STI-protective Self-efficacy and Binge Drinking in a Sample of University Students in the United Kingdom

*Abstract*

**Objective**: Alcohol use has consistently been shown to be related to sexual risk-taking behaviours. To assess what factors may contribute to the sexual risk decision-making process, this study examined the relationships among alcohol use (frequency, quantity, and binge drinking), cognitive appraisals of sexual risk taking, sex-related alcohol expectancies, and STI-protective self-efficacy.**Method:** 138 sexually-active university students who drink alcohol completed scales measuring alcohol consumption, appraisals of consequences, sex-related alcohol expectancies, and items regarding STI-protective self-efficacy. **Results**: Increasing levels of binge drinking were negatively associated with STI-protective self-efficacy. A moderated mediation analysis revealed that for binge drinkers, stronger appraisals of the positive consequences for having sexual intercourse while intoxicated predicted lower STI-protective self-efficacy indirectly through increasing rates of sex-related alcohol risk expectancies.**Conclusion**: Findings provide evidence of a need to target binge drinkers and increase their STI-protective self-efficacy by shifting their focus from positive consequences to negative risk consequences of engaging in sexual intercourse while intoxicated.

*Keywords*: STIs, interventions, risk behaviours, sexual behaviours, condoms

**Introduction**

 Young adults, including university students, seem to be overrepresented in statistics concerning sexually-transmitted infections (STIs). For instance, between 12 and 25% of sexually-active university students in the United States have been diagnosed with an STI [1]. Rates of STIs in England are also high - approximately 450,000 diagnoses were made in 2013 with heterosexuals under the age of 25 being one of the populations impacted the greatest [2]. Alcohol use is recognized as a contributing factor to sexual risk taking leading to negative sexual health outcomes [3]. Relatedly, younger adults appear to binge prevalently: binge drinking has been found to be a common occurrence amongst university students [4] with one in five male and one in ten female US first-year university students reporting consumption levels twice the required threshold over a two-week period [5]. Additionally, it was found that genitourinary medicine (GUM) clinic attendees in the United Kingdom reported high levels of bingeing (with 86% exceeding government binge drinking levels) [6]. Whilst this evidence cannot be used to argue that alcohol use per se is linked causally to STI infection and risky sexual behaviour, it is likely that there is some degree of overlap in these distributions [3]. Although suggestive of the association between alcohol and sexual risk taking, research data is inconclusive. The current study aims to explore this assertion by linking directly levels of alcohol consumption with factors related to STI risk taking (and STI-preventative efficacy) in a sample of young adults (university students) living in the UK.

*Sex-related alcohol expectancies and consequences*

Generally, an individual is more likely to engage in a risky behaviour when expectations of positive consequences (e.g. benefits) outweigh expectations of negative outcomes (e.g. associated with risks) [7]. Positive alcohol expectancies, which are positive beliefs about the effects of alcohol, have been found to have a strong influence on heavy drinking amongst young adults [8], while research regarding university students has shown that for this population perceived benefits are stronger predictors of risk-taking behaviours than are perceived risks [9]. Other research has found that positive alcohol expectancies are strongly related to levels of alcohol consumption and to both positive and negative alcohol consequences (resulting outcomes of use) [10].

 Common expectancies about the effects of alcohol on sexual behaviour include general cognitive and behavioural disinhibition, an increased likelihood of sexual activity, an enhancement of sexual experience, and a greater probability of engaging in risky sexual behaviour [11]. Dermen and Cooper [12] found that beliefs about the effects of alcohol on sexual enhancement and/or alcohol’s disinhibiting qualities in particular were related to increased intoxicated drink patterns while in sexually-orientated situations. Relatedly, a study comprising of 590 female and male respondents found an indirect relationship of participants’ sexual enhancement expectancies on casual sex through alcohol use prior to sexual activity [13]. More recently, it was reported that university students who were heavy binge drinkers showed greater alcohol-related expectancies of risk taking and rates of unplanned sexual activity than did low-binge drinkers [14].

 Additionally, positive expectancies have been found to be associated with increased levels of consumption but not with consumption frequency [15]. In a review of problem drinking amongst university students, it was noted that binge drinking frequency (how often an individual engages in binge drinking, linked with levels of single occasion consumption) may be useful in assessing alcohol use problems (and associated negative outcomes) in university students [16]. As binge drinking has also been linked to STI-risk related behaviour (e.g. [6] [14]) it is useful to examine the relationships amongst alcohol consumption levels of frequency, quantity, and bingeing with expectancies and consequences related to STI-protective self-efficacy.

*Theoretical approaches to risk and efficacy*

 Health behaviour models such as the Health Action Process Approach (HAPA) [17] suggest that various factors interact to initially affect intentions and subsequently a related behaviour such as safer sex. The HAPA proposes that risk perceptions initiate a contemplation process during which outcome expectancies and behavioural consequences are deliberated. Schwarzer [18] suggested a causal order such that risk perceptions precede and trigger expectancies and subsequently related self-efficacious beliefs. It is further suggested that individuals with decreased self-efficacy may not believe they are capable of performing a behaviour [18] [19]. As such, self-efficacy may be regarded as a crucial element in intention formation necessary for behavioural enactment. The HAPA has been found to have utility in explaining safer sex behaviour (i.e. condom use). In a sample of homosexual men, Teng and Mak [20] found that condom use intention was predicted by self-efficacy, risk perception, and outcome expectancies. Another study found that preparatory behaviour related to condom use was predicted by self-efficacy and intention [21]. However, neither study examined how alcohol may influence these variables to affect safer sex intentions. Given other evidence linking alcohol to sexual risk taking, this limitation is an important one to address.

*Purpose and Hypotheses*

The current study examined the relationships among the sex-related alcohol expectancies (i.e. beliefs relating alcohol use and sexual activity), of sexual enhancement, disinhibition, and risk, along with appraisals of the positive and negative consequences (i.e. the resulting outcomes) of combining sexual activity with alcohol use, alcohol consumption levels, and how these factors affect STI-protective self-efficacy.

Specifically:

* It was predicted that appraisals of positive consequences regarding alcohol combined with sexual activity would be linked to greater sex-related alcohol expectancies of enhancement and disinhibition;
* It was predicted that appraisals of negative consequences regarding alcohol combined with sexual activity would be linked to greater sex-related alcohol expectancies of risk;
* Sex-related alcohol expectancies of risk were expected to, in turn, mediate the effect of appraisals of consequences on STI-protective self-efficacy;
* As expectancies have been found to vary among drinker types, particularly between bingers and non-bingers, the moderating effects of drinking levels (frequency, quantity, and bingeing) on STI-protective self-efficacy on this meditative relationship were also examined;
* Given that greater levels of alcohol consumption are linked to more positive expectancies and greater risk taking, it was expected that the effect of appraisals of positive consequences of combining alcohol and sex, on STI-protective self-efficacy, would be more pronounced in heavier and binge drinkers.

**Materials and Method**

*Participants*

 One hundred and fifty-five participants were recruited from a large public university in London, UK and from a psychology postgraduate organisation in the UK. All responded as being sexually-active alcohol consumers currently attending university. Prior to formal analysis, tests for outliers (extreme cases defined as +/- 3 SDs from the sample mean; see [22] [23] regarding outlier removal) were undertaken on measures of expectancies, self-efficacy, and consequences, resulting in 17 respondents being removed from the sample. The final sample included 138 respondents - 108 female and 29 male (one did not report their gender), undergraduate and postgraduate students (mean sample age = 25.91 years, *SD* = 7.71). One hundred twenty-five (90.5%) identified as heterosexual, 3 as gay male, 1 as lesbian, and 9 as bisexual. Ethnically, 87 (63%) identified as White, 27 (19.5%) as Black, 11 (8%) as Asian, and 13 (9.4%) as ’Other’. For relationship status, 67 (49%) responded as being single and 71 (51%) as not being single.

*Procedure*

Upon approval by the London South Bank University ethics committee, flyers and emails for a study regarding ‘social interactions between university students’ were sent to potential respondents. Participation criteria included being a currently enrolled university student and a sexually-active alcohol drinker. Respondents were offered credits for a university research participation scheme and had the option of completing the survey online or on paper. In total, of the 138 respondents included in the final analyses, 68 (49%) completed a pen-and-paper survey version and 70 (51%) completed the survey online.

*Measures*

 *Demographic information*.Information about respondents’ gender, age, ethnicity, sexual orientation, and relationship status was collected.

 *Alcohol consumption levels.* The Alcohol Use Disorders Identification Test - Consumption (*AUDIT-C;* adapted from [24]) is a revised version of the AUDIT and consists of three items to assess an individual’s alcohol consumption frequency (‘how often do you have a drink containing alcohol?’), quantity (‘how many drinks containing alcohol do you have on a typical day when you are drinking?’), and bingeing (‘how often do you have six or more drinks on one occasion?’). Responses to each of three items were scored on a scale from 0 to 4 and final overall tallied scores ranged from 0 to 12, with a higher score indicating greater consumption and frequency of use and a greater possibility of hazardous drinking (for the purposes of the mediation and moderation analyses, it was necessary to adjust scales to 1 to 5 for each of the three items and to 3 to 15 for overall scores, to ensure no individual scored zero).

 *Positive and negative consequences.* A modified version of the Cognitive Appraisal of Risky Events – Revised *(CARE-R;* [25]) was used. The two single item measures were: ‘What is the likelihood of experiencing *positive* consequences from having sexual intercourse under the influence of alcohol with a new partner?’ and ‘What is the likelihood of experiencing *negative* consequences from having sexual intercourse under the influence of alcohol with a new partner?’. Responses were rated on a five-point scale from 1 (*not at all likely*) to 5 (*very likely*).

 *Self-efficacy.*‘STI-protective self-efficacy’ was assessed with three seven-point items (1.‘For me, making sure that I protect myself from STIs every time I have sex would be’: with responses ranging from ‘very difficult’ to ‘very easy’; 2. ‘How confident are you that you will be able to make sure that you protect yourself from STIs every time you have sex?’ with responses ranging from ‘not at all confident’ to ‘very confident’; 3.’How difficult will it be for you to make sure that you protect yourself from STIs every time you have sex?’; with responses ranging from ‘not at all difficult’ to ‘extremely difficult’(reverse scored)) adapted from the Attitudes Toward Condoms Questionnaire (ATCQ; [26]). Cronbach’s α = .83.

 *Sex-related alcohol expectancies.* To assess participants’ sex expectancies related to alcohol, thirteen items were used from a sex-related alcohol expectancy scale [12]. Items assessed alcohol expectancies relating to the sexual concepts of enhancement (five questions; e.g., ‘After a few drinks of alcohol, I feel closer to a sexual partner’), risk taking (four questions; e.g., ‘After a few drinks of alcohol, I am less likely to take precautions before having sex’), and disinhibition (four questions; e.g., ‘After a few drinks of alcohol, I am more likely to have sex on a first date’) with responses rated on a seven-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Cronbach’s alpha for enhancement was .80, for risk taking .86, and for disinhibition .74.

*Data Analysis*

Bivariate Pearson correlations were conducted to examine relationships among the sex-related alcohol expectancies of sexual enhancement, disinhibition, and risk, along with sexually-active drinkers’ appraisals of the positive and negative consequences of combining sexual activity with alcohol use with a new partner, STI-protective self-efficacy, and individuals’ alcohol consumption frequency, quantity, and bingeing. Regression analyses were conducted to examine the predictive influence of sex-related alcohol expectancies, appraisals of consequences, and alcohol consumption levels on STI-protective self-efficacy. It was predicted that appraisals of positive consequences of alcohol combined with sexual activity would be linked to greater perceived positive sex-related alcohol expectancies (enhancement and disinhibition). It was also predicted that appraisals of negative consequences regarding alcohol combined with sexual activity would be linked to greater sex-related alcohol expectancies of risk. Therefore, the mediating effects of sex-related alcohol expectancies (suggested to be an important indirect factor; see HAPA [19]) on STI-protective self-efficacy were also analysed. As expectancies have been found to vary among drinker types, the moderating effects of drinking levels (frequency, quantity, and bingeing) on self-efficacy on this meditative relationship were also examined.

**Results**

*Correlations amongst alcohol use, consequences, expectancies and self-efficacy*

Bivariate Pearson correlations(see Table 1) indicated that appraisals of positive consequences showed a significant positive association with all three sex-related alcohol expectancy variables - enhancement, disinhibition, and risk – and were significantly negatively associated with STI-protective self-efficacy. Appraisals of negative consequences were only significantly negatively associated with disinhibition. STI-protective self-efficacy was significantly negatively associated with risk expectancies and disinhibition expectancies but not with enhancement expectancies.

 Frequency of alcohol use was significantly positively associated with disinhibition expectancies. Both quantity of alcohol use and binge drinking were significantly associated with both positive (positively) and negative (negatively) cognitive appraisals (consequences) of having sex with a new partner while intoxicated, and positively with each of the three sex-related alcohol expectancy factors - enhancement, disinhibition, and risk. Binge drinking was also significantly negatively associated with STI-protective self-efficacy. Neither frequency nor quantity of alcohol use was significantly associated with STI-protective self-efficacy, although quantity of use approached significance.

INSERT TABLE 1 ABOUT HERE

*Predicting STI-protective Self-efficacy*

Binge drinking was the only drinking rate variable with a significant association to self-efficacy, and a simple regression model with binge drinking as the predictor variable and self-efficacy as the criterion variable was significant, R2 = .05, F(1, 136) = 7.60,

p = .007, β = -.23.

 A multiple regression model was calculated incorporating binge drinking, the expectancy variables (enhancement, disinhibition, and risk), and appraisals of positive consequences as predictors and self-efficacy as the criterion. This model was significant with risk expectancies and appraisals of positive consequences making significant contributions to the model to predict self-efficacy, while binge drinking was not significant.

 A second multiple regression model was constructed incorporating negative consequences instead of positive consequences. The overall model was significant. However, only risk expectancies made a significant contribution to the model while the variables of negative consequences and binge drinking were not significant.

INSERT TABLE 2 ABOUT HERE

*Mediation and moderation analyses*

Binge drinking was a significant predictor of self-efficacy in the simple regression model but not in the multiple regression models, which suggests a possible indirect role of binge drinking on outcomes. Mediation and moderation analyses were therefore conducted to examine the relationships among binge drinking, risk expectancies, and appraisals of positive consequences, and their predictive influence on STI-protective self-efficacy (the sample size, N = 138, fits within guidelines suggested by Tabachnick and Fidell [23] of N = 104 + number of predictors for multiple regression analyses, and N > 50 + 8k, where k = number of predictors for moderation analyses). In line with our hypotheses, a moderated meditation model was constructed to, first of all, test the indirect effects of risk expectancies (mediation) and, secondly to test whether its effect was dependent on levels of binge drinking (moderation).

 Specifically, a model was constructed with appraisals of positive consequences as the predictor (X), risk expectancies as the mediator (M), binge drinking as the moderator (V), and self-efficacy as the criterion variable (Y). The model was formulated such that binge drinking (V) moderated the effects of positive consequences on self-efficacy and risk expectancies on self-efficacy (see Figure 1). The model was tested using the methodology outlined in Hayes [27], and adopted model 15 (Hayes, p. 17 [28]). For these analyses, 95% confidence intervals (upper confidence intervals [UCIs] and lower confidence intervals [LCIs]) are reported as tests of significance, with confidence interval ranges not including zero indicating significance at the p < .05 level. A 1000 bootstrap sampling frame was employed. Values for quantitative moderators are the mean and plus/minus one SD from the mean (see [28]).

INSERT FIGURE 1 ABOUT HERE

 The overall model was significant, R2 = .28, F (5, 129) = 10.17, p < .001. Appraisals of positive consequences predicted self-efficacy, c1’= -.59, t = -2.94, LLC = -.99, ULC = -.19,

p < .01. Neither risk expectancies nor binge drinking had a significant effect on self-efficacy and there was no significant interaction between appraisals of positive consequences and binge drinking. However, there were marginal interactions between risk expectancies and binge drinking, b2i = -.11, t = -1.69, LLC = -.23, ULC = .02, p = .09, and between appraisals of positive consequences and binge drinking, c3’=.12, t = 1.45. LLC =-.05, UCL = .29,

p = .15. These results revealed that only appraisals of positive consequences had a significant relationship with self-efficacy (negative direction) and that the effects of risk expectancies as a mediator and binge drinking as a moderator were not significant. However, previous research found that university students who were heavy binge drinkers showed greater alcohol-related expectancies of risk taking than did low-binge drinkers [14]. Additionally, it is suggested that risk perceptions may have a significant indirect influence amongst variables leading to intentions [19]. Therefore, as the interaction effects between binge drinking and both risk expectancies and appraisals of positive consequences approached significance, these relationships were explored further.

 A test of the conditional direct effects of positive consequence appraisals on STI-protective self-efficacy (X on Y = c1’ + c3’V) moderated by binge drinking levels (tested at +/- 1 SD) revealed that only non-bingers and low to moderately frequent binge drinkers showed significant negative relationships between the two variables (p*s* < .001), whilst the effect for more highly frequent binge drinkers approached significance (p = .068). These results suggest that non/low to moderate binge drinkers exhibit significantly lower STI-protective self-efficacy due to the influence of appraisals of positive consequences, while frequent binge drinkers do so at a marginally significant level.

INSERT TABLE 3 ABOUT HERE

 A moderated mediation analysis was conducted to test for the conditional indirect effects of appraisals of positive consequences on STI-protective self-efficacy, with risk expectancies as a mediator and binge drinking levels as a moderator of the relationship between risk expectancies and self-efficacy (X on Y through Mi = ai (b1i + b2iV)). In the mediation model, only appraisals of positive consequences showed a significant relationship (ai b1i = -.59, p = .004) with self-efficacy for STI protection, and risk expectancies showed no significant effect as a mediator. However, with binge drinking levels as a moderator, the effect of sex-related alcohol risk expectancies as a mediator became significant for all three levels of binge drinking. These results reveal that for binge drinkers in this sample, lower STI-protective self-efficacy can be predicted by their appraisals of positive consequences because of their expectancies of risk when engaging in sexual activity while under the influence of alcohol.

INSERT TABLE 4 ABOUT HERE

**Discussion**

 Expectancies, risk perceptions, and self-efficacy have been shown to be related to condom use intentions and preparatory behaviours ([20] [21]); however, these studies did not examine how alcohol use affects these outcomes. Other research findings suggest links among alcohol expectancies, levels of consumption, and related consequences (e.g. [8] [9] [10] [14]).Findings from the current study extend and support previous research by demonstrating how increasing levels of binge drinking rates interacted with sex-related alcohol expectancies of risk and appraisals of positive consequences of combining alcohol and sex to predict lower STI-protective self-efficacy in a sample of university students.

 Drawing on Dermen and Cooper [12], and Fromme, et al. [7], it was predicted that individuals reporting higher levels of appraisals of positive consequences from having sexual intercourse with a new partner while intoxicated would also report higher levels of sex-related alcohol expectancies of enhancement and disinhibition. In line with this, appraisals of positive consequences were positively associated with all three alcohol use-related sex expectancy variables - enhancement, disinhibition, and risk. It was also predicted that individuals reporting higher levels of appraisals of negative consequences from having sexual intercourse with a new partner while intoxicated would report higher levels of sex-related alcohol risk expectancies. However, the association between these two variables was not significant. These findings suggest that sexually-active drinkers who hold beliefs about the benefits of having sex with a new partner while intoxicated (positive consequences) also hold beliefs about the benefits of enhancing the sexual experience and lowering their inhibitions, and are also aware of the possible associated risks. Thus, the perceived enhancement and disinhibitory qualities of alcohol use may motivate drinking amongst sexually-active university student drinkers who have strong beliefs regarding the benefits of combining alcohol and sex (see [29] [11] [13]). In addition, and importantly, although they are aware of the risks, they may not regard the negative consequences to outweigh the positive ones. This supports the suggestion that for university students, the positive consequences associated with alcohol use may be a greater influence than the negative consequences, which reinforces alcohol use behaviour ([30] [31]). Individuals in this population may thus ultimately be myopic in focussing on the benefits when making sexual risk decisions when drinking ([32]; see [33] for a discussion of the effects of alcohol intoxication on attitudes and intentions related to sexual risk taking).

 It was also predicted that respondents reporting higher rates of quantity and binge drinking would report reduced STI-protective self-efficacy. As binge drinking was negatively associated with STI-protective self-efficacy and the relationship with quantity of drinking approached significance, while frequency did not, it seems that the consumption of large amounts of alcohol among sexually-active university students may be playing a role in their sexual risk taking. This may be due to their reduced abilities to protect themselves after drinking large amounts because of the impairing effects of alcohol on decision-making processes (see [14]). Frequent drinkers, however, may not necessarily consume large amounts of alcohol and thus retain the cognitive abilities required for effective decision making.

 Findings also revealed a negative association between STI-protective self-efficacy and sex-related alcohol risk expectancies; that is, the greater the beliefs that sexual risks will occur after alcohol consumption, the lesser the beliefs in abilities to protect oneself from STIs. However, only binge drinking and quantity of drinking were associated (positively) with sex-related alcohol risk expectancies. As these individuals who consume large quantities and/or binge also hold beliefs of the benefits of having sex while intoxicated (including enhancement and disinhibition), it may be that their decision making regarding sexual activity while intoxicated is guided more by a desire for sex influenced by alcohol (see [34]) rather than the associated risks. This supports the idea that individuals are more likely to engage in a risky behaviour when a potential positive consequence (benefit) outweighs a potential negative outcome (risk) [7] [9] [10]. As rates of bingeing and quantity increased, beliefs of the likelihood of negative consequences decreased. Thus, in this sample it could be that reasons for drinking include the association of the positive consequences of alcohol with sexual behaviour (see [34]) including excessive drinking to specifically achieve these effects (see [29] [11]), while negative consequences may be disregarded (see [30] for a review).

 An interesting finding was that the sex-related alcohol expectancy of disinhibition (reduced sexual inhibitions due to alcohol use) was the only expectancy variable related to appraisals of negative consequences resulting from combining sex and alcohol. These variables were significantly negatively associated, suggesting that as levels of reduced inhibitions increased, appraisals of negative consequences decreased. Disinhibition expectancies were also the most strongly and significantly positively associated expectancy variable with binge drinking levels. Adding to this, disinhibition expectancies were negatively associated with STI-protective self-efficacy. These findings suggest that excessive drinking to reduce sexual inhibitions along with a disregard for negative consequences may be a motivating factor for binge drinking among sexually-active alcohol users when in potentially sexual situations. These results support a study which found that binge drinking was significantly related to alcohol use for disinhibitory effect outcomes in a sample of university students [35].

 As binge drinkers also reported significantly lower STI-protective self-efficacy, it may be that they are aware of their reduced capability to engage in STI-protective behaviours when bingeing. Their beliefs of the effects of sex enhancement and disinhibition from alcohol use may be affecting their decisions to binge drink in potentially sexual situations despite knowing that they may take risks and have reduced abilities to engage in safer sex behaviour. Findings from the moderated mediation analysis are evidence that this is particularly true for the most frequent binge drinkers - their negative association between appraisals of positive consequences and STI-protective self-efficacy was only significant when mediated by their beliefs of the sexual risks that they expect as a result of drinking alcohol. Given this, it could be that sexually-active binge drinkers in university populations may be particularly at risk of engaging in sexual risk taking as they may never form intentions to protect themselves because of their reduced self-efficacy (see [18] [19]). Instead, these individuals may be guided more by their desire for sexual enhancement and disinhibition despite their awareness of the risks.

 Another important study finding was that as levels of consumption and binge drinking increased, expectancies of sexual risk taking while intoxicated also increased, and that as bingeing increased, beliefs of negative consequences decreased. This may be evidence that heavy drinkers in this population are aware of the risks associated with engaging in sexual activity while drinking but are not very concerned about the potential of negative consequences which may result. This supports research which found that university students reporting the highest levels of alcohol consumption and negative consequences assessed these consequences as less important than those reporting fewer negative consequences [36]. This is an important consideration as it has been suggested that a minimum level of threat is necessary in order to instigate the process of weighing up factors related to risks and benefits along with self-efficacy, on the pathway to intentions and behavioural enactment [19]. It could be that young adults and university students, despite being aware of the risks, are less fearful of the consequences of HIV and STIs now than in the past, possibly due to new medications and treatments that make these diseases appear more easily treatable and less life threatening.

*Limitations and Further Suggestions*

 Whilst the roles of gender and sexual orientation were not included as component predictors discussed in this study, both factors may play discriminatory roles in the sexual risk decision-making process. For example, in the current study we adopted a generic measure of consequences and the items used in the alcohol expectancies measures may have a slightly different interpretation for males and females, or those with different sexual orientations. Females may be more influenced by the possibility of pregnancy when making sexual decisions and homosexual males may be particularly sensitive to the possibility of HIV infection resulting from unsafe sexual activity as HIV rates are disproportionately high in this population. Future studies may therefore benefit from a greater examination of differences regarding gender and sexual orientation as well as ensuring that item measures are matched to the sample studied. Also, the current sample included a high proportion of female respondents compared to male respondents and future studies may seek to include a more balanced sample in order to assess relevant gender effects. Future related studies may also benefit from including such relevant variables as age, ethnicity, and relationship status, in order to examine their influence on the sexual risk decision-making process.

 It may be beneficial for health behaviour models such as the HAPA to incorporate measures related to levels of alcohol consumption (i.e. frequency, quantity, and bingeing) when assessing the influence of alcohol on risky sexual behaviour, including specific varying degrees of binge drinking (e.g. low, moderate, and high). Accordingly, such revised models should consider that before alcohol has been consumed and when intentions are formed, an individual will generally possess cognitive-processing capabilities which will be reduced after alcohol has been consumed. Thus, a revised HAPA model would need to take into consideration the differences in cognitive processing (i.e. reflective vs. automatic, see RIM [37]; and [38]) which occur in individuals before and after alcohol has been consumed. As sexual risk taking and alcohol use often co-occur, this is an important consideration to be addressed in future research designed to target sexually-active alcohol drinkers in order to reduce negative sexual health outcomes in this population. Evidence from such research may thus be of greater utility to subsequent related interventions.

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**Table 1:**

*Correlations Amongst Consequences, Expectancies, Alcohol Use and Self-efficacy*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1. Appraisals of Positive Consequences | **--** | -.44\*\*\* | .38\*\*\* | .37\*\*\* | .18\* | -.36\*\*\* | .13 | .30\*\*\* | .26\*\*\* | .30\*\*\* |
| 2. Appraisals of Negative Consequences |  | -- | -.14 | -.26\*\* | .03 | .09 | -.15 | -.27\*\*\* | -.24\*\* | -.29\*\*\* |
| 3.Enhancement Expectancies1 |  |  | -- | .34\*\*\* | .23\*\* | -.10 | .05 | .24\*\* | .20\* | .22\* |
| 4.Disinhibition Expectancies |  |  |  | -- | .51\*\*\* | -.23\*\* | .17\* | .36\*\*\* | .39\*\*\* | .40\*\*\* |
| 5. Risk Expectancies |  |  |  |  | -- | -.40\*\*\* | .004 | .17\* | .17\* | .15 |
| 6. Self-efficacy |  |  |  |  |  | -- | -.04 | -.15 | -.23\*\* | -.18\* |
| 7. Alcohol Frequency |  |  |  | . |  |  | -- | .14 | .49\*\*\* | .66\*\*\* |
| 8. AlcoholQuantity |  |  |  |  |  |  |  | -- | .60\*\*\* | .79\*\*\* |
| 9. Alcohol Bingeing |  |  |  |  |  |  |  |  | -- | .89\*\*\* |
| 10. AUDIT Total2 |  |  |  | . |  |  |  |  |  | **--** |

\* p < .05 \*\* p < .01 \*\*\* p < .001

Notes: 1. There was a significant difference between respondents’ enhancement expectancies *t* (133) = 3.60, *p* < .001, for respondents who completed the questionnaire online (mean = 4.34) vs. on paper (mean = 5.00). All other differences were not significant.

2. Although AUDIT total scores were significantly correlated with some variables and these associations are important findings, these relationships were not included in the analyses for this study which is focusing on the differences amongst frequency, quantity, and bingeing,rather than overall drinking rates.

**Table 2:**

*Summary of Multiple Regression Analyses for Variables Predicting STI-protective Self-efficacy* (N = 138)

|  |  |  |
| --- | --- | --- |
|  | Model 1 | Model 2 |
| Variable | *B* | *SE B* | *β* | *B* | *SE B* | *β* |
| Binge Drinking |  -.13 | .10 |  -.11 | -.18 |  .11 | -.15 |
| Enhancement Expectancies  | .09 |  .08 | .09 |  -.01 |  .08 |  -.01 |
| Disinhibition Expectancies | .10 | .08 | .13 |  .05 |  .08 |  .06 |
| Risk Expectancies | -.28 | .06 | -.39\*\*\* | -.29 | .07 | -.40\*\*\* |
| Positive ConsequencesNegative Consequences | -.41 | .09 | -.39\*\*\* | .08 | .09 | .08 |
| *R2* | .2710.57\*\*\* | .155.80\*\*\* |
| *F*  |

\*\*\* p < .001

**Figure 1**

**Table 3:**

Results of binge drinking levels (V) moderating the effects of positive consequence appraisals (X) on self-efficacy (Y): (X on Y = c1’ + c3’V) [see Figure 1]

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Binge drinking levels (V)

Low -.43\*\*\*

Medium -.32\*\*\*

High -.21 ns

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*\*\* p < .001

**Table 4:**

Results of binge drinking levels (V) moderating the effects of positive consequence appraisals (X) through risk expectancies (M) on self-efficacy (Y):

 (X on Y through Mi = ai (b1i + b2iV) [see Figure 1]

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Binge drinking levels (V)

Low -.04\*

Medium -.06\*

High -.08\*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*p < .05