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Drinking Games as a Venue for Sexual Competition

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Based on sexual selection theory, I hypothesized that sex differences in sexual restrictiveness and social competitiveness—and sex differences in sexual and competitive motivations for participating in drinking games—are responsible for the sex differences in increases in drinking game behaviors over a twelve-week period. Participants were 133 women and 128 men enrolled in an introductory psychology course at the University of Miami. I found that men increased in frequency of drinking game participation and quantity of alcohol consumed during participation more so than did women. I also found that sex differences in increases in frequency of drinking game participation were partially mediated by competitive motivations for participating in drinking games and the effects of sexual restrictiveness and social competitiveness on competitive motivation. Drinking games are a major venue in which college students engage in heavy episodic drinking, which is a risk factor for college students' behavioral and health problems. Thus, examining these relationships from a functional perspective may be useful in informing public health and university interventions and enabling better identification of at-risk students.

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Chapter 1 Introduction

In the U.S., binge drinking among college students results in more than 2,000 deaths, 599,000 injuries, 646,000 assaults, and 97,000 sexual assaults annually (Hingson, Zha, & Weitzman, 2009). Students who binge drink (defined as the consumption of five drinks or more for men or four drinks or more for women in two hours; National Institute on Alcohol Abuse and Alcoholism, 2004) are at a higher risk of damaging property, getting into fights, engaging in unplanned sexual encounters, missing classes, getting poor grades, getting into accidents, violating school policies and in extreme cases, injury and death (Borsari et al., 2007; Perkins, 2002). Thus, identifying the factors that contribute to binge drinking has been recognized as an important priority for college student health (Wechsler, Kuo, Lee, & Dowdall, 2000).

Drinking games are one such factor. Drinking games are commonly characterized by the consumption of large quantities of alcohol in short amounts of time (Douglas, 1987; Engs & Hanson, 1993; Green & Grider, 1990; Nagoshi, Wood, Cote, & Abbit, 1994; Newman, Crawford, & Nellis, 1991; Pedersen, 1990). They are one of the major venues in which binge drinking occurs for college students (Douglas, 1987; Engs & Hanson, 1993; Green & Grider, 1990; Nagoshi et al., 1994; Newman et al., 1991; Pedersen, 1990) and drinking game participation is one of the best predictors of college students' binge drinking and blood alcohol levels while drinking (Clapp et al., 2003; Clapp, Won Min Jong, Shillington, Reed, & Ketchie Croff Julie, 2008). Participation in drinking games is responsible for many of the negative acute consequences associated with binge drinking in general (Cameron et al., 2010; Johnson & Stahl, 2004; Polizzotto, Saw, Tjhung, Chua, & Stockwell, 2007).

Compared to non-players, students in one study who reported participating in drinking games in the past year experienced greater incidence of hangovers, nausea or vomiting, driving drunk, cutting and missing class because of drinking and hangovers, getting poor grades, damaging property, getting into trouble with school administration and law enforcement, and getting into fights (Engs & Hanson, 1993). Students in another study who reported participating in at least one game in the past three months scored significantly higher on the Rutgers Alcohol Problem Index (RAPI), a scale assessing problems associated with or during drinking, than those who did not (Pedersen & LaBrie, 2006). Drinking game participation can have particularly adverse consequences for women (Zamboanga, Bean, Pietras, & Pabón, 2005; Zamboanga, Leitkowski, Rodriguez, & Cascio, 2006). For instance, the relationship between RAPI scores and drinking game involvement is stronger for women than for men (Pedersen & LaBrie, 2006), and even when controlling for amount of alcohol consumed, women who participate in drinking games report more negative consequences (and end up with higher blood alcohol concentrations; Cameron, Leon, & Correia, 2011; Correia & Cameron, 2010; Silvestri, 2011) than do women who do not participate in drinking games (Johnson, Wendel, & Hamilton, 1998). Finally, students who participate in drinking games report higher rates of sexual assault perpetration and victimization (e.g., intercourse without consent) than non-players and, in one study, 90% of the variance in alcohol-related sexual assault of women was accounted for by drinking game-related sexual assault (Johnson et al., 1998).

Students' Motivations for Participating in Drinking Games

Most students are well aware of many alcohol-related harms associated with drinking (Leigh, 1987), yet an estimated 63% to 86% of college students have

participated in drinking games at some point (Borsari, 2004; Cameron et al., 2010; Douglas, 1987; Engs & Hanson, 1993; Nagoshi et al., 1994; Polizzotto et al., 2007; Simons et al., 2005). Students' motivations for doing something they generally acknowledge to be risky is therefore a biological puzzle. Existing evidence suggests the plausibility of a functional account of student drinking game behaviors that takes developmentally normative competitive and sexual motivations into account.

Competitive and Sexual Aspects of Drinking Games

Evidence suggests that students seem to be motivated to participate in drinking games in order to compete and demonstrate their abilities to same- and opposite-sex peers. For example, certain drinking games allow players to assign drinks to other players and insult players who break rules or cheat (Green & Grider, 1990; Zamboanga, Calvert, O'Riordan, & McCollum, 2007). Other drinking games require the skills to bounce a quarter into a shot glass, throw a ping-pong ball into a cup, or repeat a tongue-twister (Green & Grider, 1990; Zamboanga et al., 2007). Still other drinking games require the constitution to ingest high volumes of alcohol in a short amount of time, the ability to keep one's wits about oneself despite high intake of alcohol, drinking until vomiting, and risking blackouts or severe hangovers (Green & Grider, 1990; Zamboanga et al., 2007). It seems that players compete in tasks that demonstrate physical dexterity, coordination, fortitude, strength, mental prowess, willingness to use force, and willingness to take risks. Furthermore, players cite "because I want to win" and "to take a risk" as reasons to participate in drinking games (Johnson & Sheets, 2004). Moreover, students observe that drinking games enable male players (Borsari, Bergen-Cico, & Carey, 2003; Polizzotto et al., 2007) to compete with other males to demonstrate their aforementioned abilities

(Borsari, 2004)—often in the presence of female players (Borsari et al., 2003; Polizzotto et al., 2007) who also participate and take an interest in the games' outcomes (Rhoads, 1995).

Evidence also suggests that young people are motivated to participate in drinking games because they provide an avenue for increasing their sexual opportunities. Many games are a prelude to sexual activity—in fact, sexual activity is a commonly reported reason for why drinking games end (Johnson, 2002). For example, drinking games reportedly end for men because "I have gotten someone to have sex with me," and "another person showed sexual interest in me," (Borsari, 2004; Johnson, 1999; Johnson, 2002). Moreover, players report that they participate in drinking games "in order to have sex with someone" (Johnson & Sheets, 2004). Thus, students seem to be motivated to participate in drinking games to attract the attention of potential sexual partners.

To put the matter more strongly, drinking games may serve as venues in which students can enact competitive and sexual motivations despite—and perhaps in part because of—the risks associated with them. To the extent that this is the case, students' competitive and sexual motivations for participating in drinking games may be addressed formally using sexual selection theory (Bateman, 1948; Buss & Schmitt, 1993; Darwin, 1859; Geary, 2003; Trivers, 1972).

Sexual Selection Theory as a Framework for Understanding Students' Motivations for Participating in Drinking Games

Sexual selection theory describes how natural selection gives rise to sex-specific, short- and long-term mating strategies that improve individual fitness (Bateman, 1948; Buss & Schmitt, 1993; Darwin, 1859; Geary, 2003; 2006; 2012; Trivers, 1972). In most

species, including humans, these distinct mating strategies comprise physical and psychological endowments that improve individual fitness because they solve sex-specific problems associated with reproductive constraints (Bateman, 1948; Buss & Schmitt, 1993; Darwin, 1859; Geary, 2003; 2006; 2012; Trivers, 1972). Broadly, sex-specific reproductive constraints among sexually reproducing organisms result from asymmetries in parental investment (due fundamentally to anisogamy) and reproductive rate (how quickly an individual is able to rejoin the mating pool). As a result, the fitness of members of the higher investing/slower reproducing sex (usually female) is more constrained by the quality of fitness-enhancing resources they can provide for their offspring than by their access to mating opportunities, whereas the fitness of members of the lesser investing/faster reproducing sex (usually male) is more constrained by the quantity of their mating opportunities (Trivers, 1972). At any stage of sexual reproduction, if one parent invests more in the offspring than the other (e.g., larger gametes), the higher-investing parent faces a greater fitness loss if the offspring does not survive to reproductive maturity (Trivers, 1972). This asymmetry exerts a selection pressure on the lesser-investing parent to withhold parental investment and rejoin the mating pool while still benefiting from the higher-investing parent's continued investment in their mutual progeny (Trivers, 1972) . This type of asymmetrical parental investment results in sex-specific reproductive constraints that promote intrasexual competition in males and intersexual choosiness in females (Trivers, 1972). It has also driven the evolution of sex-specific physical and psychological adaptations in many species that cause males and females to (unconsciously) pursue naturally selected mating strategies (Trivers, 1972).

When pursuing short-term mating strategies, females face the adaptive problem of maximizing immediate resource acquisition and identifying reliable signals of males' good genes, whereas males face the adaptive problem of maximizing access to females with minimal commitment of resources and identifying reliable cues of females' fertility (Trivers, 1972). In contrast, when pursuing long-term mating strategies, females face the adaptive problem of identifying males who are able and willing to continually provide resources, whereas males face the adaptive problem of ensuring paternal certainty of the offspring in which they invest (Trivers, 1972). Consequently, the selection pressure for females to choose mates who can increase the fitness of their offspring via good genes and parental investment arguably led to the evolution of psychological mechanisms that motivate them to assess mate quality and select mates with good genes and the ability and willingness to invest in offspring until they reach reproductive maturity (Trivers, 1971). Likewise, the selection pressure for males to compete for access to mates has arguably led to the evolution of psychological mechanisms that motivate males to take risks that signal their mate quality and that enable them to compete effectively for access to mates (Bateman, 1948; Buss & Schmitt, 1993; Darwin, 1859; Geary, 2003; 2006; 2012; Trivers, 1972).

From the standpoint of sexual selection theory, part of the appeal of drinking games for young adults may be that they are a venue for males to engage in competition, and for females to assess reproductively relevant characteristics of males. Specifically, drinking game participation is a risky behavior during which (1) males are able to compete with other males; (2) males are able to display to females their physical dexterity, coordination, fortitude, strength, mental prowess, willingness to use force and

willingness to take risks; and (3) females are able to observe these competitions and displays and make mating decisions on the basis of what these competitions reveal about the desirable traits of competitors. In this light, drinking games may usefully be conceptualized as venues for students to enact short-term mating strategies.

Predictions

In line with the literature on biological differences between males and females, I will refer to differences between men and women in motivations and behaviors as "sex differences." Because drinking games arguably serve as a venue for male intrasexual competition and female intersexual choosiness consistent with short-term mating strategies, as sexual selection theory might imply (Bateman, 1948; Buss & Schmitt, 1993; Darwin, 1859; Geary, 2003; 2006; 2012; Trivers, 1972), I predicted that men would report greater motivation to participate in drinking games for competitive and sexual reasons. I also predicted that men would report greater increases in frequency drinking game participation, levels of alcohol consumption while participating in drinking games, and problematic alcohol use, than would women over a twelve-week period. Additionally, I predicted these sex differences in behaviors would be mediated by sex differences in sexual restrictiveness and social competitiveness because men, due to their sexually selected psychologies, generally have less restricted sociosexual orientations (i.e., a measure of willingness to engage in unrestricted sexual activity; Simpson & Gangestad, 1991), and are generally more socially competitive than women (Simpson & Gangestad, 1991; Ahlgren & Johnson, 1979). I specified a set of mediational paths through which sex differences in sexual restrictiveness and social competitiveness predicted greater motivations to participate in drinking games for sexual and competitive

reasons, which in turn led to increases in drinking game participation, levels of alcohol consumption while participating in drinking games, and problematic alcohol use (see Figure 1).

Chapter 2 Participants and Measures

Participants

Two cohorts comprised 1,115 students enrolled in consecutive semesters of introductory psychology courses in the fall of 2010 and the spring of 2011. For both cohorts, the first phase of data collection occurred during the first week of the semester and the second phase occurred approximately twelve weeks later. Participants from the first cohort who re-enrolled in the introductory psychology course were excluded from the second cohort. Students 18 and older provided written documentation of informed consent and we obtained parental consent for students under 18. Participants obtained a small amount of course credit for participating.

Frequency of Drinking Game Participation and Quantity of Alcohol Consumed during Drinking Game Participation

I measured participants' frequency of drinking game participation and typical quantities of alcohol consumed during drinking game participation with two single Likert-type self-report items. The item, "How often do you play drinking games?" was endorsed on an eight-point scale ranging from 0 (*Never*) to 7 (*Daily or almost daily*), and the item, "How much alcohol do you tend to consume when you play drinking games ("drink" = 1 beer or 1 shot)?" was endorsed on a six-point scale ranging from 0 (*None*) to 5 (*Seven or more drinks*).

Alcohol Use Disorders Identification Test (AUDIT)

I measured students' problematic alcohol use with six items from the Alcohol Use Disorders Identification Test (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). The AUDIT includes items used to screen for alcohol use and assesses intake (1-3),

dependence (4-6), and negative outcomes (7-10; Reinert & Allen, 2002). Six of the ten items from the AUDIT (1-3, 7-8, 10) were used, and four (4-6, 9) were excluded on the premise that the high severity of some items are generally irrelevant to a population of first-year college students (e.g., "How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?"; Babor et al., 2001). I used one of the AUDIT items ("How often do you have a drink containing alcohol?") to distinguish drinkers from non-drinkers to select a subsample of participants for analysis. Studies reviewed by Reinert and Allen (2007) yield good reliability (0.75-0.97) and validity of the AUDIT in diverse samples, including college students. In this thesis, reliability of the six-item version of the AUDIT was acceptable; Cronbach's alphas ranged from 0.77 to 0.87 in the four samples tested (0.77 and 0.80 in the fall cohort during phase one and two, respectively, and 0.78 and 0.87 in the spring cohort during phase one and two, respectively.

Sociosexual Orientation Inventory (SOI)

I used the seven-item Sociosexual Orientation Inventory (SOI) to measure individual differences in sexual restrictiveness. Sociosexual orientation is a set of strongly covarying attitudes and behaviors that reflect history of and preference for engaging in uncommitted sexual activities with multiple and concurrent partners (Simpson & Gangestad, 1991). Specifically, sociosexual orientation consists of features such as preferred frequency, number, and concurrence of uncommitted sexual partners (both present and future); feelings concerning and ease of engaging in uncommitted sexual activities; and frequency of sexual fantasies involving partners other than the present partner (Simpson & Gangestad, 1991). The items assessing these features include,

for example, “With how many different partners have you had sex within the past year?” Convergent and discriminant validity was originally established in six studies (Simpson & Gangestad, 1991). Three studies revealed that unrestricted individuals engaged in sexual activities earlier in relationships, were more likely to engage in sexual activities with concurrent partners, and were more likely to be in less committed sexual relationships (Simpson & Gangestad, 1991). Discriminant validity was established through a study revealing that frequency of sexual activities between couples in sexual relationships did not correlate with sociosexual orientation. Furthermore, SOI scores were correlated with measures of similar features (e.g., impersonal sex) but not with measures of dissimilar features (e.g., sexual satisfaction; Simpson & Gangestad, 1991). The SOI is calculated by weighting and aggregating seven items pertaining to number of partners in the past year, number of partners foreseen in the next five years, number of one-night-stands, frequency of sexual fantasy, and attitudes toward engaging in casual, uncommitted sex (Simpson & Gangestad, 1991). In this sample, reliability of the SOI was acceptable; Cronbach’s alpha was 0.86 and 0.84 in the fall cohort during phase one and two, respectively, and 0.85 and 0.91 in the spring cohort during phase one and two, respectively.

Social Competitiveness

I measured social competitiveness with three items from the Cooperative/Competitive Strategy Scale (Simmons, Wehner, Tucker, & King, 2001). These items positively loaded on a factor representing the use of competition to both motivate and achieve success as opposed to the use of cooperation to motivate and achieve success or the avoidance of achieving success through competition (Simmons et

al., 2001). Items were endorsed on a five-point Likert-type scale from 1 (*Strongly disagree)* to 5 *(Strongly agree*). The items included: "To succeed, one must compete against others," "It is important for me to do better than others," and "I enjoy the challenge of competing against others to succeed." Simmons et al. (2001) found evidence for reliability (0.84) and validity of this subscale. In this sample, reliability of the social competitiveness subscale was acceptable; Cronbach's alpha was 0.73 and 0.77 in the fall and spring cohorts during phase one, respectively.

Motivations to Participate in Drinking Games

Based on qualitative work in the extant literature, I created a survey to provide measures of participants' motivations for participating in drinking games. The survey included thirty-four items designed to identify the discrete motivations underlying drinking game participation. Items were rated on a six-point Likert-type scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*), including 0 (*I do not play drinking games*). I explored factorability of the thirty-four items using phase one data from the fall cohort and confirmed the factor structure using phase one data from the spring cohort. Based on an initial inspection of factor loadings and communalities, I selected a subset of nine items that loaded on three distinct factors reflecting fortitude-display, sexual, and competitive motivations based on attempts to maximize content heterogeneity within factors (see Table 1) while also obtaining reasonable internal consistency reliabilities (Cronbach's alphas > 0.75; see Table 2). Using principal components analysis and a direct oblimin rotation with Kaiser Normalization, I re-factored these nine items, which yielded a three-factor solution that accounted for 75.22% of the variance in the nine items (see Table 2). Using confirmatory factor analysis, I tested the three-factor model, $\chi^2(24) =$

76.68, $p < 0.001$, CFI = 0.95, RMSEA = 0.10, SRMR = 0.06), against a one-factor model, $\chi^2(27) = 291.66$, CFI = 0.77, RMSEA = 0.20, SRMR = 0.10 (see Table 3). The three-factor model provided a better fit than did a one-factor model, $\chi^2\Delta(3) = 214.98$, $p < 0.001$ (see Table 3). I labeled the three factors "fortitude-display motivation" ($\alpha = 0.80$), "sexual motivation" ($\alpha = 0.89$), and "competitive motivation" ($\alpha = 0.77$).

Chapter 3 Method

Procedure

During the first week of both semesters, I administered a battery of questionnaires to all of the students enrolled in introductory psychology courses at the University of Miami. The questionnaires contained the measures described above. During the last week of both semesters, I provided students with a link to an online survey that contained the same questionnaires, which they completed a second time. Students were informed that their names would not be associated with their answers and students were encouraged to answer truthfully. In accordance with previous studies showing that a high percentage of students participate in drinking games (Borsari, 2004; Cameron et al., 2010; Douglas, 1987; Engs & Hanson, 1993; Nagoshi, Wood, Cote, & Abbit, 1994; Polizzotto, Saw, Tjhung, Chua, & Stockwell, 2007; Simons, Lantz, Klichine, & Ascolese, 2005), 80.5% of students who reported drinking at least occasionally reported participating in drinking games at least occasionally at the first phase, and 81.0% reported participating in drinking games at least occasionally at the second phase. Because a high percentage of students reported participating in drinking games, I concluded that students' self-reported behavior were representative of their actual behavior, although this is impossible to confirm within the context of the present study.

Sample Selection

For the purposes of this thesis, I focused on 261 participants (133 women and 128 men) who reported their sex and reported drinking and participating in drinking games at least occasionally, and who provided data at both phases so changes over the twelve-

week period in drinking game behavior could be examined. This provided a slightly more rigorous test of causal hypotheses than could be obtained with cross-sectional data alone (Finkel, 1995). The first cohort comprised 744 students (456 reported their sex and drinking and participating in drinking games at least occasionally) and the second cohort comprised 371 (231 reported their sex and drinking and participating in drinking games at least occasionally). Of the participants, 382 participants were tested during both the first and second phases (261 reported their sex and drinking and participating in drinking games at least occasionally), 675 were tested only during phase one (426 reported their sex and drinking and participating in drinking games at least occasionally), and 58 were tested only during phase two (44 reported their sex and drinking and participating in drinking games at least occasionally).

Power Analysis and Sample Size

I used independent samples *t*-tests to evaluate whether participants from the first and second cohorts significantly differed in sociosexual orientation, social competitiveness, mean fortitude-display, sexual, and competitive motivations, frequency of participation, quantity of alcohol consumed during participation, and AUDIT scores at the first and second phases. At the first phase of testing, participants from the first cohort differed from those from the second cohort in sociosexual orientation, $t(684) = 2.45$, $p = 0.014$, Cohen's $d = 0.20$, and mean fortitude-display motivation, $t(682) = 1.58$, $p = 0.008$, Cohen's $d = 0.21$, with students from the first cohort reporting less restricted sociosexual orientations ($M = 7.45$, $SD = 4.75$) than students from the second cohort ($M = 6.48$, $SD = 5.06$) and lower mean fortitude-display motivation ($M = 1.35$, $SD = 0.74$) than students from the second cohort ($M = 1.51$, $SD = 0.75$; see Table 1). However, the patterns of

correlations between sex and frequency of participation (rs ≈ 0.15, ps < 0.05), quantity of alcohol consumed during participation (rs ≈ 0.29, ps < 0.001), and AUDIT scores (rs ≈ 0.16, ps < 0.05) were similar in both samples, so I combined the samples to increase power (see Table 4). At the second phase of testing, participants from the first cohort differed from those from the second cohort in mean fortitude-display, $t(297) = -2.31$, $p = 0.022$, Cohen's $d = 0.38$, and mean competitive motivations, $t(297) = -1.97$, $p = 0.043$, Cohen's $d = 0.29$, with students from the first cohort ($M = 1.65$, $SD = 0.88$) reporting lower mean fortitude-display motivation than students from the second cohort and lower mean competitive motivation ($M = 2.67$, $SD = 1.10$) than students from the second cohort ($M = 2.95$, $SD = 0.81$; see Table 2). Again, the patterns of correlations between sex and frequency of participation (rs ≈ 0.22, ps = 0.074, 0.01), quantity of alcohol consumed during participation (rs ≈ 0.29, ps < 0.001, = 0.188), and AUDIT scores (rs ≈ 0.20, ps = 0.054, 0.057) were similar in both samples, so I combined the samples to increase power (see Table 5).

I also used independent samples *t*-tests to evaluate whether participants who were tested at both the first and second phases differed significantly from participants who were only tested at the first phase in sociosexual orientation, social competitiveness, mean fortitude-display, sexual, and competitive motivations, frequency of participation, quantity of alcohol consumed during participation, and AUDIT scores. Participants who were tested at both the first and second phases reported significantly higher AUDIT scores ($M = 1.18$, $SD = 0.60$) than did participants who were tested only during the first phase ($M = 1.08$, $SD = 0.57$), $t(685) = 2.11$, $p = 0.04$, Cohen's $d = 0.17$ (see Table 6). The within-phase correlations of sex with frequency of participation (rs ≈ 0.14, ps = 0.08,

0.001), quantity of alcohol consumed during participation (rs ≈ 0.28, ps < 0.001), and AUDIT scores (rs ≈ 0.15, ps < 0.05) were comparable across samples, so I combined the samples to increase power (see Table 6).

Analyses of sex differences in motivations and behaviors among college students from a cross-sectional study using the data from the fall cohort yielded effect sizes (Cohen's *d*) ranging from 0.30 to 0.92 with a mean of 0.55 Using these effect sizes as a guide, I anticipated that the effect sizes of sex differences in motivations and behaviors in this sample would be about 0.55 and using $\alpha = 0.05$ (two-tailed), and that my subsamples of students needed to include at least 42 men and 42 women for a minimum power in these studies of 0.80. With my sample of 261 participants (133 women and 128 men), estimated power was 0.99 for detecting sex differences of the expected magnitude.

Chapter 4 Statistical Analysis

Computing Residualized Change Scores in Behaviors

In a structural equation model, I specified causal paths from frequency of participation at phase two to frequency of participation at phase one, quantity of alcohol consumed during participation at phase two to quantity consumed during participation at phase one, and AUDIT scores at phase two to AUDIT scores at phase one. The three resulting residualized change scores for each respective variable were the dependent variables for the successive analyses.

Analysis of Sex Differences in Sociosexual Orientation, Social Competitiveness, Motivations, and Residualized Change Scores in Behaviors

Using independent samples *t*-tests, I examined sex differences in the phase one scores on sociosexual orientation, social competitiveness, and fortitude-display, sexual, and competitive motivations. To explore sex differences in longitudinal changes in drinking game behaviors over the twelve-week observation period, I also used independent samples *t*-tests to examine whether men and women differed in the three residualized change in frequency of participation, quantity of alcohol consumed during participation, and AUDIT scores.

Mediation of Sex Differences in Motivations by Sociosexual Orientation and Social Competitiveness and Mediation of Sex Differences in Behaviors by Sociosexual Orientation, Social Competitiveness, and Motivations

In a mediation model in Mplus Version 6 (Muthén & Muthén, 2010), I tested whether direct effects of sex on fortitude-display, sexual, and competitive motivations were mediated by sociosexual orientation and social competitiveness (see Figure 1). I

also tested whether direct effects of sex on residualized changes in frequency of participation, quantity of alcohol consumed during participation, and AUDIT scores were mediated by sociosexual orientation, social competitiveness, and fortitude-display, sexual, and competitive motivations (see Figure 1). Additionally, I tested whether indirect effects of sex on residualized change in frequency of participation, quantity of alcohol consumed during participation, and AUDIT scores were mediated by sociosexual orientation and social competitiveness via their intermediate effects on motivations for participating in drinking games. Finally, I tested whether the addition of direct effects from sex to residualized change in frequency of participation, quantity of alcohol consumed during participation, and AUDIT scores significantly improved overall model fit after all of the indirect effects were taken into account with a three-degree-of-freedom chi-square difference test (see Figure 2). The goal of these analyses was to evaluate sex differences in residualized change scores in behaviors by examining whether the effects of sex on residualized change scores in behaviors were mediated by sex differences in two relatively broad individual differences (sociosexual orientation and social competitiveness), as well as three situation-specific motivational differences (fortitude-display, sexual, and competitive motivations for participating in drinking games).

Chapter 5 Results

Sex Differences in Sociosexual Orientation, Social Competitiveness, Motivations, and Residualized Change Scores in Behavior

Independent samples *t*-tests (see Table 7) revealed that men reported less restricted sociosexual orientations ($M = 9.25$, $SD = 4.86$) than did women ($M = 5.28$, $SD = 3.65$), $t(235.45^{1}) = -7.44$, $p < 0.001$, Cohen's $d = 0.97$, and higher levels of social competitiveness ($M = 3.69$, $SD = 0.87$) than did women ($M = 3.18$, $SD = 0.85$), $t(254) = -4.76$, $p < 0.001$, Cohen's $d = 0.59$. Men also reported greater fortitude-display motivations ($M = 1.59$, $SD = 0.81$) than did women ($M = 1.26$, $SD = 0.64$), $t(239.31) = -3.59$, $p < 0.001$, Cohen's $d = 0.45$, greater sexual motivations ($M = 2.91$, $SD = 1.22$) than did women ($M = 1.80$, $SD = 1.07$), $t(249.94) = -7.78$, $p < 0.001$, Cohen's $d = 0.97$, and greater competitive motivations ($M = 2.81$, $SD = 1.09$) than did women ($M = 2.07$, $SD = 0.98$), $t(258) = -5.74$, $p < 0.001$, Cohen's $d = 0.71$.

In addition, men had greater residualized increases in frequency of drinking game participation ($M = 0.18$, $SD = 1.10$) than did women ($M = -0.14$, $SD = 0.88$), $t(233.13) = -3.10$, $p = 0.002$, Cohen's $d = 0.32$, and greater residualized increases in quantity of alcohol consumed during drinking games ($M = 0.13$, $SD = 1.00$) than did women ($M = -0.10$, $SD = 1.09$), $t(371) = -2.16$, $p = 0.031$, Cohen's $d = 0.22$. Men and women did not differ significantly in residualized AUDIT scores, $t(375) = -1.62$, $p = 0.11$, thus, men's changes in problematic alcohol use over the twelve-week period were not greater than women's. These small sex differences in residualized change scores in frequency of drinking game participation and in quantity of alcohol consumed during drinking game

[1] In cases where Levene's test for equality of variances was significant, adjusted *t* and *df* values were reported.

participation, therefore, were amenable to explanation in terms of the sex differences in sociosexual orientation, social competitiveness, and fortitude-display, sexual, and competitive motivations.

Mediation of Sex Differences in Residualized Change Scores in Behavior by Sociosexual Orientation, Social Competitiveness, and Motivations

Using Mplus version 6 (Muthén & Muthén, 2010), data were assumed to be missing at random and full information maximum likelihood estimation was used. The chi-square test of model fit to these data was significant, χ^2 (128) = 555.18, $p < 0.001$, which indicated poor fit (Schreiber, Stage, King, Nora, & Barlow, 2006). A CFI of 0.92 further indicated that the proposed model did not provide a better fit than a baseline model (Schreiber et al., 2006). Similarly, an RMSEA of 0.07, with the confidence interval having a lower bound value of 0.06 and an upper bound value of 0.08, suggested that the close-fit hypothesis could not be retained, however, the poor-fit hypothesis could be rejected (Schreiber et al., 2006). Finally, an SRMR of 0.11was obtained, indicating that the average residual of the difference between the observed and proposed variance/covariance matrix was high and thus, that the model did not provide acceptable explanatory power (Schreiber et al., 2006). Finally, the addition of direct effects from sex to residualized change in frequency of participation, quantity of alcohol consumed during participation, and AUDIT scores did not significantly improve overall model fit after all of the indirect effects were taken into account, $\chi^2\Delta(3) = 2.76$, $p > 0.05$ (see Table 8).

Direct Effects: Frequency of Participation, Quantity of Alcohol Consumed during Participation, and AUDIT Scores at Phase One

Significant direct effects of frequency of participation at phase one on frequency of participation at phase two ($b = 0.51$, $p < 0.001$), quantity of alcohol consumed during participation at phase one on quantity consumed during participation at phase two ($b = 0.54$, $p < 0.001$), and AUDIT scores at phase one on AUDIT scores at phase two ($b = 0.76$, $p < 0.001$) were found (see Figure 3).

Direct Effects: Sex

Significant direct effects of sex on sociosexual orientation ($b = 3.71$, $p < 0.001$), social competitiveness ($b = 0.42$, $p < 0.001$), competitive ($b = 0.40$, $p < 0.001$) and sexual motivations ($b = 0.84$, $p < 0.001$), but not on fortitude-display motivation ($p = 0.07$) were found. No significant direct effects of sex on frequency of participation, quantity of alcohol consumed during participation, or AUDIT scores at the second phase were found when scores at the first phase were included in the model (see Figure 3).

Direct Effects: Sociosexual Orientation

Significant direct effects of sociosexual orientation on fortitude-display ($b = 0.02$, $p = 0.001$), sexual ($b = 0.09$, $p < 0.001$), and competitive ($b = 0.02$, $p = 0.01$) motivations were found. No significant direct effects of sociosexual orientation on frequency of participation, quantity of alcohol consumed during participation, or AUDIT scores at the second phase were found when scores at the first phase were included in the model (see Figure 3).

Direct Effects: Social Competitiveness

Additionally, significant direct effects of social competitiveness on fortitude-display ($b = 0.10$, $p = 0.04$) and competitive motivations ($b = 0.37$, $p < 0.001$) were found, but direct effects of social competitiveness on sexual motivation, and on frequency

of participation, quantity of alcohol consumed during participation, and AUDIT scores at the second phase were not found (see Figure 3).

Direct Effects: Motivations

Finally, no direct effects of fortitude-display, sexual, or competitive motivations on frequency of participation, quantity of alcohol consumed during participation, or AUDIT scores at the second phase were found, save one significant direct effect of competitive motivation on residualized change scores in frequency of participation (b = 0.79, p = 0.006; see Figure 3).

Indirect Effects: Sex on Motivations via Sociosexual Orientation and Social Competitiveness

Significant indirect effects of sex via sociosexual orientation on fortitude-display (b = 0.09, p = 0.002), sexual (b = 0.32, p < 0.001), and competitive motivations (b = 0.09, p = 0.01) and an indirect effect of sex via social competitiveness on fortitude-display (b = 0.04, p = 0.05) and competitive motivations (b = 0.15, p < 0.001) were found. However, a significant indirect effect of sex on sexual motivation via social competitiveness was not found (see Figure 4).

Indirect Effects: S*ex on Residualized Change Scores in Frequency of Participation via Sociosexual Orientation, Social Competitiveness, and Motivations*

Significant indirect effects of sex on residualized change scores in frequency of participation via sociosexual orientation or via social competitiveness (p = 0.09) were not found. A significant indirect effect of sex on residualized change scores in frequency of participation via competitive motivation (b = 0.32, p = 0.02) was found, but indirect effects via fortitude-display and sexual motivations were not found.

Significant indirect effects of sex on residualized change scores in frequency of participation via the effect of sociosexual orientation on fortitude-display or sexual motivations were not found; however, a marginally significant indirect effect of sex on residualized change scores in frequency of participation via the effect of sociosexual orientation on competitive motivation was found ($b = 0.07$, $p = 0.06$). Indirect effects of sex via the effect of social competitiveness on fortitude-display and sexual motivations were not found; however a significant indirect effect of sex on residualized change scores in frequency of participation via the effect of social competitiveness on competitive motivation ($b = 0.12$, $p = 0.02$) was found (see Figure 5).

Indirect Effects: S*ex on Residualized Change Scores in Quantity of Alcohol Consumed during Participation via Sociosexual Orientation, Social Competitiveness, and Motivations*

Significant indirect effects of sex on residualized change scores in quantity of alcohol consumed via sociosexual orientation, social competitiveness, and fortitude-display, sexual, or competitive motivations, were not found. Similarly, significant indirect effects of sex on residualized change scores in quantity of alcohol consumed during participation via the effect of sociosexual orientation or social competitiveness on fortitude-display, sexual, or competitive motivations were also not found.

Indirect Effects: S*ex on Residualized Change in AUDIT Scores via Sociosexual Orientation, Social Competitiveness, and Motivations*

Significant indirect effects of sex on residualized changes in AUDIT scores via sociosexual orientation, social competitiveness or fortitude-display, sexual, or competitive motivations were not found. Also, significant indirect effects of sex on

residualized change in AUDIT scores via the effect of sociosexual orientation or social competitiveness on fortitude-display, sexual, or competitive motivations were not found.

Summary: Sex Differences in Behaviors

Men reported significantly less restricted sociosexual orientations, higher levels of social competitiveness, and higher fortitude-display, sexual, and competitive motivations than did women. Furthermore, men had larger residualized increases in frequency of drinking game participation and quantity of alcohol consumed during participation (but not larger residualized increases in AUDIT scores) than did women over a twelve-week period.

Summary: Two-Step Mediation of Sex Differences in Motivations

I found that sex differences in fortitude-display, sexual, and competitive motivations were mediated by sociosexual orientation, such that men with less restricted sociosexual orientations were more motivated to participate in drinking games for fortitude-display, sexual, and competitive reasons. Furthermore, I found that sex differences in fortitude-display and competitive (but not sexual) motivations were mediated by social competitiveness, such that men who were more socially competitive were more motivated to participate in drinking games for fortitude-display and competitive reasons.

Summary: Two-Step Mediation of Sex Differences in Residualized Change Scores

A majority of the variance in frequency of participation, quantity of alcohol consumed during participation, and AUDIT scores at phase two was accounted for by scores at phase one. However, I found evidence for mediation of the sex difference in residualized change scores in frequency of participation (but not quantity of alcohol

consumed during participation or AUDIT scores) by competitive motivation (but not fortitude-display or sexual motivations). In other words, competitive motivation caused increases in men's frequency of participation in drinking games over a twelve-week period, such that men who were highly motivated to participate for competitive reasons increase in frequency of participation the most (see Figure 6).

Summary: Three-Step Mediation of Sex Differences in Residualized Change Scores

I found evidence for mediation of the sex difference in residualized change scores in frequency of participation by the effects of sex differences in sociosexual orientation and social competitiveness on sex differences in the competitive motivation to participate in drinking games. That is, sex differences in sociosexual orientation and social competitiveness caused increases in competitive motivation, which in turn caused increases in frequency of participation on drinking games over a twelve-week period, such that men's less restricted sociosexual orientations and social competitiveness caused them to be more highly motivated to participate in drinking games for competitive reasons, which in turn caused them to increase their frequency of drinking game participation relative to women (see Figure 6).

Chapter 6 Discussion

On the premise that drinking games are a venue for male intrasexual competition and female intersexual choosiness consistent with short-term mating strategies, as sexual selection theory implies (Bateman, 1948; Buss & Schmitt, 1993; Darwin, 1859; Geary, 2003; 2006; 2012; Trivers, 1972), I hypothesized that men would report greater motivation to participate for competitive and sexual reasons (as measured by latent variables reflecting fortitude-display, sexual, and competitive motivations) than women. I also predicted that men would report greater increases in frequency drinking game participation, alcohol consumption while participating, and problematic alcohol use (as measured by residualized change scores) than would women over a twelve-week period. These predictions were largely supported by the data. However, contrary to my predictions, men did not report greater increases in problematic use than did women. These results suggest that, in line with sexual selection theory, men were more motivated to participate in drinking games for sexual and competitive reasons, and that during this twelve-week period of college, men were more likely than women to increase their participation in drinking games and alcohol consumption during participation (but not problematic alcohol use).

I also predicted that sex differences in motivations to participate in drinking games would be mediated by sex differences in sexual restrictiveness (as measured by the weighted and aggregated items of the sociosexual orientation inventory) and social competitiveness (as measured by a latent variable reflecting the use of competitiveness to achieve goals) because, due to their sexually selected psychologies, men generally have less restricted sociosexual orientations and are generally more socially competitive than

women (Simpson & Gangestad, 1991; Ahlgren & Johnson, 1979). My predictions were largely supported by the data. However, contrary to my predictions, the sex difference in sexual motivation was not mediated by social competitiveness (see Figure 4). These results suggest that men with less restricted sociosexual orientations are motivated to participate in drinking games for fortitude-display, sexual, and competitive reasons, and men who are more socially competitive are motivated to participate in drinking games for fortitude-display and competitive reasons.

Similarly, I predicted that sex differences in residualized changes in frequency of participation, quantity of alcohol consumed during participation, and AUDIT scores would also be mediated by sex differences in sociosexual orientation and social competitiveness. Contrary to my predictions, sex differences in increases in frequency of participation, quantity of alcohol consumed during participation, and AUDIT scores were not directly mediated by differences in sociosexual orientation or social competitiveness. Although I did not find that sex differences in residualized change scores were directly mediated by sex differences in sociosexual orientation or social competitiveness, I tested a set of mediational paths through which sex differences in sociosexual orientation and social competitiveness might cause greater fortitude-display, sexual, and competitive motivations, which in turn led to residualized change scores. Whereas sex differences in increases in quantity consumed during participation and AUDIT scores were not mediated by the effects of sociosexual orientation or social competitiveness on motivations to participate in drinking games, sex differences in increases in frequency of participation were mediated by the effects of sociosexual orientation and social competitiveness on competitive motivation (see Figure 6). These results suggest that men

reported greater increases in frequency of drinking game participation than did women in part because they had less restricted sociosexual orientations and were more socially competitive, which caused them to be more competitively motivated to participate in drinking games.

The finding that men increased in frequency of participation to the extent that they had less restricted sociosexual orientations and were more socially competitive, which caused them to be competitively motivated, to my knowledge, is the first attempt ever to test a functional explanation for sex differences in drinking game behavior using longitudinal data (Finkel, 1995). Understanding the ultimate causes of sex differences in drinking game behavior is a public health concern, and this functional explanation may be of some use in informing public health and university policies aimed at ameliorating negative consequences of drinking game behaviors.

Implications

Men who are highly motivated by competition experience the greatest increases in frequency of drinking game participation and the negative consequences that go along with participation, so identifying and targeting competitive men for interventions may be a key to ameliorating problems associated with drinking games. One population that might be identified as highly motivated by competition are student athletes, and in fact, one study found that increases in sports team events involving alcohol were related to increases in drinking game participation (Zamboanga, Rodriguez, & Horton, 2005). If this is the case, interventions that emphasize the negative consequences of drinking games might ironically increase participation in competitive men, whereas interventions that de-emphasize the competitive and sexual nature of drinking games may decrease

frequency of drinking game participation in this population. Public health and university policies aimed at targeting at-risk students for interventions should consider the fact that competitive men experiences the greatest increases in frequency of drinking game participation, and therefore, that de-emphasizing the risky nature of drinking games might be an effective approach to intervention.

Limitations

Increases in quantity of alcohol consumed during participation and problematic alcohol use were not explained by this model, possibly because the twelve-week observation period was not long enough to allow sexually selected differences to drive increases in these variables during students' first years of college. Furthermore, because students with low AUDIT scores were less likely to be represented in this sample due to the fact that they were tested at phase one only (and the focus of this thesis was on students with scores at phase one and phase two), the predictors of residualized change in AUDIT scores may have been underestimated. Finally, problematic drinking is extremely multifactorial and not necessarily strongly determined by social motivations, so competitive and sexual motivations may not necessarily be the most appropriate mediators of sex differences in increases in AUDIT scores.

Future Directions

It would be useful to evaluate changes in students' drinking game behaviors at more than two phases, with time intervals greater than twelve weeks to evaluate sociosexual orientation, social competitiveness, fortitude-display, sexual, and competitive motivations as predictors of increases in students' frequency of participation, quantity consumed during participation, and problematic alcohol. Such an approach would not

only enable the use of more sophisticated data analytic tools for the analysis of change (e.g., latent growth curve models) and better approaches to estimating missing data, but also would enable more time for students to change their behaviors in response to the new contingencies within the college environment. Furthermore, because students with lower baseline AUDIT scores were underrepresented in the sample because they were missing data at the second phase, in the future, it may be helpful to recruit a more representative sample during follow-up data collection efforts by offering an incentive to students at phase one (e.g., doubling the credit earned towards fulfilling the research requirement or offering monetary compensation when phase two is completed).

Furthermore, this thesis examined between-sex differences only. Future studies examining within-sex differences in sociosexual orientation, social competitiveness, and motivations for participating in drinking games in relation to within-sex differences in frequency of drinking game participation and alcohol consumption during drinking game participation would be useful for investigating why some men and women participate in drinking games and consume more alcohol during drinking games than do their same-sex peers. Similarly, future studies examining women's motivations for participating in drinking games would be useful as the results of this thesis provide a functional explanation for men's increases in frequency of participation, but not women's.

Conclusion

Drinking games are associated with many negative consequences, yet a majority of students report participating in drinking games. Students are motivated to participate in part for sexual and competitive reasons, which I addressed functionally in this thesis using sexual selection theory. According to sexual selection theory, females are

motivated to assess mate quality and select mates with good genes and the ability and willingness to invest in offspring until they reach reproductive maturity, whereas males are motivated to partake in risky behaviors that signal their mate quality and that enable them to compete for access to mates (Bateman, 1948; Buss & Schmitt, 1993; Darwin, 1859; Geary, 2003; 2006; 2012; Trivers, 1972). Because drinking game participation enables males to compete and females to observe these competitions—drinking games may be considered a venue for sexual competition. This hypothesis is supported by data confirming that sex differences in increases in frequency of drinking game participation are mediated by competitive motivation, and the effects of sexual restrictiveness and social competitiveness on competitive motivation. Because understanding the ultimate causes of sex differences in drinking game behavior is a public health concern as negative consequences of drinking games may affect up to 86% of college students, future studies providing a functional explanation of sex differences in drinking game behaviors (e.g., increases in quantity of alcohol consumed during participation over time) may inform public health and university intervention policies and enable better identification of at-risk students.

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Figures

Figure 1

Mediation of Sex Differences Model

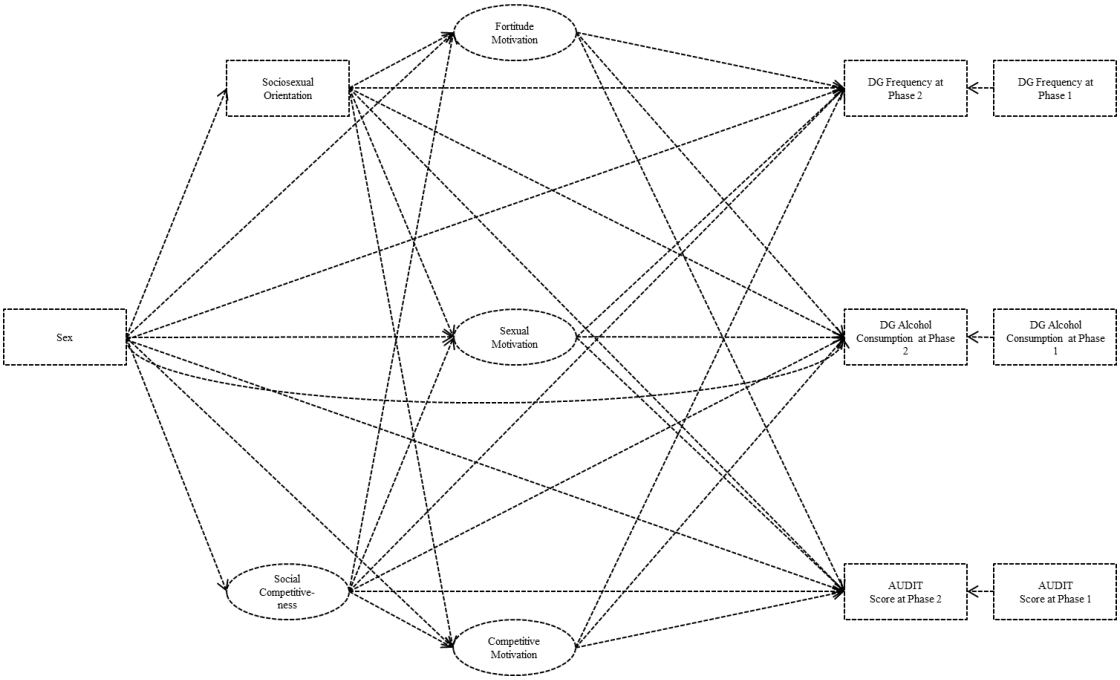


Figure 2

Mediation of Sex Differences Model with Direct Effects from Sex to Outcome Variables Removed

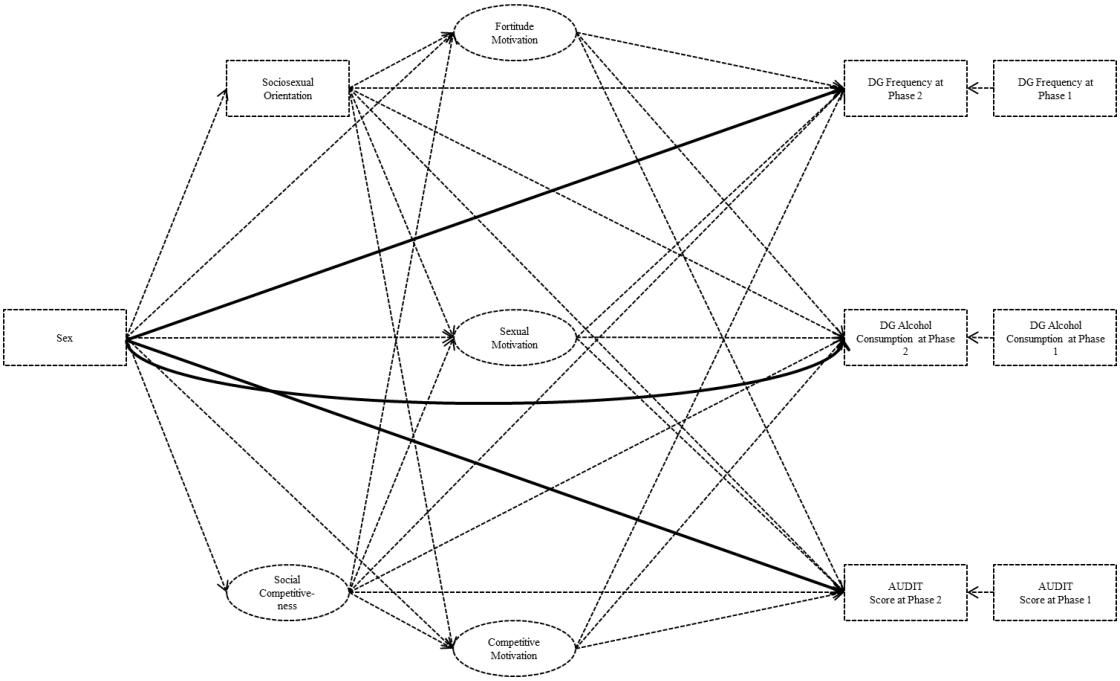


Figure 3

Significant Direct Effects

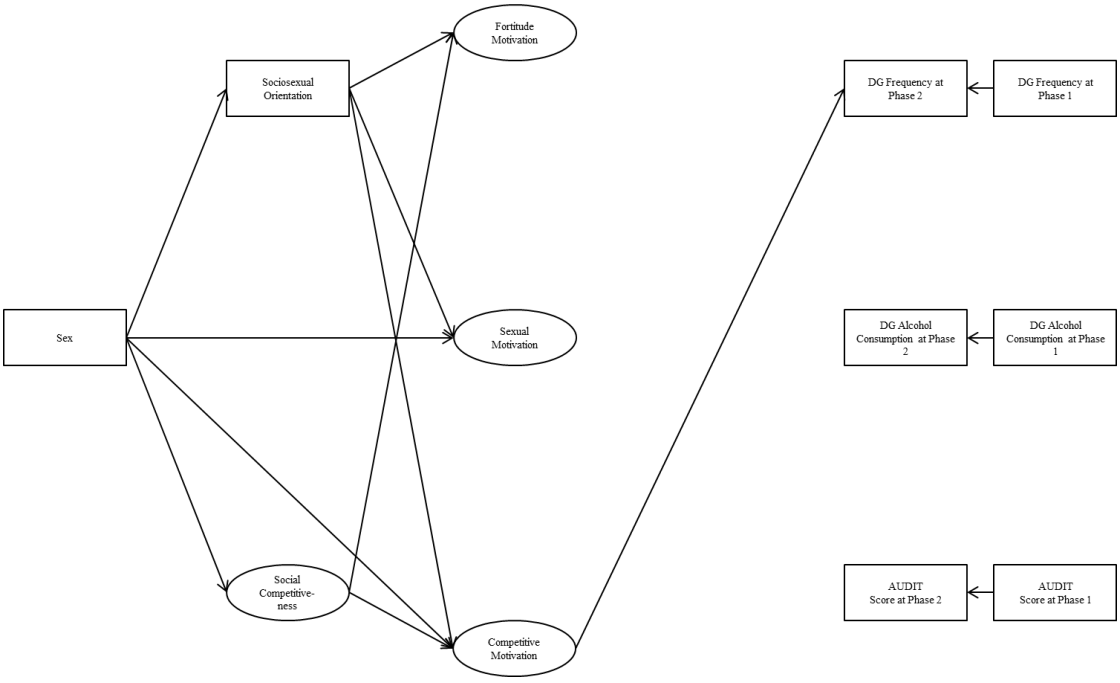


Figure 4

Significant Indirect Effects: Sex on Fortitude-Display, Sexual, and Competitive Motivations via Sociosexual Orientation and Social Competitiveness

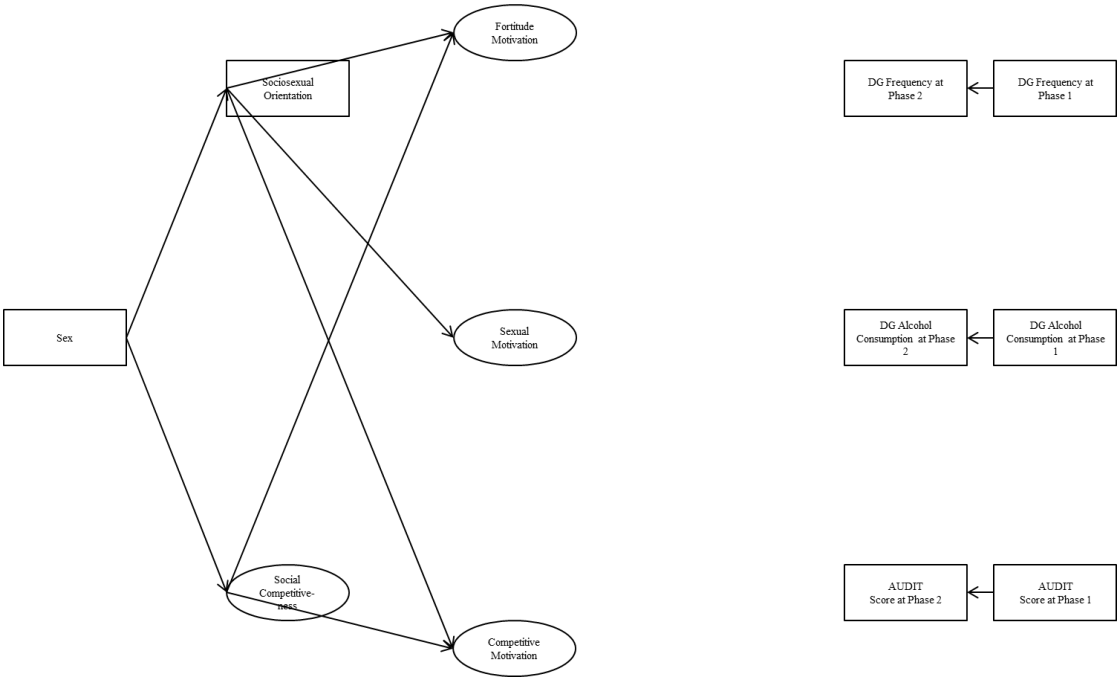


Figure 5

Indirect Effects: Sex on Frequency of Participation at Phase Two via Sociosexual Orientation, Social Competitiveness, and Fortitude-Display, Sexual, and Competitive Motivations

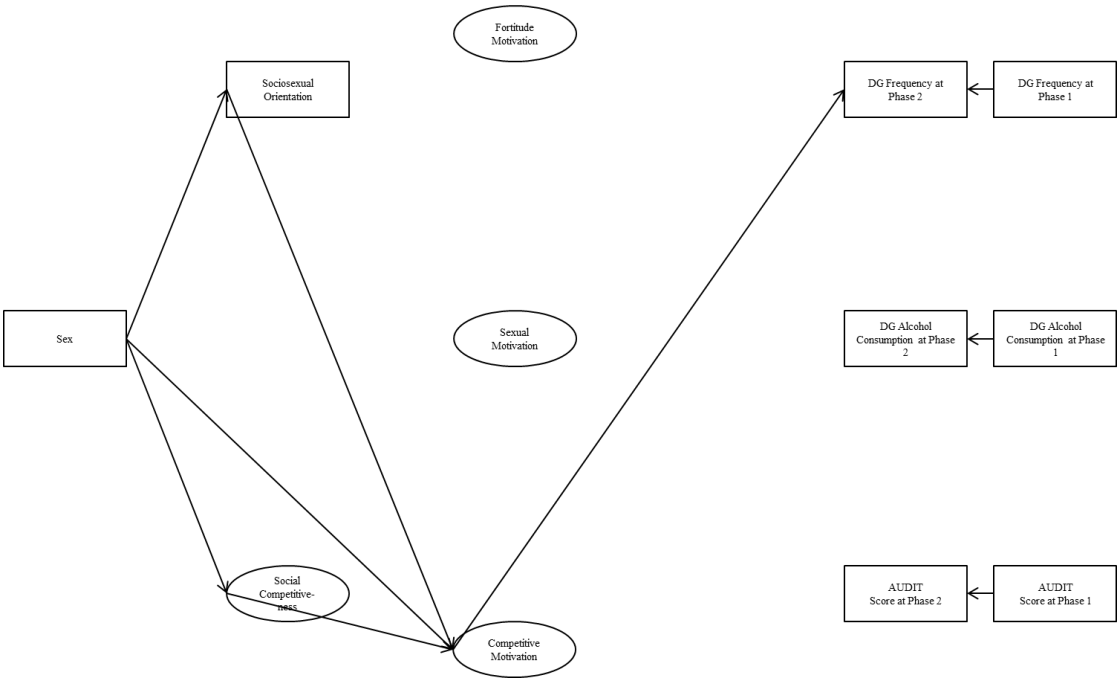
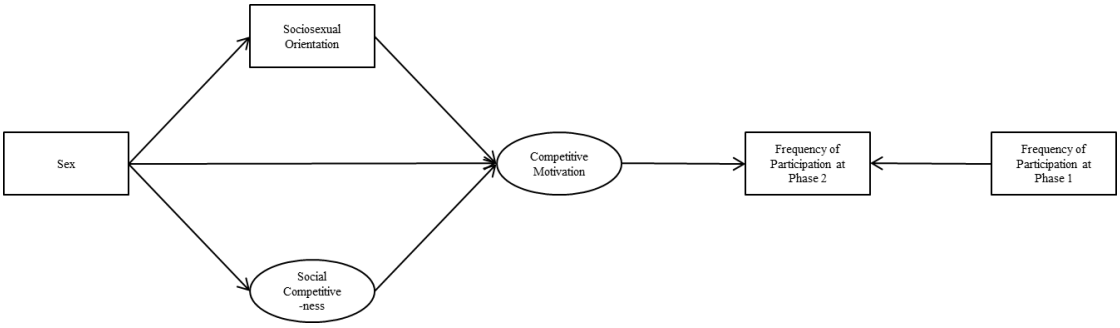


Figure 6

Indirect Effects: Sex on Frequency of Participation at Phase Two via the Effects of Sociosexual Orientation and Social Competitiveness on Competitive Motivation



Tables

Table 1

Three Distinct Sexual and Competitive Motivation Factors with Maximum Content Heterogeneity within Factors

			Factor Loading		
I like to play drinking games…	*M*	*SD*	*Fortitude-Display Motivation*	*Sexual Motivation*	*Competitive Motivation*
in which sometimes people need to be put to bed.	1.31	0.83	-0.75		
that show who can last the longest without throwing up.	1.47	1.00	-0.87		
that show who can go the longest without passing out.	1.24	0.79	-0.92		
that loosen people up for fooling around or having sex later.	1.91	1.25		0.86	
that allow me to hit on people I'm interested in.	2.50	1.41		0.87	
that allow me to have fun with people I'd like to have sex with.	2.19	1.44		0.96	
that have clear winners and losers.	2.60	1.49			0.89
in which people get teased or respected depending on how they played.	2.01	1.20			0.52
in which people are really serious about winning.	2.50	1.40			0.92

Table 2

Sexual and Competitive Motivation Factor Eigen Values and Alphas

	Initial Eigenvalues		
	Total	*% of Variance*	*Cronbach's Alpha*
Fortitude-Display Motivation	1.18	13.15	0.80
Sexual Motivation	4.58	50.91	0.89
Competitive Motivation	1.01	11.16	0.77

Table 3

Sexual and Competitive Motivation Confirmatory Factor Analysis

						95% CI of RMSEA		
Model	X^2	*df*	*p*	*CFI*	*RMSEA*	*LL*	*UL*	*SRMR*
One Motivation	291.66	27.00	< 0.001	0.77	0.20	0.18	0.22	0.10
Three Motivations	76.68	24.00	< 0.001	0.95	0.10	0.07	0.12	0.06
Difference	214.98	3.00	< 0.001					

Table 4
Differences between Cohorts on Phase One Sociosexual Orientation, Social Competitiveness, Motivations, Frequency of Participation, Alcohol Consumption during Participation, and AUDIT Scores

	Cohort 1					*Cohort 2*								
Variable	*N*	*M*	*SD*	*r*	*p*	*N*	*M*	*SD*	*r*	*p*	*t*	*df*	*p*	*d*
Sociosexual Orientation	456	7.45	4.75	0.41	< 0.001	230	6.48	5.06	0.35	< 0.001	2.45	684	0.014	0.20
Social Competitive-ness	450	3.46	0.87	0.24	< 0.001	231	3.34	0.90	0.22	< 0.001	1.58	679	0.115	NA
Fortitude-Display Motivation	453	1.35	0.74	0.19	< 0.001	231	1.51	0.75	0.07	0.274	-2.65	682	0.008	0.51
Sexual Motivation	453	2.19	1.24	0.42	< 0.001	231	2.34	1.23	0.46	< 0.001	-1.47	682	0.143	NA
Competitive Motivation	453	2.39	1.14	0.27	< 0.001	231	2.42	1.07	0.28	< 0.001	-0.37	682	0.712	NA
Frequency of Participation	456	2.69	1.38	0.11	0.014	231	2.59	1.36	0.19	0.004	0.84	685	0.401	NA
Alcohol Consumption	456	3.02	1.04	0.30	< 0.001	231	3.10	1.05	0.27	< 0.001	-1.02	685	0.307	NA
AUDIT Scores	456	1.13	0.57	0.15	0.002	231	1.10	0.59	0.16	0.016	0.60	685	0.055	NA

Table 5
Differences between Cohorts on Phase Two Sociosexual Orientation, Social Competitiveness, Motivations, Frequency of Participation, Alcohol Consumption during Participation, and AUDIT Scores

	Cohort 1					*Cohort 2*								
Variable	*N*	*M*	*SD*	*r*	*p*	*N*	*M*	*SD*	*r*	*p*	*t*	*df*	*p*	*d*
Sociosexual Orientation	247	6.24	4.70	0.37	< 0.001	47	7.20	5.71	0.36	0.013	-1.25	292	0.213	NA
Social Competitiveness						47	3.55	0.79	0.48	< 0.001				NA
Fortitude-Display Motivation	252	1.65	0.88	0.26	< 0.001	47	1.96	0.74	0.15	0.310	-2.31	297	0.022	0.52
Sexual Motivation	252	2.51	1.20	0.37	< 0.001	47	2.87	1.26	0.48	< 0.001	-1.90	297	0.059	NA
Competitive Motivation	252	2.67	1.10	0.33	< 0.001	47	2.95	0.81	0.35	0.014	-1.97	297	0.043	0.73
Frequency of Participation	252	2.44	1.43	0.11	0.074	47	2.49	1.54	0.37	0.010	-0.21	297	0.831	NA
Alcohol Consumption	252	3.08	1.09	0.23	< 0.001	47	3.11	0.94	0.20	0.188	-0.16	297	0.874	NA
AUDIT Scores	252	1.20	0.59	0.12	0.054	47	1.28	0.71	0.28	0.057	-0.84	297	0.400	NA

Table 6
Differences between Participants Tested at Phase One and Two and at Phase One Only on Phase One Sociosexual Orientation, Social Competitiveness, Motivations, Frequency of Participation, Alcohol Consumption during Participation, and AUDIT Scores

	Phase 1 & 2					*Phase 1 Only*								
Variable	*N*	*M*	*SD*	*r*	*p*	*N*	*M*	*SD*	*r*	*p*	*t*	*df*	*p*	*d*
Sociosexual Orientation	261	7.23	4.72	0.42	< 0.001	425	7.06	4.97	0.36	< 0.001	0.45	684	0.660	NA
Social Competitiveness	256	3.43	0.90	0.29	< 0.001	425	3.41	0.88	0.19	< 0.001	0.29	679	0.770	NA
Fortitude-Display Motivation	260	1.42	0.74	0.22	< 0.001	424	1.39	0.75	0.11	0.024	0.60	682	0.550	NA
Sexual Motivation	260	2.34	1.27	0.44	< 0.001	424	2.18	1.21	0.43	< 0.001	1.60	528	0.110	NA
Competitive Motivation	260	2.43	1.10	0.34	< 0.001	424	2.37	1.12	0.24	< 0.001	0.68	682	0.500	NA
Frequency of Participation	261	3.10	1.03	0.11	0.080	426	3.01	1.06	0.16	0.001	1.04	685	0.300	NA
Alcohol Consumption	261	2.74	1.41	0.25	< 0.001	426	2.60	1.35	0.31	< 0.001	1.32	685	0.190	NA
AUDIT Score	261	1.18	0.60	0.12	0.045	426	1.08	0.57	0.17	< 0.001	2.11	685	0.040	0.68

Table 7
Sex Differences in Phase One Sociosexual Orientation, Social Competitiveness, Motivations, and Residualized Change Scores in Behaviors

	Women			*Men*						
Variable	*N*	*M*	*SD*	*N*	*M*	*SD*	*t*	*df*	*p*	*d*
Sociosexual Orientation[1]	133	5.28	3.65	128	9.25	4.86	-7.44	235.45	< 0.001	0.97
Social Competitiveness[1]	131	3.18	0.85	125	3.69	0.87	-4.76	254.00	< 0.001	0.59
Fortitude-Display Motivation[1]	133	1.26	0.64	127	1.59	0.81	-3.59	239.31	< 0.001	0.45
Sexual Motivation[1]	133	1.80	1.07	127	2.91	1.22	-7.78	249.94	< 0.001	0.97
Competitive Motivation[1]	133	2.07	0.98	127	2.81	1.09	-5.74	258.00	< 0.001	0.71
Frequency of Participation[2]	207	-0.14	0.88	171	0.18	1.10	-3.10	322.13	0.002	0.36
Alcohol Consumption[2]	204	-0.10	1.09	169	0.13	1.00	-2.16	371.00	0.031	0.22
AUDIT Score[2]	206	-0.03	0.33	171	0.03	0.38	-1.62	375.00	0.107	NA

[1] Phase One

[2] Residualized Change Score

Table 8
Mediation of Sex Differences in Residualized Change Scores by Phase One Sociosexual Orientation, Social Competitiveness, and Motivations

						95% CI of RMSEA		
Model	X^2	*df*	*p*	*CFI*	*RMSEA*	*LL*	*UL*	*SRMR*
Mediation of Sex Differences	555.18	128.00	< 0.001	0.92	0.07	0.06	0.08	0.11
Direct Effects from Sex Removed	557.94	131.00	< 0.001	0.92	0.07	0.06	0.08	0.11
Difference	2.76	3.00	> 0.05					