. J., Sipski, M. L., Hull, E. M., & Heiman, J. R. (2004). Women's orgasm. *Annual Review of Sex Research, 15*, 173-257.

Monahan, K. C., & Lee, J. M. (2008). Adolescent sexual activity: Links between relational context and depressive symptoms. *Journal of Youth and Adolescence, 37*, 917-927.

Muehlenhard, C. L., Humphreys, T. P., Jozkowski, K. N., & Peterson, Z. D. (2016). The complexities of sexual consent among college students: A conceptual and empirical review. *The Journal of Sex Research, 53*, 457-487.

Muthén, B. O., & Muthén, L. K. (2000). The development of heavy drinking and alcohol-related problems from ages 18 to 37 in a US national sample. *Journal of Studies on Alcohol, 61*, 290-300.

Oei, T. P. S., & Baldwin, A. R. (1994). Expectancy theory: A two-process model of alcohol use and abuse. *Journal of Studies on Alcohol, 55*, 525–534.

O'Malley, P. M. (2004). Maturing out of problematic alcohol use. *Alcohol Research and Health, 28*, 202-204.

O'Malley, P. M., & Johnston, L. D. (2002). Epidemiology of alcohol and other drug use among American

college students. *Journal of Studies on Alcohol, 14*, S23-S39.

Orchowski, L. M., & Barnett, N. P. (2012). Alcohol-related sexual consequences during the transition

from high school to college. *Addictive Behaviors, 37*, 256-263.

Oswalt, S. B., Cameron, K. A., & Koob, J. J. (2005). Sexual regret in college students. *Archives of Sexual

Behavior, 34*, 663-669.

Owen, J., & Fincham, F. D. (2011). Young adults' emotional reactions after hooking up encounters.

Archives of Sexual Behavior, 40, 321-330.

Owen, J. J., Rhoades, G. K., Stanley, S. M., & Fincham, F. D. (2010). "Hooking up" among college

students: Demographic and psychosocial correlates. *Archives of Sexual Behavior, 39*, 653-663.

Patrick, M. E., & Maggs, J. L. (2011). College students' evaluations of alcohol consequences as positive

and negative. *Addictive Behaviors, 36*, 1148-1153.

Patrick, M. E., Maggs, J. L., & Lefkowitz, E. S. (2015). Daily associations between drinking and sex among

college students: A longitudinal measurement burst design. *Journal of Research on Adolescence,

25*, 377–386.

Paul, E. L., & Hayes, K. A. (2002). The casualties of 'casual' sex: A qualitative exploration of the

phenomenology of college students' hookups. *Journal of Social and Personal Relationships, 19*,

639-661.

Salazar, L. F., Vivolo-Kantor, A., Hardin, J., & Berkowitz, A. (2014). A web-based sexual violence

bystander intervention for male college students: Randomized controlled trial. *Journal of

Medical Internet Research, 16,* 1-16.

Shrier, L. A., Shih, M. C., Hacker, L., & de Moor, C. (2007). A momentary sampling study of the affective

experience following coital events in adolescents. *Journal of Adolescent Health, 40*, 357.e1–

357.e8.

Shulman, S., & Connolly, J. (2013). The challenge of romantic relationships in emerging adulthood: Reconceptualization of the field. *Emerging Adulthood, 1*, 27-39.

Siebenbruner, J. (2013). Are college students replacing dating and romantic relationships with hooking up? *Journal of College Student Development, 54*, 433-438.

Söchting, I., Fairbrother, N., & Koch, W. J. (2004). Sexual assault of women: Prevention efforts and risk factors. *Violence Against Women, 10*, 73-93.

Steele, C. M., & Josephs, R. A. (1990). Alcohol myopia: Its prized and dangerous effects. *American Psychologist, 45*, 921-933.

Strokoff, J., Owen, J., & Fincham, F. D. (2015). Diverse reactions to hooking up among US university students. *Archives of Sexual Behavior, 44*, 935-943.

Tait, R. J., & Lenton, S. (2015). Online alcohol interventions, sexual violence and intimate partner violence: A systematic review. *Internet Interventions, 2*, 152-160.

Townsend, J. M., & Wasserman, T. H. (2011). Sexual hookups among college students: Sex differences in emotional reactions. *Archives of Sexual Behavior, 40*, 1173-1181.

Vasilenko, S. A., & Lefkowitz, E. S. (2017). *Sexual behavior and daily affect in emerging adulthood*. Manuscript submitted for publication.

Vasilenko, S. A., Lefkowitz, E. S., & Maggs, J. L. (2012). Short-term positive and negative consequences of sex based on daily reports among college students. *Journal of Sex Research, 49*, 558-569.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063-1070.

Wechsler, H., & Austin, S. B. (1998). Binge drinking: The five/four measure. *Journal of Studies on Alcohol, 59*, 122-124.

Wechsler, H., & Nelson, T. F. (2001). Binge drinking and the American college students: What's five

drinks? *Psychology of Addictive Behaviors, 15*, 287-291.

Wentland, J. J., & Reissing, E. D. (2011). Taking casual sex not too casually: Exploring definitions of casual

sexual relationships. *Canadian Journal of Human Sexuality, 20,* 75-91.

Wesche, R., Claxton, S. E., Lefkowitz, E. S., & van Dulmen, M. H. M. (2017). Evaluations and future plans

after casual sexual experiences: Differences across partner type. *Journal of Sex Research,*

advance online publication.

Wesche, R., Lefkowitz, E. S., & Vasilenko, S. A. (2017). Latent classes of sexual behaviors: Prevalence,

predictors and consequences. *Sexuality Research and Social Policy, 14*, 100-111.

White, H. R., Fleming, C. B., Catalano, R. F., & Bailey, J. A. (2009). Prospective associations among alcohol

use-related sexual enhancement expectancies, sex after alcohol use, and casual sex. *Psychology*

of Addictive Behaviors, 23, 702-707.

Table 3-1. *Descriptive Statistics*

	Women		Men	
	Mean or proportion	*SD*	Mean or proportion	*SD*
Positive Affect	*M*	*SD*	*M*	*SD*
Semester 1 (S1)	2.19	0.84	2.25	0.86
S2	2.14	0.86	2.16	0.87
S3	2.18	0.86	2.24	0.87
S4	2.20	0.86	2.25	0.86
S5	2.20	0.83	2.26	0.85
S6	2.23	0.87	2.26	0.91
S7	2.22	0.86	2.26	0.89
Negative Affect	*M*	*SD*	*M*	*SD*
S1	1.42	0.50	1.35	0.49
S2	1.41	0.52	1.44	0.57
S3	1.47	0.56	1.47	0.62
S4	1.46	0.56	1.47	0.59
S5	1.52	0.59	1.50	0.61
S6	1.52	0.60	1.48	0.62
S7	1.51	0.59	1.50	0.61
Days with sexual behavior	Proportion		Proportion	
S1	.05		.04	
S2	.07		.04	
S3	.06		.04	
S4	.08		.04	
S5	.09		.06	
S6	.08		.06	
S7	.08		.06	
Sexual behavior days with heavy alcohol use before sex	Proportion		Proportion	
S1	.18		.17	
S2	.21		.15	
S3	.19		.20	
S4	.19		.20	
S5	.22		.16	
S6	.22		.19	
S7	.21		.27	
Sexual behavior days with committed romantic partner	Proportion		Proportion	
S1	.76		.73	
S2	.79		.79	
S3	.84		.66	
S4	.84		.74	
S5	.81		.81	
S6	.78		.72	
S7	.82		.79	

Note. Number of observations ranges from 3,811 – 4,512 across semesters for women and from 2,864 – 4,110 for men; Number of participants ranges from 578-714 across semesters. The possible range of positive and negative affect is 1-5.

Table 3-2. *Multilevel Model Results, Model 1 (*N *= 735)*

	Positive Affect		Negative Affect	
	Estimate	Standard Error	Estimate	Standard Error
Fixed effects				
Level 1: Day				
Intercept (γ_{000})	2.27***	0.05	1.44***	0.03
Sexual behavior (γ_{100})	0.11***	0.02	-0.04**	0.01
Sexual behavior*Semester (γ_{110})	<-0.01	0.01	<0.01	<0.01
Level 2: Semester				
Sexual behavior (γ_{010})	-0.03	0.06	0.01	0.04
Semester (γ_{020})	0.01**	<0.01	0.02***	<0.01
Level 3: Person				
Sexual behavior (γ_{001})	0.59*	0.28	0.10	0.17
Black (γ_{002})	-0.13*	0.06	-0.04*	0.04
Hispanic (γ_{003})	-0.24***	0.06	-0.08	0.04
Asian (γ_{004})	-0.23***	0.06	0.02	0.04
Male (γ_{005})	0.08	0.05	-0.02	0.03
Random effects				
Level-2 intercept (ε_{0ij})	0.37***	0.02	0.13***	0.01
Level-3 intercept (ζ_{00j})	0.10***	<0.01	0.06***	<0.01
Residual (e_{tij})	0.24***	<0.01	0.13***	<0.01

*p < .05. **p < .01. ***p < .001.

Table 3-3. *Multilevel Model Results, Model 2 (*N *= 735)*

	Positive Affect		Negative Affect	
	Estimate	Standard Error	Estimate	Standard Error
Fixed effects				
Level 1: Day				
Intercept (γ_{000})	2.26***	0.05	1.44***	0.03
Sexual behavior after heavy drinking (γ_{100})	0.13***	0.04	-0.03	0.03
Sexual behavior without heavy drinking (γ_{200})	0.10***	0.02	-0.04*	0.02
Semester*Sexual behavior after heavy drinking (γ_{110})	-0.01	0.01	0.00	0.01
Semester*Sexual behavior without heavy drinking (γ_{210})	<0.01	0.01	<0.01	<0.01
Level 2: Semester				
Sexual behavior after heavy drinking (γ_{010})	0.08	0.17	<0.01	0.13
Sexual behavior without heavy drinking (γ_{020})	-0.04	0.07	0.02	0.05
Semester (γ_{030})	0.01**	<0.01	0.02***	<0.01
Level 3: Person				
Sexual behavior after heavy drinking (γ_{001})	1.69	1.06	-0.05	0.65
Sexual behavior without heavy drinking (γ_{002})	0.43	0.32	0.11	0.20
Black (γ_{003})	-0.12	0.06	-0.04	0.04
Hispanic (γ_{004})	-0.24***	0.06	-0.08*	0.04
Asian (γ_{005})	-0.22***	0.06	0.02	0.04
Male (γ_{006})	0.08	0.05	-0.02	0.03
Random effects				
Level-2 intercept (ε_{0ij})	0.37***	0.02	0.13***	0.01
Level-3 intercept (ζ_{00j})	0.10***	<0.01	0.06***	<0.01
Residual (e_{tij})	0.24***	<0.01	0.13***	<0.01

*p < .05. **p < .01. ***p < .001.

Table 3-4. *Multilevel Model Results, Model 3 (*N *= 735)*

	Positive Affect		Negative Affect	
	Estimate	Standard Error	Estimate	Standard Error
Fixed effects				
Level 1: Day				
Intercept (γ_{000})	2.28***	0.05	1.44***	0.03
Sexual behavior with romantic partner (γ_{100})	0.10***	0.02	-0.04*	0.02
Sexual behavior with casual partner (γ_{200})	0.11**	0.04	-0.04	0.03
Semester*Sexual behavior with romantic partner (γ_{110})	<0.01	0.01	<0.01	<0.01
Semester*Sexual behavior with casual partner (γ_{210})	-0.01	0.01	<0.01	0.01
Level 2: Semester				
Sexual behavior with romantic partner (γ_{010})	-0.02	0.06	<0.01	0.05
Sexual behavior with casual partner (γ_{020})	-0.02	0.13	0.17	0.10
Semester (γ_{030})	0.01**	<0.01	0.02***	<0.01
Level 3: Person				
Sexual behavior with romantic partner (γ_{001})	0.50	0.31	0.07	0.19
Sexual behavior with casual partner (γ_{002})	1.03	0.81	0.09	0.50
Black (γ_{003})	-0.14*	0.06	-0.04	0.04
Hispanic (γ_{004})	-0.25***	0.06	-0.08*	0.04
Asian (γ_{005})	-0.23***	0.06	0.02	0.04
Male (γ_{006})	0.08	0.05	-0.02	0.03
Random effects				
Level-2 intercept (ε_{0ij})	0.37***	0.02	0.13***	0.01
Level-3 intercept (ζ_{00j})	0.10***	<0.01	0.06***	<0.01
Residual (e_{tij})	0.24***	<0.01	0.13***	<0.01

*p < .05. **p < .01. ***p < .001.

Table 3-5. *Multilevel Model Results, Model 4 (*N = 735)

	Positive Affect		Negative Affect	
	Estimate	Standard Error	Estimate	Standard Error
Fixed effects				
Level 1: Day				
Intercept (γ_{000})	2.26***	0.05	1.44***	0.03
Sexual behavior after heavy alcohol/ with romantic partner (γ_{100})	0.14***	0.03	-0.04	0.02
Sexual behavior without heavy alcohol/ with romantic partner (γ_{200})	0.10***	0.01	-0.02*	0.01
Sexual behavior after heavy alcohol/ with casual partner (γ_{300})	0.07*	0.03	-0.01	0.02
Sexual behavior without heavy alcohol/ with casual partner (γ_{400})	0.10***	0.03	-0.058	0.02
Level 2: Semester				
Sexual behavior after heavy alcohol/ with romantic partner (γ_{010})	0.06	0.21	-0.16	0.16
Sexual behavior without heavy alcohol/ with romantic partner (γ_{020})	-0.03	0.07	0.03	0.05
Sexual behavior after heavy alcohol /with casual partner (γ_{030})	0.16	0.27	0.29	0.21
Sexual behavior without heavy alcohol /with casual partner (γ_{040})	-0.14	0.17	0.08	0.13
Semester (γ_{050})	0.01**	<0.01	0.02***	0.00
Level 3: Person				
Sexual behavior after heavy alcohol/ with romantic partner (γ_{001})	0.51	1.34	0.27	0.82
Sexual behavior without heavy alcohol/ with romantic partner (γ_{002})	0.57	0.37	0.02	0.23
Sexual behavior after heavy alcohol/ with casual partner (γ_{003})	3.96	1.92	-0.76	1.18
Sexual behavior without heavy alcohol/ with casual partner (γ_{004})	-0.05*	1.04	0.43	0.65
Black (γ_{005})	-0.12	0.06	-0.05	0.04
Hispanic (γ_{006})	-0.25***	0.06	-0.08*	0.04
Asian (γ_{007})	-0.22***	0.06	0.02	0.04
Male (γ_{008})	0.08	0.05	-0.03	0.03
Random effects				
Level-2 intercept (ε_{0ij})	0.36***	0.02	0.13***	0.01
Level-3 intercept (ζ_{00j})	0.10***	<0.01	0.06***	<0.01
Residual (e_{tij})	0.24***	<0.01	0.13***	<0.01

*p < .05. **p < .01. ***p < .001.

Chapter 5

Discussion

In this dissertation, I examined associations between social relationships and heavy alcohol use in adolescence and young adulthood. By including data from a range of social relationships and examining possible mechanisms of social influence, this dissertation advances understanding of how social relationships may affect heavy alcohol use in adolescence and young adulthood. The research adds nuance to understanding *who* matters for heavy alcohol use in adolescence/young adulthood, and *how* those individuals matter. Findings inform understanding of heavy alcohol use in adolescence and young adulthood from a developmental perspective, and inform future intervention strategies. Furthermore, the limitations of these papers highlight methodological issues that can affect results, providing directions for future research.

Social Influences on Heavy Alcohol Use and Its Outcomes

Past research on associations between close relationships and alcohol use in adolescence and young adulthood has examined both friendships and romantic and sexual relationships as contexts for alcohol use (e.g., Burk, van der Vorst, Kerr, & Stattin, 2012; Fischer & Wiersma, 2012; Kreager, Haynie, & Hopfer, 2013). Regarding relationship type, adolescents' and young adults' social relationships are diverse, and these diverse relationships may influence heavy alcohol use. Across adolescence, individuals become more susceptible to friends' influences on risk behaviors (Brechwald & Prinstein, 2011; Steinberg & Monahan, 2007). In addition to friendships, romantic relationships increase in prevalence, commitment, and emotional intimacy across adolescence and young adulthood (Connolly & McIsaac, 2011; Meier & Allen, 2009; Regan, Durvasula, Howell, Ureño, & Rea, 2004; Shulman & Connolly, 2013). Romantic involvement expands adolescents' social circles to include romantic partners' friends (Kreager & Haynie, 2011). Friends, romantic partners, and romantic partners' friends may influence heavy alcohol use in adolescence and young adulthood (Fleming, White, & Catalano, 2010;

Kreager et al., 2013; Mushquash et al., 2013).

Furthermore, adolescent and young adult romantic and sexual relationships are diverse. Romantic relationships include dating, cohabitating, and married relationships (Furman & Collibee, 2014; Meier & Allen, 2009; Shulman & Connolly, 2013). In addition to these romantic relationships, most young adults have engaged in some type of casual sexual relationship/experience (Claxton & van Dulmen, 2013; Wentland & Reissing, 2007). These diverse romantic and sexual relationships, which vary in their levels of commitment and intimacy (Claxton & van Dulmen, 2013; Pistole & Roberts, 2011), may have implications for heavy alcohol use.

In addition to the multiple social relationships of adolescence and young adulthood, there are multiple mechanisms by which social relationships may influence heavy alcohol use, including social learning influence, unstructured socializing, and shaping alcohol-related outcomes (Akers, Krohn, Lanza-Kaduce, & Radosevich, 1979; Haynie & Osgood, 2005; Patrick & Maggs, 2008). However, research that explains how these mechanisms operate in diverse social relationships is limited. One reason for this limitation is that research on mechanisms of social influence on alcohol use tends to focus on one type of relationship and/or one type of mechanism of social influence. In this dissertation, I examined how diverse social relationships, including friendships and romantic and sexual relationships, are associated with heavy alcohol use and its outcomes. The results of this research inform understanding of the types of relationships that may influence adolescents' and young adults' heavy alcohol use, and the mechanisms by which these influences may operate.

Who Matters for Heavy Alcohol Use?

Overall, the results of this dissertation support past research findings that friends are important in determining adolescents' alcohol use (e.g., Borsari & Carey, 2003; Kirke, 2004; Osgood et al., 2013). In addition, the results provide evidence that romantic and sexual partners are important in determining alcohol use for older adolescents and young adults. Regarding the role of friends, in Paper 1, I used a

social network perspective to address the relative contributions of friends, romantic partners, and partners' friends to adolescents' frequency of drunkenness. A strength of this paper was its examination of multiple mechanisms of social influence on frequency of drunkenness across three different social relationships: friends, romantic partners, and romantic partners' friends. The results of this paper suggest that adolescents are drunk more frequently when their friends are drunk more frequently and, later in adolescence, when they engage in more frequent unstructured socializing with their friends. This finding builds on past research examining friends' influence on adolescents' alcohol use (e.g., Kirke, 2004; Maxwell, 2002; Osgood et al., 2013) by demonstrating that these associations are independent of the contributions of romantic partners and partners' friends. Thus, the results of this paper suggest that friends' behaviors have a robust association with adolescents' frequency of drunkenness.

In contrast, there were no main effects of romantic partners and partners' friends with adolescents' frequency of drunkenness, controlling for other relationships/mechanisms of social influence. However, more frequent unstructured socializing with romantic partners was associated with less frequent drunkenness for older adolescent girls. Therefore, although friends' characteristics may be the best predictor of adolescents' heavy alcohol use, romantic relationships still play a role. The results of Paper 2 provide additional evidence for the idea that romantic partners contribute to alcohol use. Individuals binge drank more frequently at ages 24-32 if their romantic partners binge drank more frequently six years earlier. Together, the results of Papers 1 and 2 demonstrate that romantic and sexual relationships are associated with heavy alcohol use, consistent with past research (Fleming et al., 2010; Kim, Tiberio, Pears, Capaldi, & Washburn, 2013; Kreager & Haynie, 2011; Kreager et al., 2013; Mushquash et al., 2013).

In Papers 2 and 3, I explored how romantic and sexual relationship type are associated with heavy alcohol use and its short-term outcomes. I found that diverse romantic and sexual relationships are associated with alcohol-related outcomes; in Paper 2, romantic relationship type (married dating, or

cohabitating) did not moderate the association between partners' negative alcohol-related

consequences and changes in future binge drinking. That is, partners' binge drinking and alcohol-related

consequences similarly predicted changes in individuals' own binge drinking regardless of relationship

type. In Paper 3, the association between engaging in sexual behavior after heavy alcohol use and daily

affect did not differ by sexual partner type (committed romantic partner versus casual partner). The

results of both papers provide evidence that heavy alcohol use is rewarding and may be positively

reinforcing; romantic and sexual relationship type does not make heavy alcohol use less rewarding.

These results build on past research that has examined romantic relationships and alcohol use using

data from one type of relationship (either dating, cohabitating, or married; e.g., Fleming et al., 2010; Kim

et al., 2013; Mushquash et al., 2013), by examining relationship diversity. The findings suggest that the

contexts of these relationships (e.g., romantic versus casual; dating versus cohabitating versus married)

may be less important determinants of heavy alcohol use than partners' heavy alcohol use and

unstructured socializing with partners are.

Mechanisms of Social Influence on Heavy Alcohol Use

In addition to examining multiple types of social relationships, I examined multiple mechanisms

by which close others might influence individuals' alcohol use. These mechanisms are drawn from

differential association theory (Sutherland, 1947), social learning theory (Akers et al., 1979), social

ecological theories (Hawley, 1950; Haynie & Osgood, 2005), and expectancy theory (Jones, Corbin, &

Fromme, 2001), and include others' behaviors, alcohol-related attitudes, unstructured socializing with

others, and alcohol-related consequences. Taken together, the results of Papers 1 and 2 support that

others' heavy alcohol use is associated with individuals' own heavy alcohol use. These results inform

social learning explanations of heavy alcohol use in adolescence and young adulthood. The results of

Paper 1 also support unstructured socializing as a mechanism of social influence on adolescents' heavy

alcohol use, supporting social ecological theories of alcohol use. Papers 2 and 3 offer mixed evidence

that alcohol-related consequences may play a role in determining future heavy alcohol use, with implications for understanding how heavy alcohol use influences alcohol expectancies.

Social learning theory (Akers et al., 1979) proposes that the behaviors of close others influence individuals' own behaviors via mimicry and modeling of norms for behaviors. Regarding norms, individuals may learn heavy alcohol use by observing others' heavy alcohol use or alcohol-related consequences. Both Papers 1 and 2 provide evidence for social learning influences on heavy alcohol use, although the conclusions to be drawn from these papers differ. In Paper 1, friends' frequency of drunkenness predicted adolescents' own frequency of drunkenness, but romantic partners' frequency of drunkenness did not predict adolescents' own frequency of drunkenness. In contrast, in Paper 2, young adults' romantic partners' binge drinking predicted changes in young adults' own binge drinking. Thus, the results of Paper 1 suggest that social learning influence on adolescents' binge drinking operates primarily through friends, not romantic partners. The results of Paper 2 suggest that romantic partners do have a social learning influence on young adults' binge drinking. The discrepancy between these findings may be due to differences in the types of relationships that were measured or age differences in the samples. Regarding relationship types, it is possible that romantic partners' influence in Paper 2 was confounded with friends' influence, but I could not assess this possibility because the participants in Paper 2 did not answer questions about friends' binge drinking. Regarding age differences, Paper 1 used an adolescent sample, whereas Paper 2 used a young adult sample. As individuals age from adolescence to young adulthood, romantic relationships become more committed and emotionally intimate (Meier & Allen, 2009; Shulman & Connolly, 2013), and partners interact with each other more frequently: many of the couples in Paper 2 were cohabitating or married. Therefore, the role of romantic partners in determining heavy alcohol use may be greater for young adults than adolescents. The difference in the findings of Papers 1 and 2 may reflect these developmental changes.

Regardless of the differences in the findings of Papers 1 and 2, both papers support past

research findings that others' heavy alcohol use may influence adolescents' own heavy alcohol use (Kirke, 2004; Maxwell, 2002; Osgood et al., 2013; Fleming et al., 2010; Mushquash et al., 2013). These influences may come from friends in adolescence or romantic partners in young adulthood. In contrast to the evidence for others' behavior, the results of Paper 1 did not support others' attitudes as a predictor of adolescent heavy alcohol use. This finding differs from past research on close others' attitudes and alcohol use in adolescence, which has found that friends' alcohol-related attitudes predict adolescents' alcohol use (Ary, Tildesley, Hops, & Andrews, 1993; Borsari & Carey, 2003). However, these studies did not control for friends' alcohol use. Therefore, one explanation for these discrepant findings is that close others' attitudes may not predict heavy alcohol use independently of close others' behavior.

Complementary findings on behavioral and attitudinal influence inform explanations of adolescents' heavy alcohol use. Differential association theory proposes that attitude transference is sufficient to promote deviant behaviors such as alcohol use (Sutherland, 1947). In contrast, social learning theory (Akers et al., 1979) proposes that additional social learning processes are also necessary to influence behavior. Others have examined peer behavior and attitudes as unique predictors of delinquency and produced similar findings (Warr & Stafford, 1991). Warr and Stafford (1991; pp. 892-893) concluded that "There can be little doubt that peers are a critical factor in the production of delinquency, but the notion of attitude transference on which differential association theory rests does not appear to be a sufficient explanation of peer influence." Instead, the influence of close others' attitudes on heavy alcohol use may depend on whether these close others also drink heavily. These findings may also imply that adolescents attend more to peers' behavior than to peers' attitudes. When using social information to decide whether to drink heavily, close others' past behavior may be easier to recall than others' attitudes, and therefore may have a stronger influence on behavior.

In addition to social learning influences, the results of Paper 1 supported social ecological

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explanations of adolescent heavy alcohol use. In particular, unstructured socializing may be an important context for older adolescents' heavy alcohol use. Older adolescents were drunk more frequently when they engaged in more unstructured socializing with their friends. Social ecological explanations of alcohol use emphasize that individuals engage in behaviors when they have the opportunity to do so. Unstructured socializing (unsupervised socializing without a specific purpose) with friends may present more opportunities to drink alcohol for older adolescents, who may have easier access to alcohol (Harrison, Fulkerson, & Park, 2000).

In Papers 2 and 3, I explored outcomes of alcohol use in young adulthood, including daily affect and negative alcohol-related consequences, which may be mechanisms of influence on future alcohol use. A feed-forward model of alcohol use (Lee, Maggs, Neighbors, & Patrick, 2011) proposes that outcomes of alcohol use influence expectancies, which in turn influence future behavior. The results of past research partially support this model: positive alcohol-related consequences predict increases in plans to drink (Patrick & Maggs, 2008). There is less evidence that negative alcohol-related consequences predict decreases in alcohol use (Patrick & Maggs, 2008; White & Ray, 2014). In Paper 2, I incorporated a relational perspective into the feed-forward model of alcohol use by assessing whether romantic partners' alcohol-related consequences may also influence young adults' heavy alcohol use. Partners' consequences predicted increases in young adults' frequency of binge drinking. However, this association was no longer significant in the context of other predictors. In Paper 3, I examined how heavy alcohol use may influence improvements in affect following sexual behavior. The results support the idea that young adults experience sexual behavior after heavy alcohol use positively. Sexual behavior was associated with improvements in affect even if it occurred after heavy alcohol use.

Taken together, the results of Papers 2 and 3 suggest that romantic partners' binge drinking, individuals' own alcohol-related consequences, romantic partners' alcohol-related consequences, and heavy alcohol use before sexual behavior do not provide negative feedback that could contribute to

decreases in heavy alcohol use. On the contrary, individuals experience positive consequences of sexual behavior after heavy alcohol use. Furthermore, even when individuals experience negative consequences or observe others' negative consequences, these consequences do not deter individuals from continuing to binge drink. Consistent with past research (Lee et al., 2011; Park, 2004; Patrick & Maggs, 2008), young adults experienced positive alcohol-related consequences (improved affect following sexual behavior after heavy alcohol use). These findings suggest that positive consequences of alcohol use may increase positive alcohol expectancies, leading to increases in heavy alcohol use. However, individuals who experienced negative alcohol-related consequences did not decrease but actually increased their alcohol use. Therefore, young adults may see negative consequences as unimportant to avoid (Patrick & Maggs, 2008), or negative consequences may be outweighed by positive consequences (Patrick & Maggs, 2008). Furthermore, the results of this dissertation extend the feed-forward model of alcohol use (Lee et al., 2011), which has previously been applied to individuals' own alcohol-related consequences. The feed-forward model may also explain how interpersonal consequences (sexual behavior after heavy alcohol use) and observations of others' consequences (romantic partners' negative alcohol-related consequences) affect future alcohol use.

Developmental Considerations

The papers of this dissertation inform developmental understanding of heavy alcohol use in adolescence and young adulthood by utilizing samples of different ages and by examining age interactions in the associations between close relationships and heavy alcohol use and its outcomes. Regarding samples of different ages, in Papers 1 and 2 I examined how romantic partners' heavy alcohol use predicted individuals' own heavy alcohol use using adolescent and young adult samples, respectively. The disparate results of these papers suggest that the mechanisms of social influence on heavy alcohol use may differ for young adults, compared to adolescents. Romantic partners' alcohol use may be associated with young adults' heavy alcohol use, but not adolescents' heavy alcohol use.

However, it is important to keep in mind that other methodological differences between these studies may explain disparate findings.

Regarding age interactions, the results of Paper 1 suggest that unstructured socializing may become a more important context for heavy alcohol use as adolescents age. Furthermore, the importance of unstructured socializing may differ by relationship type and/or gender. As adolescents age, unstructured socializing with friends may encourage heavy alcohol use, whereas unstructured socializing with romantic partners may discourage girls' heavy alcohol use.

These findings may reflect different social purposes of friendships and romantic relationships across adolescence and into young adulthood. Early in adolescence, individuals interact with friends more frequently than romantic partners and rely on friends more than romantic partners to meet attachment needs (Connolly, Craig, Goldberg, & Pepler, 2004; Markiewicz, Lawford, Doyle, & Haggart, 2006). Romantic relationships tend to be short-lived and are often based on affiliative desires more than attachment or emotional bonds (Carver, Joyner, & Udry, 2003; Feiring, 1996; Furman & Wehner, 1997). As adolescents age, romantic relationships increase in stability and emotional intimacy, and individuals spend more time with partners (Carver et. al, 2003; Meier & Allen, 2009). Therefore, romantic partners' influence on heavy alcohol use may increase between adolescence and young adulthood. In addition, romantic relationships become more sexually intimate across adolescence (Centers for Disease Control, 2015; Halpern, Waller, Spriggs, & Hallfors, 2006). Unstructured socializing with romantic partners in late adolescence may protect against heavy alcohol use because partners use this time to explore sexual behaviors instead of drinking.

Although the results of Papers 1 and 2 suggest changes in the nature of relationships and heavy alcohol use between adolescence and young adulthood, the results of Paper 3 suggest that links between sexual relationships and heavy alcohol use may not change within young adulthood. In particular, sexual behavior after heavy alcohol use remains rewarding throughout the college years.

There were no semester interactions for associations between sexual behavior after heavy alcohol use and affect. One explanation for this finding is that heavy alcohol use and sexual behavior with casual partners are normative throughout college (Muthén & Muthén, 2000; Lefkowitz, Wesche, Vasilenko, & Maggs, 2017). Thus, small changes in the prevalence of heavy alcohol use and sexual behavior with casual partners may not make a difference in people's affective responses to diverse sexual encounters.

Prevention Implications

The results of this dissertation strengthen understanding of how different social relationships matter for adolescent and young adult heavy alcohol use, and this understanding can be used to inform future interventions. Past interventions on social relationships and alcohol use in adolescence and young adulthood have primarily focused on friends; the results of Papers 1 and 2 provide insight on whether and how to intervene with romantic relationships as well. In addition, the results of Papers 2 and 3 raise challenges for intervening on alcohol use within sexual relationships.

In adolescence and young adulthood, multiple interventions exist that address friends' influences on individuals' alcohol use. These interventions may alter the behavior and/or attitudes of individuals who have many friends (e.g., Valente, Gallaher, & Mouttapa, 2004). They may also aim to correct misperceptions about peers' drinking behavior and attitudes (Lewis, Neighbors, Oster-Aaland, Kirkeby, & Larimer, 2007; Neighbors et al., 2010; Walters & Neighbors, 2005). Other interventions reduce opportunities for unstructured socializing (Smith, 2007; Tebes et al., 2007). The findings of the present research have implications for the target audience and content of future interventions.

Regarding the target audience of interventions, the present research suggests that social network interventions for adolescents should continue to focus on individuals who are central in friendship networks, given the importance of friends to adolescent alcohol use. In contrast, the role of romantic partners in determining alcohol use is limited; targeting adolescents with romantic partners may not be a cost-effective intervention strategy given the scarce resources available for addressing

adolescent alcohol use. Regarding intervention content, the lack of support for attitudes as a predictor

of adolescent alcohol use in Paper 1 suggests that normative feedback interventions for reducing

adolescent alcohol use should continue to focus on behavior rather than attitudes. For example,

normative feedback interventions may continue to be effective if they correct misperceptions about

how much others drink; correcting misperceptions about others' alcohol-related attitudes may not be

necessary to effect change in alcohol use.

In addition to interventions focusing on friends in adolescence, in young adulthood, focusing on

romantic partners' alcohol use may also be an effective prevention strategy. Couples-based behavioral

alcohol treatments exist, but these programs typically focus on married couples and assess one couple

member's alcohol use as an outcome (Powers, Vedel, & Emmelkamp, 2008). The results of Paper 2

suggest that these interventions may also be useful in dating and/or cohabiting couples. In addition,

because romantic partners' binge drinking predicts individuals' own binge drinking, interventions to

reduce the heavier-drinking partner's alcohol use may result in decreases in binge drinking for both

partners. Future interventions should measure both partners' outcomes after therapeutic interventions.

However, because partners' negative alcohol-related consequences did not uniquely predict individuals'

binge drinking, addressing romantic partners' negative alcohol-related consequences may not improve

intervention effectiveness beyond addressing partners' binge drinking.

In addition to suggesting prevention strategies, the results of Papers 2 and 3 highlight the

challenges of intervening on young adult alcohol use. Many young adults experience positive

consequences of alcohol use (Lee et al., 2011; Park, 2004), including improved affect following sexual

behavior after heavy alcohol use. Even when individuals experience negative alcohol-related

consequences themselves or witness others experiencing them, these negative consequences do not

seem to deter young adults from continuing to drink heavily and may even lead to increases in heavy

alcohol use. Given these findings, interventions that emphasize the negative consequences of alcohol

use are unlikely to be effective because they do not reflect young adults' experiences.

Similarly, it may prove difficult to discourage young adults from having sex while intoxicated if sexual behavior after heavy alcohol use is associated with positive outcomes such as improvements in affect. However, sexual behavior after heavy alcohol use presents problems for young adult health, such as failure to use condoms with casual partners and sexual assault (Brown & Vanable, 2007; Cooper, 2002; Fisher, Daigle, & Cullen, 2010; Orchowski & Barnett, 2012). Therefore, it remains an important target of prevention programs. A challenge for intervention program designers will be to deter young adults from engaging in sexual behavior after heavy alcohol use. Taking a harm reduction approach to prevention may be more effective than focusing on abstaining from having sex after heavy alcohol use because sexual behavior after heavy alcohol use is normative and positive (Livingston, Bay-Cheng, Hequembourg, Testa, & Downs, 2013; Marlatt, Larimer, & Witkiewitz, 2011). One harm reduction strategy may be to attempt to make sexual behavior after heavy alcohol use and/or with casual partners less risky by encouraging protective strategies such as condom use. For example, interventions may aim to make condom use a salient behavior by stamping bar patrons' hands with safer sex-related messages (MacDonald, Fong, Zanna, & Martineau, 2000).

Harm reduction strategies related to sexual behavior after alcohol use may also help prevent sexual assault. Sexual consent after alcohol use is a complex issue. Alcohol use increases the risk of both sexual assault victimization and perpetration (Abbey, Zawacki, Buck Clinton, & McAuslan, 2004). Among many reasons for this link, alcohol use introduces barriers to expressing consent and to legally being capable of consenting to sexual behavior (Eileraas, 2011; Jozkowski & Wiersma, 2015). Although they may not consent to sexual behavior explicitly and/or legally, many individuals engage in wanted sexual behavior after heavy alcohol use (Muehlenhard, Humphreys, Jozkowski, & Peterson, 2016). Therefore, intervention approaches that tell young adults never to engage in sexual behavior after heavy alcohol use may be impractical (Jozkowski & Wiersma, 2015). Existing interventions using this approach have

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shown limited effectiveness (Lewis et al., 2014; Patrick, Lee, & Neighbors, 2014). Instead, educators may focus on sexual assault education for both men and women in other domains: rape attitudes, rape knowledge, self-defense (Anderson & Whiston ,2005; Söchting, Fairbrother, & Koch, 2004). In addition, bystander interventions, in which peers are trained to recognize and intervene in coercive situations, may help reduce sexual assault even when individuals engage in sexual behavior after heavy alcohol use (e.g., Salazar, Vivolo-Kantor, Hardin, & Berkowitz, 2014).

Methodological Considerations and Future Research

The papers in this dissertation used diverse methodologies to examine heavy alcohol use in adolescence and young adulthood. The differences between these methodological strategies raise questions about the discrepant findings of these papers, suggesting directions for future research. In addition, the present results offer limited information about causal associations between social relationships and heavy alcohol use. This limitation has implications for the interpretation of findings and for future research directions.

Regarding methodological strategies, Papers 1 and 2 included reports from multiple informants: participants and their friends, romantic partners, and/or romantic partners' friends. This strength allowed us to assess these close others' actual self-reported alcohol-related behaviors and attitudes instead of relying on perceptions of these variables. However, it did not allow us to examine the differences between individuals' perceptions of close others' behavior/attitudes, and close others' actual behavior/attitudes. This distinction is important; research on perceived and actual alcohol-related behavior and attitudes has found that college students' perceptions of their peers' alcohol-related behavior and attitudes differ from peers' actual alcohol-related behavior and attitudes (Borsari & Carey, 2003). Furthermore, individuals who overestimate their peers' alcohol use drink more alcohol themselves (Neighbors et al., 2008; Prentice & Miller, 1993). Future research should examine both actual and perceived behavior and attitudes in order to determine whether adolescents and young

adults misperceive the alcohol-related behavior and attitudes of friends, romantic partners, and partners' friends. Furthermore, researchers may consider examining whether these misperceptions are equally important predictors of heavy alcohol use across diverse social relationships.

In addition to including data from multiple informants, the papers in this dissertation used samples with individuals of different ages and featured longitudinal designs. These characteristics of the data enabled age comparisons. These comparisons revealed that romantic partners may be more influential on young adults' than on adolescents' binge drinking (Papers 1 and 2), that the mechanisms of social influence on heavy alcohol use may change across adolescence (Paper 1), and that young adults experience sexual behavior after heavy alcohol use positively across the college years (Paper 3). Although the findings of these papers suggest that there may be some developmental changes in how relationships are associated with heavy alcohol use and its outcomes, their contributions are limited by the length of data collection. Each paper examined adolescence or young adulthood; however, without long-term longitudinal studies, it is impossible to determine how the roles of different social relationships in determining heavy alcohol use change between adolescence and young adulthood. Therefore, a future direction of research is to use longitudinal data with measures of social relationships across adolescence and young adulthood to understand how the associations between diverse relationships and heavy alcohol use changes throughout these developmental stages.

The longitudinal nature of the studies I utilized in this dissertation also allowed me to assess within-person associations between independent and dependent variables. This strategy rules out time-stable confounding factors, bringing researchers closer to understanding causal associations between variables. However, within-person analyses do not permit causal inferences about the associations between variables. For example, in Paper 1, both selection processes (individuals choose friends/romantic partners who are similar to them) and influence processes (individuals become more similar to their friends/romantic partners over time) are responsible for friendship and romantic

relationship influences on alcohol use in adolescence and young adulthood (e.g., Brechwald & Prinstein,

2011; Dishion & Owen, 2002; Kreager & Haynie, 2011; Osgood et al., 2013; Rhule-Louie & McMahon,

2007). Selection of friends and romantic partners may partially account for any associations between

close others' heavy alcohol use/attitudes/ unstructured socializing and individuals' alcohol use. In Papers

2 and 3, time-varying confounding factors may have influenced results. For example, in Paper 2,

negative alcohol-related consequences may lead to mental health problems for individuals and their

romantic partners, which in turn cause increases in both partners' binge drinking over time. In Paper 3,

days with sexual behavior after heavy alcohol use may also be associated with time spent with friends,

which in turn influences affect the following day.

In order to better understand the causal associations between social relationships and heavy

alcohol use, more detailed data and more complex analytic strategies are necessary. To distinguish

selection effects, it is necessary to understand how social relationships change as a result of alcohol use.

For research on dyads, longitudinal data from both partners that tracks how friendships and romantic

relationships change over time would enable these comparisons. The results of Paper 2 could be

extended to encompass these changes with more waves of longitudinal data, enabling understanding of

partner selection and partner influence on alcohol use. However, understanding selection and influence

effects within networks of friendships and romantic relationships presents further challenges because of

the interdependence of many participants within groups. Some analysis strategies allow separation of

selection and influence effects within social networks, such as SIENA (Steglich, Snijders, & West, 2006).

However, using this strategy with romantic networks was not feasible in this dissertation because

adolescent romantic networks were sparse, characterized by few connections between participants.

Future research should continue to assess how diverse relationships are associated with heavy alcohol

use through both selection and influence effects.

In addition to new methods for addressing similar research questions, the results of this

dissertation inform new research questions about links between social relationships and alcohol use in adolescence and young adulthood. One direction is examining how relationship processes, rather than relationship characteristics, shape heavy alcohol use. For example, attachment and support-seeking within adult romantic relationships are associated with health (Pietromonaco, Uchino, & Dunkel Schetter, 2013). Are these processes equally important in determining heavy alcohol use within adolescents' friendships and romantic relationships? Similarly, what processes mediate associations between close others' heavy alcohol use and individuals' own heavy alcohol use? These processes might include communication about alcohol use or being offered alcohol.

Another future direction is to extend research on social relationships and heavy alcohol use to focus on additional health-related outcomes. The three papers of this dissertation addressed the alcohol-related outcomes of drunkenness, binge drinking, negative alcohol-related consequences, and affect following sexual behavior. However, heavy alcohol use results in a range of positive and negative outcomes, many of which are interpersonal: relationship problems, unsafe sex, and sexual assault are some examples. What relational risk/protective factors exist for experiencing positive and negative interpersonal outcomes of heavy alcohol use? How can social relationships promote/inhibit protective drinking behaviors and risk-taking while intoxicated?

Finally, friends, romantic partners, and partners' friends are not the only close relationships adolescents and young adults have. Parents and siblings may also influence heavy alcohol use (e.g., Conger & Rueter, 1996). Incorporating these relationships into understanding how diverse relationships and mechanisms of influence are associated with heavy alcohol use will increase the comprehensive understanding of social relationships and alcohol use.

Conclusion

Overall, this dissertation advances understanding of how diverse social relationships are associated with heavy alcohol use in adolescence and young adulthood. Friends' characteristics

predicted heavy alcohol use in adolescence and romantic partners' characteristics predicted heavy

alcohol use in young adulthood. The papers also advance understanding of mechanisms of social

influence, with support for close others' heavy alcohol use and unstructured socializing as influential on

adolescent and young adult heavy alcohol use. The role of consequences in determining heavy alcohol

use is complex; heavy alcohol use presents both positive and negative consequences, both of which may

correspond to increases in heavy alcohol use. This research informs developmental understanding of

heavy alcohol use in adolescence and young adulthood; both the important social relationships and the

mechanisms of social influence may differ across adolescence and young adulthood. The results and

limitations of this dissertation provide directions for future research, including long-term longitudinal

studies and statistical strategies for separating selection and influence effects.

References

Abbey, A., Zawacki, T., Buck, P. O., Clinton, A. M., & McAuslan, P. (2004). Sexual assault and alcohol

consumption: What do we know about their relationship and what types of research are still

needed? *Aggression and Violent Behavior, 9*, 271-303.

Akers, R. L., Krohn, M. D., Lanza-Kaduce, L., & Radosevich, M. (1979). Social learning and deviant

behavior: A specific test of a general theory. *American Sociological Review, 44*, 636-655.

Anderson, L. A., & Whiston, S. C. (2005). Sexual assault education programs: A meta-analytic

examination of their effectiveness. *Psychology of Women Quarterly, 29*, 374-388.

Ary, D. V., Tildesley, E., Hops, H., & Andrews, J. (1993). The influence of parent, sibling, and peer

modeling and attitudes on adolescent use of alcohol. *International Journal of the Addictions, 28*,

853-880.

Baer, J. S. (1994). Effects of college residence on perceived norms for alcohol consumption: An

examination of the first year in college. *Psychology of Addictive Behaviors, 8*, 43-50.

Borsari, B., & Carey, K. B. (2003). Descriptive and injunctive norms in college drinking: A meta-analytic

integration. *Journal of Studies on Alcohol, 64*, 331-341.

Brechwald, W. A., & Prinstein, M. J. (2011). Beyond homophily: A decade of advances in understanding

peer influence processes. *Journal of Research on Adolescence, 21*, 166-179.

Brown, J. L., & Vanable, P. A. (2007). Alcohol use, partner type, and risky sexual behavior among college

students: Findings from an event-level study. *Addictive Behaviors, 32*, 2940-2952.

Burk, W. J., van der Vorst, H., Kerr, M., & Stattin, H. (2012). Alcohol use and friendship dynamics:

Selection and socialization in early-, middle-, and late-adolescent peer networks. *Journal of*

Studies on Alcohol and Drugs, 73, 89-98.

Carver, K., Joyner, K., & Udry, J. R. (2003). National estimates of adolescent romantic relationships. In P.

Florsheim (Ed.), *Adolescent romantic relations and sexual behavior: Theory, research, and*

practical implications. Mahwah, NJ: Erlbaum.

Centers for Disease Control. (2015). Youth risk behavior surveillance—United States, 2013. *Morbidity and Mortality Weekly Report, 63*, 1–168.

Claxton, S. E., & van Dulmen, M. H. (2013). Casual sexual relationships and experiences in emerging adulthood. *Emerging Adulthood, 1*, 138-150.

Conger, R. D., & Reuter, M. A. (1996). Siblings, parents, and peers: A longitudinal study of social influences in adolescent risk for alcohol use and abuse. In G. H. Brody (Ed.), *Sibling relationships: Their causes and consequences* (pp. 1-30). Norwood, NJ: Ablex.

Connolly, J., Craig, W., Goldberg, A., & Pepler, D. (2004). Mixed-gender groups, dating, and romantic relationships in early adolescence. *Journal of Research on Adolescence, 14*, 185-207.

Connolly, J., & McIsaac, C. (2011). Romantic relationships in adolescence. In M. K. Underwood & L. H. Rosen (Eds.), *Social development: Relationships in infancy, childhood, and adolescence* (pp. 180-206). New York, NY: Guilford Press.

Cooper, M. L. (2002). Alcohol use and risky sexual behavior among college students and youth: Evaluating the evidence. *Journal of Studies on Alcohol, 14*, S101-S117.

Dishion, T. J., & Owen, L. D. (2002). A longitudinal analysis of friendships and substance use: Bidirectional influence from adolescence to adulthood. *Developmental Psychology, 38*, 480-491.

Eileraas, K. (2011). Legal definitions of rape. In M. Z. Stange, C. K. Oyster, & J. E. Sloan (Eds.), *Encyclopedia of women in today's world* (pp. 1205–1209). Thousand Oaks, CA: Sage.

Feiring, C. (1996). Concepts of romance in 15-year-old adolescents. *Journal of Research on Adolescence, 6*, 181-200.

Fischer, J. L., & Wiersma, J. D. (2012). Romantic relationships and alcohol use. *Current Drug Abuse Reviews, 5*, 98-116.

Fisher, B. S., Daigle, L. E., & Cullen, F. T. (2010). *Unsafe in the ivory tower: The sexual victimization of*

college women. Thousand Oaks, CA: Sage Publications.

Fleming, C. B., White, H. R., & Catalano, R. F. (2010). Romantic relationships and substance use in early

adulthood: An examination of the influences of relationship type, partner substance use, and

relationship quality. *Journal of Health and Social Behavior, 51*, 153-167.

Furman, W., & Collibee, C. (2014). A matter of timing: Developmental theories of romantic involvement

and psychosocial adjustment. *Development and Psychopathology, 26*, 1149-1160.

Furman, W., & Wehner, E. A. (1997). Adolescent romantic relationships: A developmental perspective.

New directions for child and adolescent development, 78, 21-36.

Halpern, C. T., Waller, M. W., Spriggs, A., & Hallfors, D. D. (2006). Adolescent predictors of emerging

adult sexual patterns. *Journal of Adolescent Health, 39*, e1–e10.

Harrison, P. A., Fulkerson, J. A., & Park, E. (2000). The relative importance of social versus commercial

sources in youth access to tobacco, alcohol, and other drugs. *Preventive Medicine, 31*, 39-48.

Hawley, A. (1950). *Human ecology: A theory of community structure*. New York, NY: Ronald.

Haynie, D. L., & Osgood, D. W. (2005). Reconsidering peers and delinquency: How do peers matter?

Social Forces, 84, 1109-1130.

Jones, B. T., Corbin, W., & Fromme, K. (2001). A review of expectancy theory and alcohol consumption.

Addiction, 96, 57-72.

Jozkowski, K. N., & Wiersma, J. D. (2015). Does drinking alcohol prior to sexual activity influence college

students' consent? *International Journal of Sexual Health, 27*, 156-174.

Keefe, K. (1994). Perceptions of normative social pressure and attitudes toward alcohol use: Changes

during adolescence. *Journal of Studies on Alcohol, 55*, 46-54.

Kim, H. K., Tiberio, S. S., Pears, K. C., Capaldi, D. M., & Washburn, I. J. (2013). Growth of men's alcohol

use in early adulthood: Intimate partners' influence. *Psychology of Addictive Behaviors, 27*,

1167-1174.

Kirke, D. M. (2004). Chain reactions in adolescents' cigarette, alcohol and drug use: Similarity through

    peer influence or the patterning of ties in peer networks? *Social Networks, 26*, 3-28.

Kreager, D. A., & Haynie, D. L. (2011). Dangerous liaisons? Dating and drinking diffusion in adolescent

    peer networks. *American Sociological Review, 76*, 737-763.

Kreager, D. A., Haynie, D. L., & Hopfer, S. (2013). Dating and substance use in adolescent peer networks:

    A replication and extension. *Addiction, 108*, 638-647.

Larimer, M. E., Turner, A. P., Mallett, K. A., & Geisner, I. M. (2004). Predicting drinking behavior and

    alcohol-related problems among fraternity and sorority members: Examining the role of

    descriptive and injunctive norms. *Psychology of Addictive Behaviors, 18*, 203-212.

Lee, C. M., Maggs, J. L., Neighbors, C., & Patrick, M. E. (2011). Positive and negative alcohol-related

    consequences: Associations with past drinking. *Journal of Adolescence, 34*, 87-94.

Lefkowitz, E. S., Wesche, R., Vasilenko, S. A., & Maggs, J. L. (2017). *Developmental changes in diverse*

    sexual behaviors across the college years. Manuscript submitted for publication.

Lewis, M. A., Neighbors, C., Geisner, I. M., Lee, C. M., Kilmer, R. A., & Atkins, D. C. (2010) Examining the

    relationship between severity of injunctive drinking norms and alcohol related negative

    consequences: The roles of alcohol consumption and identity. *Psychology of Addictive*

    Behaviors, 24, 177–189.

Lewis, M. A., Neighbors, C., Oster-Aaland, L., Kirkeby, B. S., & Larimer, M. E. (2007). Indicated prevention

    for incoming freshmen: Personalized normative feedback and high-risk drinking. *Addictive*

    Behaviors, 32, 2495-2508.

Lewis, M. A., Patrick, M. E., Litt, D. M., Atkins, D. C., Kim, T., Blayney, J. A., … & Larimer, M. E. (2014).

    Randomized controlled trial of a web-delivered personalized normative feedback intervention to

    reduce alcohol-related risky sexual behavior among college students. Journal of Consulting and

    Clinical Psychology, 82, 429.

Livingston, J. A., Bay-Cheng, L. Y., Hequembourg, A. L., Testa, M., & Downs, J. S. (2013). Mixed drinks and

    mixed messages: Adolescent girls' perspectives on alcohol and sexuality. *Psychology of Women*

    Quarterly, 37, 38-50.

MacDonald, T. K., Fong, G. T., Zanna, M. P., & Martineau, A. M. (2000). Alcohol myopia and condom use:

    Can alcohol intoxication be associated with more prudent behavior? *Journal of Personality and*

    Social Psychology, 78, 605-619.

Marlatt, G. A., Larimer, M. E., & Witkiewitz, K. (Eds.). (2011). *Harm reduction: Pragmatic strategies for*

    managing high-risk behaviors. New York, NY: Guilford Press.

Markiewicz, D., Lawford, H., Doyle, A. B., & Haggart, N. (2006). Developmental differences in

    adolescents' and young adults' use of mothers, fathers, best friends, and romantic partners to

    fulfill attachment needs. *Journal of Youth and Adolescence, 35*, 121-134.

Maxwell, K. A. (2002). Friends: The role of peer influence across adolescent risk behaviors. *Journal of*

    Youth and Adolescence, 31, 267-277.

Meier, A., & Allen, G. (2009). Romantic relationships from adolescence to young adulthood: Evidence

    from the National Longitudinal Study of Adolescent Health. *The Sociological Quarterly, 50*, 308-

    335.

Merrill, J. E., Read, J. P., & Colder, C. R. (2013). Normative perceptions and past-year consequences as

    predictors of subjective evaluations and weekly drinking behavior. *Addictive Behaviors, 38*,

    2625-2634.

Muehlenhard, C. L., Humphreys, T. P., Jozkowski, K. N., & Peterson, Z. D. (2016). The complexities of

    sexual consent among college students: A conceptual and empirical review. *The Journal of Sex*

    Research, 53, 457-487.

Mushquash, A. R., Stewart, S. H., Sherry, S. B., Mackinnon, S. P., Antony, M. M., & Sherry, D. L. (2013).

    Heavy episodic drinking among dating partners: A longitudinal actor–partner interdependence

model. *Psychology of Addictive Behaviors, 27*, 178-183.

Muthén, B. O., & Muthén, L. K. (2000). The development of heavy drinking and alcohol-related problems

from ages 18 to 37 in a US national sample. *Journal of Studies on Alcohol, 61*, 290-300.

Neighbors, C., Lewis, M. A., Atkins, D. C., Jensen, M. M., Walter, T., Fossos, N., ... & Larimer, M. E. (2010).

Efficacy of web-based personalized normative feedback: A two-year randomized controlled trial.

Journal of Consulting and Clinical Psychology, 78, 898-911.

Neighbors, C., O'Connor, R. M., Lewis, M. A., Chawla, N., Lee, C. M., & Fossos, N. (2008). The relative

impact of injunctive norms on college student drinking: The role of reference group. *Psychology

of Addictive Behaviors, 22*, 576-581.

Orchowski, L. M., & Barnett, N. P. (2012). Alcohol-related sexual consequences during the transition

from high school to college. *Addictive Behaviors, 37*, 256-263.

Osgood, D. W., Ragan, D. T., Wallace, L., Gest, S. D., Feinberg, M. E., & Moody, J. (2013). Peers and the

emergence of alcohol use: Influence and selection processes in adolescent friendship networks.

Journal of Research on Adolescence, 23, 500-512.

Park, C. L. (2004). Positive and negative consequences of alcohol consumption in college students.

Addictive Behaviors, 29, 311-321.

Patrick, M. E., Lee, C. M., & Neighbors, C. (2014). Web-based intervention to change perceived norms of

college student alcohol use and sexual behavior on Spring Break. *Addictive Behaviors, 39*, 600-

606.

Patrick, M. E., & Maggs, J. L. (2008). Short-term changes in plans to drink and importance of positive and

negative alcohol consequences. *Journal of Adolescence, 31*, 307-321.

Pietromonaco, P. R., Uchino, B., & Dunkel Schetter, C. (2013). Close relationship processes and health:

Implications of attachment theory for health and disease. *Health Psychology, 32*, 499-513.

Pistole, M. C., & Roberts, A. (2011). Measuring long-distance romantic relationships: A validity study.

Measurement and Evaluation in Counseling and Development, 44, 63-76.

Powers, M. B., Vedel, E., & Emmelkamp, P. M. (2008). Behavioral couples therapy (BCT) for alcohol and

drug use disorders: A meta-analysis. *Clinical Psychology Review, 28*, 952-962.

Prentice, D. A., & Miller, D. T. (1993). Pluralistic ignorance and alcohol use on campus: Some

consequences of misperceiving the social norm. *Journal of Personality and Social Psychology, 64*,

243-256.

Regan, P. C., Durvasula, R., Howell, L., Ureño, O., & Rea, M. (2004). Gender, ethnicity, and the

developmental timing of first sexual and romantic experiences. *Social Behavior and Personality:*

An International Journal, 32, 667-676.

Rhule-Louie, D. M., & McMahon, R. J. (2007). Problem behavior and romantic relationships: Assortative

mating, behavior contagion, and desistance. *Clinical Child and Family Psychology Review, 10*, 53-

100.

Salazar, L. F., Vivolo-Kantor, A., Hardin, J., & Berkowitz, A. (2014). A web-based sexual violence

bystander intervention for male college students: Randomized controlled trial. *Journal of*

Medical Internet Research, 16, 1-16.

Shulman, S., & Connolly, J. (2013). The challenge of romantic relationships in emerging adulthood:

Reconceptualization of the field. *Emerging Adulthood, 1*, 27-39.

Smith, E. P. (2007). The role of afterschool settings in positive youth development. *The Journal of*

Adolescent Health, 41, 219-220.

Söchting, I., Fairbrother, N., & Koch, W. J. (2004). Sexual assault of women: Prevention efforts and risk

factors. *Violence Against Women, 10*, 73-93.

Steglich, C., Snijders, T. A., & West, P. (2006). Applying SIENA. *Methodology, 2*, 48-56.

Steinberg, L., & Monahan, K. C. (2007). Age differences in resistance to peer influence. *Developmental*

Psychology, 43, 1531-1543.

Sutherland, E. H. (1947). *Principles of criminology*, 4th ed. Philadelphia, PA: Lippincott.

Tebes, J. K., Feinn, R., Vanderploeg, J. J., Chinman, M. J., Shepard, J., Brabham, T., ... & Connell, C. (2007). Impact of a positive youth development program in urban after-school settings on the prevention of adolescent substance use. *Journal of Adolescent Health, 41*, 239-247.

Valente, T. W., Gallaher, P., & Mouttapa, M. (2004). Using social networks to understand and prevent substance use: A transdisciplinary perspective. *Substance Use & Misuse, 39*, 1685-1712.

Walters, S. T., & Neighbors, C. (2005). Feedback interventions for college alcohol misuse: What, why and for whom? *Addictive Behaviors, 30*, 1168-1182.

Warr, M., & Stafford, M. (1991). The influence of delinquent peers: What they think or what they do? *Criminology, 29*, 851-866.

Wentland, J. J., & Reissing, E. D. (2011). Taking casual sex not too casually: Exploring definitions of casual sexual relationships. *Canadian Journal of Human Sexuality, 20,* 75-91.

White, H. R., & Ray, A. E. (2014). Differential evaluations of alcohol-related consequences among emerging adults. *Prevention Science, 15*, 115-124.

Appendix A

Paper 1 Fixed and Random Effects Model Equations

<u>Model 1: Frequency of drunkenness</u>

Level 1 (wave): $Drunkenness = \beta_{0j} + \beta_{1j}\,(friend\ drunk) + \beta_{2j}\,(partner\ drunk) + \beta_{3j}\,(partner\ friend\ drunk) + \beta_{4j}\,(wave) + \beta_{5j}\,(wave * friend\ drunk)\ \beta_{6j}\,(wave * partner\ drunk)\ \beta_{7j}\,(wave * partner\ friend\ drunk) + \beta_{8j}\,(grades) + e_{ij}$

Level 2 (person): $\beta_{0j} = \gamma_{00} + \gamma_{01}(free\ lunch) + \gamma_{02}(two-parent\ household) + \gamma_{03}(average\ friend\ drunk) + \gamma_{04}(average\ partner\ drunk) + \gamma_{05}(average\ partner\ friend\ drunk) + \zeta_{0j}$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\beta_{5j} = \gamma_{50}$$

$$\beta_{6j} = \gamma_{60}$$

$$\beta_{7j} = \gamma_{70}$$

$$\beta_{8j} = \gamma_{80}$$

Combined: $Drunkenness = \gamma_{00} + \gamma_{10}\,(friend\ drunk) + \gamma_{20}\,(partner\ drunk) + \gamma_{30}\,(partner\ friend\ drunk) + \gamma_{40}(wave) + \gamma_{50}\,(wave * friend\ drunk) + \gamma_{60}\,(wave * partner\ drunk) + \gamma_{70}\,(wave * partner\ friend\ drunk) + \gamma_{80}\,(grades) + \gamma_{01}(free\ lunch) + \gamma_{02}(two-parent\ household) + \gamma_{03}(average\ friend\ drunk) + \gamma_{04}(average\ partner\ drunk) + \gamma_{05}(average\ partner\ friend\ drunk) + \zeta_{0j} + e_{ij}$

Model 4: Combined model

Level 1 (wave): $Drunkenness = \beta_{0j} + \beta_{1j}\,(friend\ drunk) + \beta_{2j}\,(partner\ drunk) +$
$\beta_{3j}\,(partner\ friend\ drunk) + \beta_{4j}\,(friend\ attitudes) +$
$\beta_{5j}\,(partner\ attitudes) + \beta_{6j}\,(partner\ friend\ attitudes) +$
$\beta_{7j}\,(friend\ socializing) + \beta_{8j}\,(partner\ socializing) +$
$\beta_{9j}\,(partner\ friend\ socializing) + \beta_{10j}\,(wave) +$
$\beta_{11j}\,(wave * friend\ drunk) + \beta_{12j}\,(wave * partner\ drunk) +$
$\beta_{13j}\,(wave * partner\ friend\ drunk) + \beta_{14j}\,(wave *$
$friend\ attitudes) + \beta_{15j}\,(wave * partner\ attitudes) +$
$\beta_{16j}\,(wave * partner\ friend\ attitudes) + \beta_{17j}\,(wave *$
$friend\ socializing) + \beta_{18j}\,(wave * partner\ socializing) +$
$\beta_{19j}\,(wave * partner\ friend\ socializing) + \beta_{20j}\,(grades) +$
e_{ij}

Level 2 (person): $\beta_{0j} = \gamma_{00} + \gamma_{01}(free\ lunch) + \gamma_{02}(two-parent\ household) +$
$\gamma_{03}(average\ friend\ drunk) + \gamma_{04}(average\ partner\ drunk) +$
$\gamma_{05}(average\ partner\ friend\ drunk) +$
$\gamma_{06}(average\ friend\ attitudes) + \gamma_{07}(average\ partner\ attitudes) +$
$\gamma_{08}(average\ partner\ friend\ attitudes) +$
$\gamma_{09}(average\ friend\ socializing) +$
$\gamma_{010}(average\ partner\ socializing) +$
$\gamma_{011}(average\ partner\ friend\ socializing) + \zeta_{0j}$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\beta_{5j} = \gamma_{50}$$

$$\beta_{6j} = \gamma_{60}$$

$$\beta_{7j} = \gamma_{70}$$

$$\beta_{8j} = \gamma_{80}$$

$$\beta_{9j} = \gamma_{90}$$

$$\beta_{10j} = \gamma_{100}$$

$$\beta_{11j} = \gamma_{110}$$

$$\beta_{12j} = \gamma_{120}$$

$$\beta_{13j} = \gamma_{130}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

$$\beta_{16j} = \gamma_{160}$$

$$\beta_{17j} = \gamma_{170}$$

$$\beta_{18j} = \gamma_{180}$$

$$\beta_{19j} = \gamma_{190}$$

$$\beta_{20j} = \gamma_{200}$$

Combined:
$$\beta_{0j} = \gamma_{00} + \gamma_{10}(friend\ drunk) + \gamma_{20}(partner\ drunk) + \gamma_{30}(partner\ friend\ drunk) + \gamma_{40}(friend\ attitudes) + \gamma_{50}(partner\ attitudes) + \gamma_{60}(partner\ friend\ attitudes) + \gamma_{70}(friend\ socializing) + \gamma_{80}(partner\ socializing) + \gamma_{90}(partner\ friend\ socializing) + \gamma_{100}(wave) + \gamma_{110}\,(wave * friend\ drunk) + \gamma_{120}\,(wave * partner\ drunk) + \gamma_{130}\,(wave * partner\ friend\ drunk) + \gamma_{140}\,(wave * friend\ attitudes) + \gamma_{150}\,(wave * partner\ attitudes) + \gamma_{160}\,(wave * partner\ friend\ attitudes) + \gamma_{170}\,(wave * friend\ socializing) + \gamma_{180}\,(wave * partner\ socializing) + \gamma_{190}\,(wave * partner\ friend\ socializing) + \gamma_{200}(grades) + \gamma_{01}(free\ lunch) + \gamma_{02}(two-parent\ household) + \gamma_{03}(average\ friend\ drunk) + \gamma_{04}(average\ partner\ drunk) + \gamma_{05}(average\ partner\ friend\ drunk) + \gamma_{06}(average\ participant\ attitudes) + \gamma_{06}(average\ friend\ attitudes) + \gamma_{07}(average\ partner\ attitudes) + \gamma_{08}(average\ partner\ friend\ attitudes) + \gamma_{09}(average\ friend\ socializing) + \gamma_{010}(average\ partner\ socializing) + \gamma_{011}(average\ partner\ friend\ socializing) + \zeta_{0j} + e_{ij}$$

Appendix B

Paper 1 Additional Analyses

Fixed and random effects model results for boys

	Model 1 Others' drunkenness		Model 2 Others' attitudes		Model 3 Unstructured socializing		Model 4 Full Model		Model 5 Remove Interactions	
	coefficient	bootstrapped SE	coefficient	bootstrapped SE	coefficient	bootstrapped SE	coefficient	bootstrapped SE	coefficient	bootstrapped SE
Within-person effects										
Friends' drunkenness	.371***	.075					.390***	.098	.274***	.062
Partners' drunkenness	.043	.057					.018	.063	.068	.053
Partners' friends' drunkenness	.125*	.058					.116	.107	.211**	.069
Wave*Friends' drunkenness	-.037	.023					-.057	.034		
Wave*Romantic partners' drunkenness	.041	.028					.028	.027		
Wave*Partners' friends' drunkenness	.030	.035					.041	.039		
Friends' attitudes			.204**	.074			-.055	.090	.007	.084
Partners' attitudes			.055	.055			.061	.051	.077	.042
Partners' friends' attitudes			.058	.072			.063	.112	-.036	.067
Wave*Friends' attitudes			.019	.026			.027	.035		
Wave*Romantic partners' attitudes			.063**	.024			.006	.021		
Wave*Partners' friends' attitudes			.051	.032			-.050	.044		
Unstructured socializing with friends					-.092	.052	-.071	.041	-.074	.042
Unstructured socializing with partners					-.020	.027	-.007	.017	-.003	.022
Romantic partners' unstructured socializing with friends					-.046	.046	-.017	.048	.002	.043
Wave*Unstructured socializing with friends					.087***	.024	.051*	.022	.055**	.019

	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Wave*Unstructured socializing with romantic partners					.010	.012	.003	.011		
Wave*Partners' unstructured socializing with friends					.045	.025	.014	.021		
Wave	.048	.041	-.087	.060	-.192*	.079	-.098	.084	-.078	.061
School grades	-.129**	.041	-.137***	.029	-.203	.029	-.120***	.032	-.120***	.026
Between-person effects										
Free/reduced lunch	-.025	.086	-.007	.072	.018	.081	-.018	.077	-.018	.070
Two-parent family	-.009	.078	.024	.070	.003	.089	.040	.068	.016	.058
Average friends' drunkenness	.168*	.085					.109	.123	.116	.112
Average partners' drunkenness	-.004	.068					.016	.086	.010	.090
Average partners' friends' drunkenness	.101	.081					.071	.082	.068	.087
Average friends' attitudes			.234**	.077			.027	.088	.020	.109
Average Partners' attitudes			.015	.078			-.072	.086	-.080	.100
Average Partners' friends' attitudes			.181	.105			.069	.120	.078	.117
Average Unstructured socializing with friends					.272***	.057	.175***	.045	.175***	.052
Unstructured socializing with partners					-.009	.047	-.010	.042	-.012	.048
Romantic partners' unstructured socializing with friends					.120*	.046	.066	.064	.065	.070
Variance components										
Within-person	.671		.722		.735		.646		.645	
Between-person	.791		.812		.846		.784		.784	
ICC	.418		.441		.430		.405		.403	
Number of participants	791		791		791		780		780	
Number of observations	1706		1706		1706		1603		1603	

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$.

Fixed and random effects model results for girls

	Model 1 Others' drunkenness		Model 2 Others' attitudes		Model 3 Unstructured socializing		Model 4 Full Model		Model 5 Remove Interactions	
	coefficient	bootstrapped SE	coefficient	bootstrapped SE	coefficient	bootstrapped SE	coefficient	bootstrapped SE	coefficient	bootstrapped SE
Within-person effects										
Friends' drunkenness	.227**	.083					.257*	.101	.288***	.057
Partners' drunkenness	.013	.040					-.027	.043	.051	.039
Partners' friends' drunkenness	.011	.064					.029	.074	.123**	.044
Wave*Friends' drunkenness	.028	.033					.004	.040		
Wave*Romantic partners' drunkenness	.034	.017					.036	.020		
Wave*Partners' friends' drunkenness	.043	.029					.039	.038		
Friends' attitudes			.080	.072			-.016	.079	.003	.066
Partners' attitudes			.062*	.030			.081	.043	.068	.046
Partners' friends' attitudes			-.025	.056			.004	.080	.029	.050
Wave*Friends' attitudes			.075*	.035			.020	.033		
Wave*Romantic partners' attitudes			.028	.020			-.003	.025		
Wave*Partners' friends' attitudes			.064*	.027			-.011	.040		
Unstructured socializing with friends					-.140**	.049	-.087*	.043	-.078	.042
Unstructured socializing with partners					.067*	.030	.054	.028	.040	.028
Romantic partners' unstructured socializing with friends					-.090**	.030	-.023	.031	-.043	.028
Wave*Unstructured socializing with friends					.087***	.020	.054**	.019	.055**	.019
Wave*Unstructured socializing with romantic partners					-.015	.013	-.021*	.010	.047***	.012
Wave*Partners' unstructured socializing with friends					.084***	.013	.034*	.017		

	Model 1		Model 2		Model 3		Model 4		Model 5	
Wave	-.102**	.037	-.206***	.049	-.283***	.057	-.268**	.081	-.201***	.046
School grades	-.086***	.053	-.177**	.052	-.199***	.054	-.168***	.040	-.150**	.051
Between-person effects										
Free/reduced lunch	-.053	.065	-.058	.089	-.060	.086	-.062	.070	-.065	.068
Two-parent family	-.142*	.065	-.153	.088	-.195*	.081	-.129*	.063	-.125*	.054
Average friends' drunkenness	.140*	.060					.111	.066	.102	.073
Average partners' drunkenness	.063	.046					.093	.053	.094	.062
Average partners' friends' drunkenness	.052	.052					.045	.076	.042	.071
Average friends' attitudes			.294**	.088			.041	.125	.054	.115
Average Partners' attitudes			-.007	.053			-.095	.080	-.091	.072
Average Partners' friends' attitudes			.095	.065			.006	.082	<.001	.084
Average Unstructured socializing with friends					.116*	.057	.051	.042	.048	.051
Unstructured socializing with partners					.010	.037	-.006	.032	-.010	.067
Romantic partners' unstructured socializing with friends					.165***	.042	.026	.041	.030	.039
Variance components										
Within-person	.518		.585		.602		.507		.503	
Between-person	.579		.602		.667		.586		.592	
ICC	.444		.486		.449		.423		.419	
Number of participants	675		675		678		659		659	
Number of observations	1414		1418		1469		1340		1340	

Notes: * *p* < .05, ** *p* < .01, *** *p* < .001.

Paper 2 Additional Analyses

Logistic Regression Results (N = 1,139)

	Model 1		Model 2 (partner binge drinking)		Model 3 (participant consequences)		Model 4 (partner consequences)		Model 5 (combined model)		Model 6 (partner type interaction)	
Cox & Snell R^2	.17		.19		.18		.18		.19		.20	
	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE
Cohabitating	.21	.18	.15	.18	.17	.18	.16	.18	.13	.18	.09	.19
Dating	.38*	.17	.33	.18	.34	.18	.32	.18	.30	.18	.26	.18
Relationship length	<.01	<.01	<-.01	<.01	<-.01	<.01	<-.01	<.01	<-.01	<.01	<-.01	<.01
Participant age at wave 3	-.14**	.04	-.12**	.04	-.14**	.04	-.13**	.04	-.12**	.04	-.13**	.04
Years of education	.05	.04	.04	.04	.04	.04	-.04	.04	.04	.04	.04	.04
Gender (male = 1)	.67***	.14	.88***	.15	.69***	.14	.74***	.14	.88***	.14	.90***	.15
Black	-.63**	.19	-.56**	.19	-.63**	.19	-.60**	.19	-.56**	.19	-.54**	.19
American Indian/Native American	-.35	.30	-.33	.30	-.36	.30	-.36	.30	-.33	.30	-.36	.30
Asian	-.21	.26	-.19	.26	-.23	.26	-.19	.26	-.20	.26	-.17	.26
Hispanic	.05	.20	.07	.20	.05	.20	.05	.20	.08	.20	.10	.20
Participant binge drinking wave 3	.48***	.05	.43***	.05	.39***	.07	.45***	.05	.36***	.07	.36***	.07
Partner binge drinking wave 3			.24***	.05					.22**	.06	.35**	.10
Participant alcohol consequences wave 3					.56*	.24			.42	.24	.40	.24
Partner alcohol consequences wave 3							.49**	.17	.02	.20	.09	.47

Dating*Partner alcohol consequences		-.26	.13
Cohabitating* Partner alcohol consequences		-.07	.14
Dating*Partner binge drinking		.28	.55
Cohabitating* Partner binge drinking		-.66	.62

Notes: *p < .05, **p < .01, ***p < .001

Appendix D

Paper 3 Multilevel Model Equations

Model 1:

Level 1 (day): $Outcome = \beta_{0ij} + \beta_{1ij}(sexual\ behavior) + e_{tij}$

Level 2 (semester): $\beta_{0ij} = \pi_{00j} + \pi_{01j}(sexual\ behavior) + \pi_{02j}(semester) + \varepsilon_{0ij}$
$\beta_{1ij} = \pi_{10j} + \pi_{11j}(semester)$

Level 3 (person): $\pi_{00j} = \gamma_{000} + \gamma_{001}(sexual\ behavior) + \gamma_{002}(Black) + \gamma_{003}(Hispanic) +$
$\gamma_{004}(Asian) + \gamma_{005}(Gender) + \zeta_{00j}$
$\pi_{01j} = \gamma_{010}$
$\pi_{10j} = \gamma_{100}$

Combined: $Outcome = \gamma_{000} + \gamma_{001}(sexual\ behavior) + \gamma_{002}(Black) + \gamma_{003}(Hispanic) +$
$\gamma_{004}(Asian) + \gamma_{005}(Gender) + \gamma_{010}(sexual\ behavior) +$
$\gamma_{020}(semester) + \gamma_{100}(sexual\ behavior) + \gamma_{110}(sexual\ behavior *$
$semester) + \zeta_{00j} + \varepsilon_{0ij} + e_{tij}$

Model 2:

Level 1 (day): $Outcome = \beta_{0ij} + \beta_{1ij}(sex\ after\ drinking) + \beta_{2ij}(sex\ w/o\ drinking) + e_{tij}$

Level 2 (semester): $\beta_{0ij} = \pi_{00j} + \pi_{01j}(sex\ after\ drinking) + \pi_{02j}(sex\ w/o\ drinking) +$
$\pi_{03j}(semester) + \varepsilon_{0ij}$
$\beta_{1ij} = \pi_{10j} + \pi_{11j}(semester)$
$\beta_{2ij} = \pi_{20j} + \pi_{21j}(semester)$

Level 3 (person): $\pi_{00j} = \gamma_{000} + \gamma_{001}(sex\ after\ drinking) + \gamma_{002}(sex\ w/o\ drinking) +$
$\gamma_{003}(Black) + \gamma_{004}(Hispanic) + \gamma_{005}(Asian) + \gamma_{006}(Gender) + \zeta_{00j}$
$\pi_{01j} = \gamma_{010}$
$\pi_{02j} = \gamma_{020}$
$\pi_{10j} = \gamma_{100}$
$\pi_{20j} = \gamma_{200}$

Combined: $Outcome = \gamma_{000} + \gamma_{001}(sex\ after\ drinking) + \gamma_{002}(sex\ w/o\ drinking) +$
$\gamma_{003}(Black) + \gamma_{004}(Hispanic) + \gamma_{005}(Asian) + \gamma_{006}(Gender) +$
$\gamma_{010}(sex\ after\ drinking) + \gamma_{020}(sex\ w/o\ drinking) +$
$\gamma_{030}(semester) + \gamma_{100}(sex\ after\ drinking) + \gamma_{200}(sex\ w/o\ drinking) + \gamma_{110}(sex\ after\ drinking * semester) +$
$\gamma_{210}(sex\ w/o\ drinking * semester) + \zeta_{00j} + \varepsilon_{0ij} + e_{tij}$

Model 3:

Level 1 (day): $Outcome = \beta_{0ij} + \beta_{1ij}(romantic\ sex) + \beta_{2ij}(casual\ sex) + e_{tij}$

Level 2 (semester): $\beta_{0ij} = \pi_{00j} + \pi_{01j}(romantic\ sex) + \pi_{02j}(casual\ sex) + \pi_{03j}(semester) + \varepsilon_{0ij}$
$\beta_{1ij} = \pi_{10j} + \pi_{11j}(semester)$
$\beta_{2ij} = \pi_{20j} + \pi_{21j}(semester)$

Level 3 (person): $\pi_{00j} = \gamma_{000} + \gamma_{001}(romantic\ sex) + \gamma_{002}(casual\ sex) + \gamma_{003}(Black) +$
$\qquad\qquad \gamma_{004}(Hispanic) + \gamma_{005}(Asian) + \gamma_{006}(Gender) + \zeta_{00j}$
$\pi_{01j} = \gamma_{010}$
$\pi_{02j} = \gamma_{020}$
$\pi_{10j} = \gamma_{100}$
$\pi_{20j} = \gamma_{200}$

Combined: $Outcome = \gamma_{000} + \gamma_{001}(romantic\ sex) + \gamma_{002}(casual\ sex) + \gamma_{003}(Black) +$
$\qquad\qquad \gamma_{004}(Hispanic) + \gamma_{005}(Asian) + \gamma_{006}(Gender) +$
$\qquad\qquad \gamma_{010}(romantic\ sex) + \gamma_{020}(casual\ sex) + \gamma_{030}(semester) +$
$\qquad\qquad \gamma_{100}(romantic\ sex) + \gamma_{200}(casual\ sex) + \gamma_{110}(romantic\ sex *$
$\qquad\qquad semester) + \gamma_{210}(casual\ sex * semester) + \zeta_{00j} + \varepsilon_{0ij} + e_{tij}$

Model 4:

Level 1 (day): $Outcome = \beta_{0ij} + \beta_{1ij}(romantic\ sex\ after\ heavy\ drinking) +$
$\beta_{2ij}(romantic\ sex\ without\ heavy\ drinking) +$
$\beta_{3ij}(casual\ sex\ afterheavy\ drinking) +$
$\beta_{4ij}(casual\ sex\ withoutheavy\ drinking) + e_{tij}$

Level 2 (semester): $\beta_{0ij} = \pi_{00j} + \pi_{01j}(romantic\ sex\ after\ heavy\ drinking) +$
$+ \pi_{02j}(romantic\ sex\ without\ heavy\ drinking) +$
$\pi_{03j}(casual\ sex\ after\ heavy\ drinking) +$
$\pi_{04j}(casual\ sex\ without\ heavy\ drinking) + \pi_{05j}(semester) + \varepsilon_{0ij}$
$\beta_{1ij} = \pi_{10j}$
$\beta_{2ij} = \pi_{20j}$
$\beta_{3ij} = \pi_{30j}$
$\beta_{4ij} = \pi_{40j}$

Level 3 (person): $\pi_{00j} = \gamma_{000} + \gamma_{001}(romantic\ sex\ after\ heavy\ drinkng) +$
$\gamma_{002}(romantic\ sex\ without\ heavy\ drinking) +$
$\gamma_{003}(casual\ sex\ after\ heavy\ drinkng) +$
$\gamma_{004}(casual\ sex\ without\ heavy\ drinking) + \gamma_{005}(Black) +$
$\gamma_{006}(Hispanic) + \gamma_{007}(Asian) + \gamma_{008}(Gender) + \zeta_{00j}$
$\pi_{01j} = \gamma_{010}$
$\pi_{02j} = \gamma_{020}$
$\pi_{03j} = \gamma_{030}$
$\pi_{04j} = \gamma_{040}$
$\pi_{05j} = \gamma_{050}$
$\pi_{10j} = \gamma_{100}$
$\pi_{20j} = \gamma_{200}$
$\pi_{30j} = \gamma_{300}$
$\pi_{40j} = \gamma_{400}$

Combined: $Outcome = \gamma_{000} + \gamma_{001}(romantic\ sex\ after\ heavy\ drinking) +$
$\gamma_{002}(romantic\ sex\ without\ heavy\ drinking) +$
$\gamma_{003}(casual\ sex\ after\ heavy\ drinking) +$
$\gamma_{004}(casual\ sex\ without\ heavy\ drinking) + \gamma_{005}(Black) +$
$\gamma_{006}(Hispanic) + \gamma_{007}(Asian) + \gamma_{008}(Gender) +$
$\gamma_{010}(romantic\ sex\ after\ heavy\ drinking) +$
$\gamma_{020}(romantic\ sex\ without\ heavy\ drinking) +$
$\gamma_{030}(casual\ sex\ after\ heavy\ drinking) +$
$\gamma_{040}(casual\ sex\ without\ heavy\ drinking) + \gamma_{050}(semester) +$
$\gamma_{100}(romantic\ sex\ after\ heavy\ drinking) +$
$\gamma_{200}(romantic\ sex\ without\ heavy\ drinking) +$
$\gamma_{300}(casual\ sex\ after\ heavy\ drinking) +$
$\gamma_{400}(casual\ sex\ without\ heavy\ drinking) + \zeta_{00j} + \varepsilon_{0ij} + e_{tij}$

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Wesche, R., Claxton, S. E., Lefkowitz, E. S., & van Dulmen, M. H. M. (2017). Evaluations and future plans after casual sexual experiences: Differences across partner type. *Journal of Sex Research*. Advance online publication. doi: 10.1080/00224499.2017.1298714

Wesche, R., Kreager, D. A., Lefkowitz, E. S., & Siennick, S. (2017). Early sexual initiation and mental health: A fleeting association or enduring change? *Journal of Research on Adolescence.* Advance online publication*.* doi: 10.1111/jora.12303

Wesche, R., Lefkowitz, E. S., & Vasilenko, S. A. (2017). Latent classes of sexual behaviors: Prevalence, predictors and consequences. *Sexuality Research and Social Policy, 14*, 100-111. doi: 10.1007/s13178-016-0228-y

Wesche, R., Espinosa-Hernández, G., & Lefkowitz, E. S. (2016). Gender's role in misperceptions of peers' sexual motives. *Sexuality & Culture, 20*, 1003-1019*.* doi: 10.1007/s12119-016-9370-1

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