Health promotion: a web-based motivational enhancement intervention to reduce risky behaviors among college women

Amy J. Starosta
University at Albany, State University of New York, as182232@albany.edu

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Health Promotion: A Web-Based Motivational Enhancement Intervention to Reduce Risky Behaviors Among College Women

by

Amy Starosta, M.A.

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Abstract

Behavioral interventions that successfully increase condom use often require significant resources. Given the need for low-cost, sustainable interventions, I designed a web-based intervention to increase condom use among college women by focusing on discrepancies between idealized and actual behavior. Participants (422 women $M_{\text{age}}=18.88$ years, $SD=1.65$) completed demographic, sexual, and condom attitudes and intentions questionnaires as well as a Timeline Followback Interview to assess their drinking and condom use for the previous month. Participants engaged in a decisional balance analysis for each time they did or did not use a condom. Finally, participants wrote an essay encouraging high school girls to use condoms. The control group engaged in all the same procedures with the target behavior of binge drinking. All procedures were conducted online. Women in the condom group had significantly greater intentions to use condoms and more positive attitudes about condoms immediately following the intervention. Women in the binge drinking group had greater intentions to avoid binge drinking.

A subset of women (N=216, $M_{\text{age}}=18.91$, $SD=1.32$) completed a three-month follow up. There were no group differences in attitudes, intentions, or drinking or sex behaviors at follow up.

Condom attitudes following the intervention significantly predicted condom use at follow up, and this relationship was mediated by condom intentions post intervention. Furthermore, the link between intentions and condom use was moderated by group; intentions had a greater impact on condom use among those in the condom intervention compared to those in binge drinking group.

This study highlights the importance of considering the process of behavior change and the multiple pathways through which an intervention can influence on behavior.
Health Promotion: A Web-Based Motivational Enhancement Intervention to Reduce Risky Behaviors Among College Women

One of the most pressing public health problems in the United States today is the rapid spread of sexually transmitted infections (STIs). The Center for Disease Control and Prevention (CDC) reports that more than 19 million new cases of STIs occur every year, roughly 10 times the number of people diagnosed with diabetes every year (CDC, 2008; CDC, 2010a). Nearly half of these new STI cases occur in 15-24 year olds (Weinstock, Berman, & Cates, 2004). An anonymous national survey examining one-year prevalence found that, among sexually active college students, 3.3% of women and 1.1% of men reported genital warts/human papillomavirus, 1.2% of women and 0.6% of men reported genital herpes, and 0.2% of women and 0.4% of men reported HIV (American College Health Association, 2008). This same age group also accounts for approximately 14% of all new HIV/AIDS diagnoses (CDC, 2008).

Given the previously described research, it is clear that college students acquire STIs at an alarming rate. Not only do STIs pose a serious health epidemic, they present a financial burden as well. Negative consequences from STIs cause direct medical costs of nearly $15.5 billion per year, comparable to $26.8 billion caused by negative consequences from obesity (Chesson, Blandford, Gift, Tao, & Irwin, 2004; Finkelstein, Fiebelkorn, & Wang, 2003). Given prevalence and costs, the need for interventions to decrease the occurrence of STIs is paramount. While STIs affect the population as a whole, they are particularly concerning for women. Untreated STIs pose potentially serious health complications for women, such as pelvic inflammatory disease, chronic pelvic pain, ectopic pregnancy, birth complications and infertility (WHO, 2001; CDC, 2007). Untreated STIs can also increase the risk of both acquisition and
transmission of HIV (Fleming & Wasserheit, 1999). In addition to serious complications from
STIs, women have a greater physical risk of acquiring HIV. During heterosexual intercourse,
women’s risk of acquiring HIV is nine times greater than a male partner’s due to the lining of the
vagina providing a larger area of potential exposure to HIV-infected semen (Padian, Buvé, Balkus, Serwadda, & Cates Jr, 2008).

A relatively easy and inexpensive means to protect against STIs and HIV/AIDS is regular
condom use. Recent meta-analyses have shown that consistent condom use can reduce the risk
of HIV by 80-94% (Warner, Stone, Macaluso, Buehler, & Austin, 2006). However, only 13% of
college women with multiple sexual partners report consistent male-condom use (Corbin &
Fromme, 2002). In general, men are considered to have more influence over the decision to
engage in safe-sex practices, since they are actually wearing the condoms (Seal & Ehrhardt,
2004). There have been numerous efforts to increase condom usage among men, but both parties
are responsible for safe sexual behavior. Very few efforts have been made to emphasize this
point to women, who statistically and practically have much more at risk during sex (Scott-
Sheldon, Fielder, & Carey, 2010). This creates a critical need to develop interventions
specifically targeting safe sexual practice among women.

HIV/AIDS is one of the most costly and serious infections that can result from unsafe sex
practices and over half a million people have died from AIDS since the epidemic began (CDC,
2010b). The CDC estimates that nearly 1 million people are currently living with HIV infections,
and 1 in 5 people with HIV are not aware that they are infected (CDC, 2010b). Initial efforts in
HIV/AIDS reduction focused primarily on biomedical approaches, including medical cures and
vaccines for HIV. Antiretroviral medications have advanced significantly over the past 30 years
and help to improve the quality of life and prolong life for HIV+ individuals. However, there is
still no cure for HIV/AIDS (Rotheram-Borus, Swendeman, & Chovnick, 2009). Progress on HIV vaccines, originally thought to be the “magic bullet” to prevent HIV infection has been similarly unsuccessful (Eaton & Kalichman, 2007). Several vaccine trials have found experimental vaccines to not only be ineffective, but may actually increase the risk of HIV transmission (Moore, Klasse, Dolan, & Ahuja, 2008). Experts generally agree that even if it is possible to develop a safe and effective vaccine for HIV, it will not be available for dissemination within the foreseeable future (Girard, Osmanov, & Kieny, 2006; Padian et al., 2008). As an HIV vaccination may never be realized, widespread and readily available behavioral interventions will be critical for future HIV prevention (Kalichman, 2008). Interventions to reduce the risk of HIV/AIDS started development over 25 years ago, and meta-analyses consistently show that behavioral interventions produce positive outcomes. Nevertheless, behavioral interventions require considerable resources to implement and sustain (Kazdin & Blase, 2011).

Efforts to reduce the resources necessary for intervention as well as maximize the number of people who can be reached have led to a trend toward brief intervention styles. These brief, client-centered interventions have reduced a wide array of STIs and HIV risk behaviors as well as increasing HIV testing (Kamb et al., 1998; Belcher et al., 1998; Kalichman et al., 2005). Many of these kinds of brief interventions focus not just on providing information and skills to participants, but also attempting to enhance individuals’ motivations. Motivational enhancement has been particularly effective in sexual risk behaviors, as many people underestimate their vulnerabilities (Fisher & Misovich, 1990) or their need to increase their condom use (Aronson, Fried, & Stone, 1991). A specific style developed by Miller and Rollnick (1991, 2002) called Motivational Interviewing (MI) increases intrinsic motivation for change through development
of discrepancy and examination of ambivalence. The MI approach was initially used in substance abusing populations, but has become more widely used since its initial development.

One component of MI that has been effective in increasing condom use is examining a decisional balance. This paradigm was used with college men to assess the reasons for and against condom use (LaBrie, Pedersen, Thompson, & Earleywine, 2008). Participants who used a decisional-balance exercise to examine their condom use reported higher motivation to increase their condom use and reported more condom use at a 30-day follow up than those participants who had only received information on safe sex practices. Evaluating the decisional balance may be a critical component to decreasing ambivalence about condom use and increasing motivation to reduce risky behaviors. Another important aspect of MI is developing a discrepancy between behaviors and values. The psychological state that manifests as a result of discrepancy between difference in beliefs and values and behavior is called cognitive dissonance.

Cognitive dissonance was first conceptualized by Leon Festinger in 1957. Festinger postulated that when people hold two or more cognitions that are psychologically inconsistent they experience varying degrees of distress, which they will then be motivated to resolve in order to reduce the dissonance. Festinger and Carlsmith first examined this by conducting a study (1959) in which participants completed a task about which they would have a negative opinion. After an hour, participants were randomly assigned to one of three conditions. The controls proceeded to a post-study interview about their attitudes about the study. Two other groups were asked to explain the study to a confederate participant and tell the confederate that the study was fun and enjoyable. The participants are either paid $1 for their participation or $20. After the participant explained the study to the confederate, they were interviewed about their opinions of the study. Results showed that the control group reported that the study tasks were not enjoyable
or scientifically important, they did not learn anything, and they would not participate in other similar tasks in the future. Participants who received $20 for their participation reported similar attitudes toward the tasks. However, the participants who only received $1 for their participation reported attitudes toward the tasks they had conducted that were much more positive, indicating that the tasks were enjoyable and they would participate in similar tasks in the future.

Festinger suggested that lying to the confederate was an attitude discrepant behavior. Those participants who were asked to lie to the confederate and were paid $20 did not feel strong dissonance because the monetary compensation served as a justification for the lie. However, those who were only paid $1 experienced more dissonance because they lied without justification. As such, they were more motivated to change their attitudes regarding the task in order to reduce the negative dissonance they felt.

Further studies suggested that cognitive dissonance required certain conditions in order to produce attitude change (Cooper & Fazio, 1984). First there must be a discrepancy between attitudes and behaviors, which causes negative consequences. Second, there must be a perceived freedom of choice to engage in the counterattitudinal behavior. Additionally, there must be physiological arousal in response to the cognitive dissonance. Finally, there must be awareness of the occurrence of the discomfort caused by the counterattitudinal behavior.

Cognitive dissonance has been widely studied and accepted as a fundamental process responsible for change in opinions and attitudes. Further studies have found cognitive dissonance to be a reliable predictor of attitudes towards a variety of scenarios, including group initiation processes (Aronson & Mills, 1959), children’s toy preferences (Aronson & Carlsmith, 1963), and attitudes toward illicit drug use (Nel, Helmreich, & Aronson, 1969). Whereas cognitive dissonance produces changes in attitudes, research as shown that this change is most likely to
occur immediately after counterattitudinal behavior, and becomes decreasingly likely after as little as five minutes (Beauvois, Joule, & Joule, 1996). Furthermore, changes in attitudes are found in explicit attitudes, but not implicit attitudes (Gawronski & Strack, 2004). These findings suggest that while attitudes can be readily changed to reconcile dissonance, these changes may be short-term and limited in scope.

Another way to reduce dissonance produced by attitude discrepant behavior is to change the counterattitudinal behaviors. Using cognitive dissonance to promote behavior change has improved behavior across a wide range of domains. In one study targeting energy conservation, Kantola, Syme, and Campbell (1984) enrolled homeowners who stated that they were in favor of energy conservation. Participants agreed to have their energy usage monitored and following two weeks of monitoring, they were randomly assigned to receive one of four mailings: 1) a letter stating they were high energy consumers even though they previously reported that they believe in conservation along with a pamphlet on conservation, 2) a letter stating they were high energy consumers, without mention of their personal beliefs, as well as a pamphlet, 3) the conservation pamphlet only, or 4) a post-card thanking them for their participation with the option to request more information about conservation. Those who had received the letter highlighting the discrepancy between their beliefs and their behavior used significantly less energy than the other participants in the weeks following the mailing. In another field-based study, Fointait (2004) examined the impact of dissonance on safe driving behaviors. In these studies, researchers approached shoppers in a grocery store parking lot asking them to participate in a road safety study. Participants first signed a flyer advocating for obeying posted speed limits, and then half of the participants were asked to write down times within the two months when they sped as well as the reasons for the transgression. Participants were then asked if they
would be willing to let the researchers use a tachometer to monitor the participants driving; those who had highlighted their past transgressions were significantly more willing to have their driving monitored.

Cognitive dissonance has also been found to impact positive change in health behaviors. For example, Bator and Bryan (2009) had college students provide reasons why they do not exercise regularly and then asked them to sign a large poster which advocated for regular use of the college fitness center. Those students who highlighted their previous failure to exercise and then signed the poster were more likely to use the recreation facilities in the following week. Additionally, Stice, Chase, & Stormer (2001) used a group intervention format to address bulimic symptomology. Over the course of three sessions, participants engaged in a variety of exercises that fostered cognitive dissonance, including designing a “body image acceptance” program for younger girls, identifying strategies for avoiding the internalization of the thin-ideal, writing an essay about the costs of the pursuit of the thin-ideal, group discussion and education, counter-attitudinal role play, and a body image exposure task in which participants stood in front of a mirror and recorded only positive thoughts about their bodies. Four weeks after the intervention, researchers found when compared to a healthy weight management control group, that those participants who engaged in the experimental group reported decreased thin-ideal internalization, body dissatisfaction, dieting, negative affect, and bulimic symptoms. In fact, a meta-analysis (Stice & Shaw, 2004) found that cognitive dissonance based interventions consistently reduce eating disorder risk factors and symptoms and are superior to other interventions and control conditions.

Other studies have even found that dissonance can be experienced due to hypocrisy demonstrated by others within a peer group. In a series of studies examining sunscreen use
(Stone & Focella, 2011) participants evaluated a recording in which a member of their peer group or someone outside of their peer group advocated for sunscreen use and then admitted past failures to use sunscreen. Those participants who shared a strong social identity with the hypocrite were more likely to report positive attitudes and intentions for regular sunscreen use, and were more likely to use sunscreen when given the opportunity by researchers.

Findings from these studies show a long-term behavior change suggesting that while attitude change due to cognitive dissonance may be short-term, behavior change as a result of cognitive dissonance may be more long-term and relatively stable. Because cognitive dissonance can produce long-term behavior change, it is critical to examine the role of dissonance in reducing risky sexual behaviors especially since the discrepancy between behaviors and values is particularly relevant within the realm of sexual behaviors. Most people believe that they should engage in safe sexual behaviors, but many fail to act accordingly. Drawing out the discrepancy between action and beliefs creates a sense of cognitive dissonance, which people will strive to reduce, often by bringing their actions in line with their beliefs. For example, Aronson, Fried and Stone (1991) applied a cognitive dissonance paradigm to increase condom usage through self-persuasion. In this study, participants were told they were helping an AIDS prevention program. Half of the subjects were asked to describe past sexual encounters in which they failed to use a condom. This procedure was designed to highlight participants’ own failures to engage in safe sexual behavior. Then participants were asked to compose a short speech on the importance of condom use. Half of the participants then gave their speech in front of a camera and were told that the tape would be shown to high school students as part of the AIDS prevention program. The other half simply rehearsed their speech silently to themselves.
Results showed that those participants who were asked to advocate for condom use after highlighting their own failures (hypocrisy group) reported the highest difference between their current behavior and their planned future behavior. Ceiling effects prevented analysis on group difference in intentions to use condoms; however, multiple groups reported a higher intention to use condoms in relation to their current sexual practices. Furthermore, results at a three-month follow-up suggested that those in the hypocrisy group reported the most condom use of any intervention group. Additional studies supported these findings showing that those participants who were asked to advocate for condom use reported higher intent to use condoms in the future and purchased more condoms when provided the opportunity by experimenters (Stone, Aronson, Crain, Winslow, & Fried, 1994). These findings suggest that highlighting the discrepancy between ideal and actual behavior increases motivation to use condoms and may be the most effective route to long-term behavior change.

Previous condom-use interventions have relied on one-on-one interviews between the participant and a counselor, which greatly increases the resources required for intervention. One way to reduce the resource demand and maximize the number of people reached is to take advantage of computer-based technologies. While motivational interviewing was developed for face-to-face counseling, research has found that printed versions of motivational interviewing can be equally effective in promoting lifestyle change (Van Keulen et al., 2011). Mass media print outlets have been utilized to convey health information in the hopes of modifying health attitudes and behavior. Although they are good channels for creating awareness, newspapers and magazines have not been found to be very compelling means for promoting behavior change (Wallack, 1989). Instead, research suggests that more reciprocal and interpersonal avenues of media may be more effective for influencing behavior change (Backer, Rogers, & Sopory, 1992;
A meta-analysis of web-based health behavior interventions has suggested that these interventions are an effective vehicle for health behavior change paradigms (Webb, Joseph, Yardley, & Michie, 2010). Individual web-based programs have shown success in increasing breast cancer screening among women (Bowen et al., 2011), increasing physical activity and fruit and vegetable consumption among overweight populations (Winett et al., 2011), as well as increasing colorectal screening (Vernon et al., 2011). Web-based personalized normative feedback programs have already been used to effectively target heavy drinking among college students and are now available commercially for universities (Bersamin, Paschall, Fearnow-Kenney, & Wyrick, 2007) (Doumas & Andersen, 2009; Doumas, Haustveit, & Coll, 2010) (Walters, Vader, & Harris, 2007). Additionally, web-based programs have shown positive behavioral outcomes among HIV-positive youth (Markham, Shegog, Leonard, Bui, & Paul, 2009). However, none of these web-based interventions have employed cognitive dissonance paradigms. Web-based technologies could provide a highly effective forum for cognitive dissonance interventions. Additionally, using web-based technologies will reduce the resources required to implement interventions, therefore greatly increasing the number of people who can be reached.

Not only do web-based interventions reduce the resources required for intervention, but they also increase the anonymity of the participant. As sexual behaviors are not readily observable, interventions rely on participant self-report to assess the effectiveness of the
intervention. Studies have found that even when discussing innocuous behaviors, participants are more willing to disclose information in self-administered surveys as opposed to face-to-face interviews or investigator-led surveys (Hochstim, 1967). These findings have been replicated in the sexual behaviors literature as well, with men reporting more sexual partners when answering interview questions and fewer partners when answering a self-administered survey (Tourangeau & Smith, 1996). Conversely, this same study found that women are more likely to underreport their number of sexual partners on web-based surveys than when answering interview questions. Similar findings suggest that, overall, women are more likely to underreport risky sexual behavior (Starosta & Earleywine, 2014). Self-administered surveys that emphasize anonymity, such as web-based interventions, can increase the likelihood of accurate responses (Tourangeau & Smith, 1996).

Sustainable and effective behavioral interventions to increase condom use are needed to help battle the current STI epidemic. Findings support the potential of computer-based applications for STI/HIV prevention; however, as noted by Markham et al. (2009) the potential of this forum has yet to be investigated in a clinical setting. The present study employed a web-based motivational enhancement intervention that focused on decisional-balance examination and self-persuasion by developing the discrepancy between idealized and actual behavior. The web-based format reduces the resources required, potentially increasing the sustainability of the intervention. Additionally, this study targeted women because research has suggest that women are more likely to underreport risky sexual behaviors (Starosta & Earleywine, 2014). Because of its low cost and low maintenance, this intervention has the potential to be used not just in a research or clinical population, but also on a broad scale in universities across the country.
Specific Aims

[SA1] **Examine the effect of cognitive-dissonance self-persuasion techniques on intentions and attitudes about condom use**

Drawing out the discrepancy between action and beliefs creates a sense of cognitive dissonance, which people will strive to reduce often by bringing their actions in line with their beliefs. This technique of self-persuasion has enhanced energy conservation (Kantola et al., 1984), physical activity (Bator & Bryan, 2009), sunscreen use (Stone & Focella, 2011), safe driving (Fointiat, 2004) and reduced bulimic symptomology and internalization of the thin-ideal (Stice et al., 2001). Studies have also applied self-persuasion to condom use by highlighting participants’ failures to use condoms followed by asking them to perform a speech on the importance of condom use (Aronson et al., 1991). Those participants who advocated for condom use reported higher intent to use condoms in the future and purchased more condoms when provided the opportunity by experimenters (Stone et al., 1994). These findings suggest that introducing hypocrisy of behavior by highlighting the discrepancy between ideal and actual behavior can increase one’s motivation to use condoms.

[SA2] **Examine the influence of intentions on condom use**

Interventions centered on increasing condom use have focused on factors that predict condom use during sexual intercourse, such as intentions toward condom use. The Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975) is one social-cognitive model that has been used to predict behavior across a variety of domains, including condom use. This theory states that voluntary behavior is determined by intentions, which are in part determined by attitudes toward performing the behavior (Fishbein & Ajzen, 1975). In this case, I predict that increased attitudes towards condoms will increase both intentions to use condoms and actual condom use.
Examine the effect of the intervention on condom use at follow-up

Brief, client-centered interventions have increased HIV testing, reduced STIs, and decreased risky behaviors (Belcher et al., 1998; Kalichman et al., 2005; Kamb et al., 1998). Many of these kinds of brief interventions focused not just on providing information and skills to participants, but also attempting to enhance motivation. Motivational enhancement has been particularly effective in sexual risk behaviors, as many people underestimate their vulnerability (Fisher & Misovich, 1990) or their need to increase their condom use (Aronson et al., 1991). Web-based personalized normative feedback programs have been used to effectively target and reduce heavy drinking among college students and are now available commercially for universities (Bersamin et al., 2007; Doumas & Andersen, 2009; Doumas et al., 2010 Walters et al., 2007). Additionally, web-based programs have shown positive behavioral outcomes among HIV-positive youth (Markham et al., 2009). Using computer-based technologies will reduce the resource demand and allow for a more sustainable intervention.

Summary and Integration

Despite their previously demonstrated effectiveness, sexual risk reduction interventions have been poorly maintained due to the vast amount of resources necessary to sustain them. It is critical to develop sustainable and effective behavioral interventions in order to increase condom usage in the face of the current STI epidemic. The present study seeks to employ a web-based motivational enhancement intervention that focuses on decisional-balance examination and self-persuasion by developing discrepancy between idealized and actual behavior. The web-based format will reduce resources required therefore increasing the sustainability of the intervention. Additionally, this study seeks to target women, as they have a greater risk of acquiring STIs and HIV/AIDS because of both their increased physical risk and their tendency to underreport risky
sexual behaviors. Because of its low cost and low maintenance, this intervention has the potential to be used not just in a research or clinical population, but also on a broad scale in universities across the country.

**Methods**

**Participants**

All participants were recruited through the University at Albany’s psychology research pool. Participants were given course credit for participation in the baseline portion of the research protocol and were given the option of enrolling in the three-month follow up. All participants were screened for eligibility before enrolling in the study. Participants had to be female and sexually active. In total, there were 488 participants enrolled in the baseline intervention (see Figure 1). Of these participants 23 identified as primarily engaging in sexual activities with female partners and were removed from further analyses. The surveys were all administered independently in order to ensure anonymity and to encourage truthful responding. However, in order to confirm maximum effort throughout the survey, there were six infrequency items included in the surveys. These items were included in the MCAS survey and either stated, “Please select strongly agree,” or “Please select strongly disagree.” Participants who incorrectly responded to three or more of these six infrequency items were assumed to be responding carelessly and were removed from analysis. In total, 40 participants were removed due to incorrectly responding to three or more infrequency items. Three additional participants were removed for having greater than 25% of their data missing (see Statistical analysis). Eligibility criteria required that participants be sexually active within the past year. Some women met this criterion, but had not be sexually active within the past three months. These women were not
excluded, and therefore some women reported no sexually activity for the three months prior to the baseline assessment.

Overall, 422 participants (M\text{age} = 18.88\ years, SD=1.65, age range: 17-41) were included in final analyses. Because research participants were recruited through the university psychology research pool, some were younger than 18. Per university policy, these participants obtained general consent from their guardians to participant in the research pool and additional guardian consent was not required for this specific study. Of the participants who completed baseline procedures, 304 (M\text{age} = 19.02\ years, age range: 17-41) participants agreed to be contact for the three-month follow-up. Compared to those who declined to participate in the three-month follow-up study, those who agreed to participate were older (t=-3.629, p<.001) and reported having used condoms for fewer of their vaginal (t=2.450, p=.015) and more of their oral (t=-2.158, p=.033) sex acts in the previous three months. In total, 216 participants (M\text{age} = 18.91\ years, age range: 17-28) completed the three-month follow-up (see Figure 1). There were no baseline demographic differences between those participants who completed the follow-up assessments and those who did not.

Measures

**Demographic questions.** Participants provided basic demographic information such as age, race and education level in addition to sexual history questions such as relationship status, sexual preference, and previous condom use and alcohol consumption history.

**Multidimensional Condom Attitudes Scale (MCAS).** The 25-item scale originally developed by Helweg-Larsen and Collins (1994) has been shown to be a reliable and valid measure of college students’ attitudes toward condoms (Cronbach’s \(\alpha = .846\); Starosta, Berghoff, & Earleywine, 2014). The MCAS has five sub-factors: reliability and effectiveness of condoms
for contraception and protection against STIs (effectiveness), sexual pleasure associated with condoms (pleasure), stigma attached to those people who used condoms (stigma), embarrassment about negotiations and use (use), and embarrassment about purchase (purchase).

**Condom and Alcohol Use Intentions.** Participants completed a five items, 7-point Likert scale measure (1=Never to 7=Always) assessing their intent to use condoms and alcohol in the following month. These items have previously been found to show good reliability (intent to use condoms Cronbach’s α=.63: Helweg-Larsen & Collins, 1994); intent to consume alcohol Cronbach’s α=.71: LaBrie et al., 2008).

**Readiness to Change ruler (RTR).** Participants rated themselves on a scale of 0 to 10 on their motivation to change their drinking and sexual behaviors (0=Not needing to change; 10=Maintaining a change). These rulers have been previously found to have reliability comparable to that of longer scales (LaBrie, Quinlan, Schiffman, & Earleywine, 2005).

**Timeline Followback Interview: Sexual Behavior and Substance Use (TLFB-SS).** TLFB-SS is an assessment tool for both drinking and sexual behavior that assesses behaviors retrospectively. This assessment used a calendar-aided recall of previous behaviors. The TLFB-SS has been found to be a valid assessment of risky sexual behavior as well as binge drinking in college students (Carey, 1997; Carey, Carey, Maisto, Gordon, & Weinhardt, 2001). In the computer adaptation of the TLFB, participants were given a blank calendar and prompted to enter dates such as holidays, menstrual periods, or other memorable events to serve as marker dates. Then participants were prompted to enter any time they had sexual intercourse or consumed alcohol. For each occasion, participants are asked what type of sexual intercourse (oral, anal, vaginal), if they used a condom or not, in addition to type of drinks and number of drinks for any alcohol consumption.
Procedures

Subjects were recruited via a University at Albany’s psychology department research pool and received course credit for participation. Following the consent process, eligible participants independently completed the baseline assessment on the laboratory computers. All questionnaires and study procedure instructions were administered via SurveyMonkey, an online survey management site. All procedures were reviewed and approved by the university Institutional Review Board.

Participants were offered the option of participating in the three-month follow-up portion of the study for compensation of $10. Students who agreed to participate in the follow-up assessment were sent an email invitation to complete follow-up questionnaires on their personal computers.

After baseline assessments were completed, participants were randomly assigned to the condom-use intervention or a binge-drinking intervention (control condition). The conditions were identical in procedure and differed only in the targeted behavior.

**Condom Use Intervention.** Participants answered questions about each occurrence of sexual intercourse (or binge drinking in the control group) reported in the TLFB-SS. Each time participants did not use a condom during their sexual activities they were asked to report their reason for not using a condom. Participants were asked to rate the importance of that reason for them. Once all of the condom non-use reasons were compiled, the participant was asked to rate these reasons as a group in overall importance and were asked to report those ratings in SurveyMonkey. The same procedure was conducted for each time a condom was used. Participants first rated the importance of each individual reason and then rated the overall importance of the group or reasons. Finally participants compared their ratings of reasons for
non-use to reasons for use. Participants were then asked to write a testimonial encouraging high school girls to insist that their partners use condoms during all acts of sexual intercourse. Participants were informed that these essays could be used in a website to promote healthy behaviors among teenage girls and were provided with fact sheets from the CDC for additional information to include in the testimonial.

**Binge drinking intervention.** Alcohol can be a contributing factor leading to risky sexual behavior. Brown and Vanable (2007) found that among college students, alcohol use increased the likelihood of unprotected sex with a casual partner. Therefore, I selected binge drinking as a comparison behavior for the condom intervention, both to serve as a control, but also because of its salience to risky sexual behavior. I predicted that if binge drinking were to decrease, then risky sexually behavior would decrease as well. Participants in the binge drinking intervention engaged in the same decisional-balance exercise as the condom intervention group, but instead examined every time they did or did not drink more than four drinks on a single occasion. After they completed the decisional-balance exercise, they were asked to write an essay encouraging young girls to engage in safe drinking behaviors. They were provided fact sheets from the CDC with additional information on binge drinking.

**Immediate follow-up assessment.** The intervention concluded with a reassessment of participants’ intent to use condoms and the MCAS to assess the immediate effect of the intervention on condom attitudes. After completion of the post-intervention assessments, participants shredded all the paper materials they had used for the intervention. Overall, the assessment and intervention required approximately 30 minutes.

**Three-month follow up assessment.** Those participants who agreed to participate in the follow up were sent an email with an invitation to complete the three-month follow up. The
follow-up email included calendars for the TLFB-SS, the TLFB-SS in order to assess drinking and sex behaviors, the MCAS to assess condom attitudes, and condom and drinking intentions scale.

**Statistical analysis**

Data were evaluated for missing data. When evaluating missing data, it is critical to ensure that data are not missing in a systematic way, or that the “missingness” of the data are not related to some other explanatory variable. This can be done by evaluating each variable and comparing those cases that are missing to those that are not missing on other outcome variables (Dixon, 1981). However, when using multivariate data this approach can require a large number of analyses, which can lead to an increased chance of a Type I error. Additionally, it is difficult to identify if there is simultaneous interference from multiple sources. Instead, Little (1998) proposed a global test statistic that uses all the available data. This approach compares the observed mean missing pattern to the overall expectation-maximization derived mean using a chi-square statistic. A statistically significant finding indicates that the data are not missing completely at random.

Missing data were evaluated using Little’s Missing Completely at Random Test. Because of uncertainty regarding the reasons for missing data for items regarding drinking and sexual behaviors, only attitudes and intentions were analyzed for missing data. Over all, there were very little missing data, with an average of 0.74% of data missing at the baseline intervention and 3.84% missing from the follow-up survey. There were two participants who were removed from analyses for having greater than 25% missing data in the baseline intervention and one participant from follow-up. Little’s Missing Completely at Random Test was conducted for all participants ($\chi^2 (2454)=2547.747, p=.092$) as well as for the follow-up
questions ($\chi^2 (413)=416.192, p=.447$) and found to be non-significant, suggesting that there were no biases or confounding variables contributing to the pattern of missing data. Therefore all missing values were replaced with the mean of the sample for that specific item.

All statistical analyses were conducted using SPSS 16.0. An examination of group differences was conducted using ANCOVAs using intervention group as the main factor and post-test condom attitudes and intentions as the dependent variables while using the pre-intervention levels as covariates. Analyses with regard to mediation models were conducted in two steps. First, a linear regression model was used to identify the significant predictors of condom use. Then, I examined the mediation model.

Mediational models were examined using the traditional multistep approach proposed by Baron and Kenny (1986). The Baron and Kenny approach uses three separate regressions to establish that 1) the independent variable affects the dependent variable, 2) the independent variable affects the mediating variable, and 3) the mediating variable affects the dependent variable, and when the mediating variable is included in the regression model, the affect of the independent variable on the dependent variable decreases. However, methodologists have identified a number of limitations in this process. Specifically, the Baron and Kenny approach has very low power unless the effect size or the sample size is very large (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Alternatively, researchers have used the Sobel Test (Sobel, 1982; Sobel, 1987) as a way of circumventing power difficulties. The Sobel Test examines the effect of the intervening variable by dividing the estimate of the effect of the intervening variable by its standard error and ultimately comparing this value to a normal distribution. Unfortunately, the Sobel Test relies on the assumption that the distribution of this calculated “$ab$” value is normal, which is commonly violated.
Therefore, to avoid the pitfalls of low power or violations of normality assumptions, I elected to use the Sobel Test combined with 95% bootstrapped confidence intervals for the indirect effects as laid out by Preacher and Hayes (2004). Bootstrapping is a non-parametric approach to effect-size estimation that does not rely on assumptions regarding the normality of the distributions of variables within a model. In the bootstrapping approach a large number of samples of size $n$ (wherein $n$ is the original sample size) are taken from the data, sampling with replacement. The indirect $ab$ affect is calculated for each sample, creating a sampling distribution of the $ab$. As a general rule, it is recommended that at least 1,000 estimates be used for bootstrapping (Preacher & Hayes, 2004). A 95% confidence interval is generated by ranking the estimates of $ab$ from low to high. This method has been suggested as a method to avoid reductions in power due to asymmetries and other forms of non-normal sample distributions of the $ab$ pathway (Lockwood & MacKinnon, 1998; Shrout & Bolger, 2002) and recent studies suggest that this method is more appropriate than the Sobel Test for use with smaller samples and non-normally distributed variables (MacKinnon et al., 2002; Preacher & Hayes, 2004; Shrout & Bolger, 2002).

In order to conduct mediation analyses of the indirect effect of condom use intentions on the relationship between condom attitude and actual condom use, I use the SPSS Sobel Test with the bootstrapping macro designed by Preacher and Hayes (2004). Finally, I evaluated the impact of the intervention on the mediating effect of intentions on behavior by integrating the intervention as a proposed moderator into the mediation model. This was conducted as specified in the methodology laid out by Preacher & colleagues (2007) and using their MODMED SPSS macro.
Change over time and group differences in behavior at follow up was conducted using paired t-tests and independent samples t-tests using the difference in total reported condom use compared between the intervention and control group at baseline and each follow-up time point.

**Results**

Participants ($M_{\text{age}}=18.22 \ SD=1.65$) were primarily in their freshman year of college (55%). Ethnically, 59% of participants identified as Caucasian, 19% as African American, 7.6% as Asian, 14.9% as Hispanic/Latino, and 5.5% identified as Other. The cumulative total is larger than 100% as participants were able to identify as more than one race. All participants were sexually active within the past year, and 22% were currently in a monogamous relationship ($M=15.86 \ SD=12.76$). Women reported an average of $2.62 \ (SD=1.94)$ sexual partners over the past year. Vaginal sex was the most common sex act over the past 90 days ($M=12.13, \ SD=14.47$). Oral sex was less common ($M=6.04, \ SD=8.63$), and anal sex was rare ($M=.18, \ SD=.76$). Overall, condom use was low; on average women used condoms for $61.91\%$ ($SD=40.4$) of vaginal sex, $35.53\% \ (SD=47.80)$ of anal sex, and only $8.36\% \ (SD=25.58)$ of oral sex. There were no baseline demographic differences between the experimental groups (Table 1).

**Immediate Effect of the Intervention on Attitudes and Intentions**

First, ANCOVAs were conducted to examine the immediate effect of the intervention on intentions to use condoms and attitudes toward condoms, taking into account participants’ baseline attitudes and behaviors (see Table 2). Models included participants’ baseline intentions to use condoms, intentions to reduce binge drinking, condom attitudes, age, number of partners, the percentage of times they used a condom in the past three months for vaginal sex, the percentage of times they binge drank, and their readiness to change their condom use and drinking behaviors. As condom attitudes have been found to be a multidimensional construct
(Helweg-Larsen & Collins, 1994), each condom attitude factor was analyzed individually. Results showed that immediately following the intervention those participants in the experimental group had significantly more positive attitudes toward condoms in the areas of effectiveness, pleasure, and embarrassment about purchase. There were no significant group differences in attitudes about stigma or embarrassment about negotiation or use. Furthermore, groups differed significantly in their intentions to use a condom, with the experimental group reporting higher intentions to use a condom. Of note, this same pattern was found in intentions to binge drink with the control group reporting significantly greater intentions to reduce binge drinking. These group differences were not maintained at follow up, and at the three-month follow up there were no significant group differences in condom attitudes or intentions to use a condom or reduce binge drinking (see Table 2).

**Impact of Relationship Status and Alcohol Intake on Condom Use**

As relationship status can be a significant factor influencing the use of condoms (Wang, 2013), I examined how relationship status impacted condom use in our sample. Those who were in a relationship at baseline reported that on average they had used a condom for 55% \((SD=43.9\%)\) of vaginal sex acts over the previous three months, while single participants reported that they had used a condom 64% \((SD=39.1\%)\) of the time. This was not a statistically significant difference \((t=-1.846, p=0.067)\). At follow-up those who were in a relationship reported that on average they had used a condom for 49% \((SD=43.9\%)\) of vaginal sex acts over the previous three months, while single participants reported that they had used a condom 60% \((SD=42.1\%)\) of the time. This was not a statistically significant difference \((t=-1.730, p=0.085)\). Although the difference in condom use between those participants in a relationship and those not in a relationship did not reach conventional two-tailed levels of statistical significance, the two
groups were reporting an approximate 10% difference in condom use at baseline and follow-up. This suggests that relationship status could potentially impact condom use, with those in a relationship using condoms less frequently than single participants. Therefore, I removed all participants who were in a relationship to examine the impact of the intervention for single participants. Of the 119 single participants who completed the three-month follow-up, those participants in the alcohol group reported that they had used a condom for an average of 57% (SD=38.7%) of vaginal sex acts over the previous three months, while those in the condom group reported that they had used a condom 65% (SD=43.2%) of the time. Again, this difference was not statistically significant (t=-1.029, p=0.306).

Relationship status is not necessarily a homogenous descriptor. Condom use tends to be higher and more consistent among those in a new or casual relationship (Macaluso, Demand, Artz, & Hook III, 2000). It is particularly important for those in a new relationship to continue condom use as many people may be unaware of their new partners’ sexual history or current behavior. In fact, Drumright, Gorbach, and Holmes (2004) found that only 26% of the new couples in their study were aware if their partner had concurrent sexual partners and that being unaware of concurrency status was associated with higher rates of STIs. Therefore, I examined if those participants in a new relationship (less than three months) had a different rate of condom use than those in longer relationships. Those participants in new relationships at baseline reported that they used condoms for an average of 67% (SD=44.3%) of vaginal sex acts over the previous three months while those participants in relationships longer than three months reported using condoms for 53% (SD=43.9%) of the time. This difference was not statistically significant (t=0.935, p=0.352). Similarly at the three-month follow-up, those participants in new relationships reported using condoms for an average of 65% (SD=36.6%) of vaginal sex acts
over the previous three months while those participants in relationships longer than three months reported using condoms only 45% ($SD=45.0\%$) of the time. This difference, though suggestive, was also not statistically significant ($t=1.778, p=0.087$).

Alcohol use is also related to risky sexual behaviors, particularly among casual partners (Brown & Vanable, 2007). Therefore, I evaluated the impact of alcohol consumption on condom use. The number of times participants binge drank was not related to their condom use at baseline ($r=-0.054, p=0.280$) or at the three-month follow-up ($r=-0.019, p=0.799$). Similarly the percentage of times participants binge drank was also unrelated to condom use both at baseline ($r=-0.036, p=0.489$) and at follow-up ($r=-0.022, p=0.770$).

**Mediation of Attitudes and Intentions on Condom Use**

Given that there was a very low rate of endorsement for both oral and anal sex (see Table 1), all analyses of condom use focused on condom use during vaginal sex. Based on the Theory of Reasoned Action as a theoretical starting point, I hypothesized that baseline attitudes toward condoms predict condom use at three months, and this relationship is indirectly affected by intentions to use a condom post intervention. In order to test this model, I first examined the relationship between the condom attitudes factors and condom use at follow up. I conducted a regression analysis in which the five factors of the condom attitude scale predicted condom use at three months (see Table 3). The only attitude factor that was a significant predictor of condom use was the pleasure factor ($\beta=0.356, p<.001$); those participants who indicated at baseline that they thought condoms were more pleasurable had greater condom use at follow up.

Next, I examined the indirect effect of intentions to use a condom on the relationship between condom attitudes, specifically the pleasure factor, and condom use. Analyses using the Sobel test and bootstrapping (as laid out by Preacher and Hayes, 2004) indicated that post-
intervention intentions indirectly affected the relationship between baseline condom attitudes and condom use at 3 months (see Table 4); those participants who thought condoms were more pleasurable at baseline were more likely to have stronger intentions to use condoms following the intervention. Participants with stronger intentions to use condoms reported a greater percentage of condom use at the three-month follow up.

**Effect of the Intervention on Behavior at Follow Up**

Given that results found attitudes and intentions to be predictive of condom use, and that the intervention increased intentions to use a condom as well as attitudes toward condoms, it follows that those participants in the experimental condition would report higher condom use at follow up. However, this was not the case. There was no significant group difference in the percentage of times that condoms were used during vaginal sex at a three-month follow up ($t(181)=-0.464, p=.643$). Additionally, there was no significant change over time in the percentage of condoms used when comparing baseline behavioral report to the three-month follow-up ($t(94)=0.523, p=.602$). Similar results were found with regards to binge drinking, with no difference between groups ($t(196)=-0.102, p=.919$) and no change over time ($t(105)=-0.631, p=.529$).

**Effect of the Intervention on Mediation Model**

As the intervention did not appear to have a direct impact on behavior, I sought to further examine the influence of the intervention on the factors that mediate condom-use behavior. Specifically, moderated mediation analyses were conducted to evaluate a conditional indirect effect model in which the relation between intentions and condom use in the previously established mediation model of condom attitudes, intentions, and use was moderated by intervention group. Results indicated that the interaction between intentions and intervention
group was significant ($\beta=0.042, p=.0464$) such that intentions to use condoms had a greater impact on condom use at follow up among those participants who were in the condom intervention group.

**Discussion**

Behavioral interventions to reduce sexual risk behaviors have been consistently found to be effective; however, these interventions can be prohibitively expensive to implement when administered in a face-to-face format. The current study sought to reduce the costs of behavioral interventions by adapting previously empirically supported interventions to web-based format. Results showed that immediately following the intervention, participants in the condom-intervention group reported that they believed condoms were more effective and more pleasurable, and that purchasing condoms was less embarrassing when compared to the control group. Furthermore, those participants who completed the condom intervention follow up reported greater intentions to use condoms.

Regarding actual behavioral outcomes, overall condom use was low. On average, women were only using condoms for approximately 60% of their vaginal sex acts, even though they reported having more than one partner. This indicates that despite all of the education resources and media campaigns dedicated to promoting safe sex behaviors, there is still a critical need for interventions to increase condom use among college-aged women. Within our sample, there were no statistically significant differences in rates of condom use between those participants in a relationship and those who were single. There also were no differences based on the length of relationship. Although there was no statistically significant difference based on relationship status, those participants in longer relationships consistently reported less condom use. This is consistent with the broader literature and is likely due to the fact that those people in a long-term
relationship likely have a lower risk of acquiring an STI from their partner. However, it is unclear at what point in the relationship partners determine condom use is no longer necessary and if it is related to actually decreased risk of STIs. The present study was not designed to answer these specific questions, but future research should further examine how and when partners decide to end condom use.

Attitudes towards condoms, specifically attitudes regarding the pleasurableness of condoms, predicted condom use at the three-month follow-up; those who indicated that they found condoms to be pleasurable used condoms during a greater percentage of their vaginal sex acts. As pleasure was the only condom attitude factor that was predictive of actual use, it begs the question, what is so important about the pleasure factor? While the current study does not provide answers, I posit that attitudes regarding the pleasurableness of condoms are the only attitudes that would be applicable “in the moment.” Questions about the effectiveness of condoms assess a person’s attitudes toward the ability of condoms to prevent long-term future consequences, such as pregnancy or STIs, following a sex act. Questions about embarrassment in purchasing evaluate a person’s attitudes toward the preparatory behaviors like buying or carrying a condom that would make a condom available during a sex act. Questions about embarrassment about negotiating use of condoms evaluate a person’s attitude toward the communication necessary to initiate condom use. And questions about the stigma of condom use are likely measuring whether a person is even willing to have sex with someone who uses condoms (or perceives themselves to still be worthy of sex if they suggest condom use). However, the pleasurableness of condoms is directly related to the sex act itself, the time when the condom needs to be used. Therefore, perhaps the reason that the pleasure factor is the most
important factor in predicting actual use is because it is the most directly relevant to the
enjoyment of the sex act.

If in fact the pleasurableness of condoms is the most important factor in predicting actual
condom use, interventions could focus less on skill building or negotiation tactics, and more on
presenting condoms as a sexy, enjoyable part of sex. Cognitive dissonance based interventions
could focus specifically on countering the idea that condom use impedes pleasure during sex.
Participants could be instructed to specifically write counterattitudinal essays about how to
pleasurably incorporate condoms into sex acts. Commercially, companies that focus on making
condoms physically more pleasurable through thinner materials or ribbing or alternatively
pairing them with other pleasure enhancing features and products may in fact promote the actual
use of condoms.

However, condom use is never straightforward; therefore, it is likely that there are more
factors contributing to condom use at the follow-up than just attitudes toward condoms. Based on
the well-established Theory of Reasoned Action (Fishbein & Ajzen, 1975), which consistently
finds that behaviors are determined by intentions that are in part dictated by attitudes, I
hypothesized that intentions to use condoms may be contributing to the relationship between
condom attitudes and actual condom use. In fact, this relationship between attitudes and use was
mediated by intentions to use condoms; more positive attitudes toward condoms prior to the
intervention resulted in stronger intentions to use condoms following the intervention, and
stronger intentions to use condoms resulted in greater condom use three months later. It is
possible that those participants who had more positive attitudes toward condoms were more
likely to be positively engaged in the intervention. They may have also experienced more
dissonance when they highlighted the discrepancy between their positive attitudes and their
actual past behavior. Therefore, the intervention may have been more effective for them, resulting in stronger intentions to use condoms.

The intervention increased positive attitudes toward condoms as well as intentions to use condoms. Those attitudes and intentions increased actual condom use over a three-month period. Unfortunately, these findings did not hold when examining the long-term impact of the intervention. The intervention groups did not differ in their actual behavior at three-month follow up. However, the intervention moderated the impact of the identified mediation model. Among those in the condom intervention group, intentions to use condoms had a stronger impact on actual condom use compared to those in the alcohol condition. These findings suggest that not only did the intervention immediately increase participants’ positive attitudes toward condoms and their intentions to use condoms, but also it essentially amplified those intentions overtime. Perhaps the development of cognitive dissonance acted to strengthen the participants’ resolve to stick to their beliefs.

The study has several limitations that may undermine the generalizability of the findings. Specifically, the study population was limited to women and was overwhelmingly Caucasian. The demographic distribution of our sample is consistent with the general college population in the United States. However, there are many other at-risk populations that may benefit from this intervention. Future studies should examine the effectiveness of the intervention in a broader sample. This study relied on self-report data, and there were no questions regarding participants’ HIV status or past history of STIs. It is possible that participants’ personal experience with STIs could impact their condom use and could be a confounding factor. Future studies should examine STI history and its impact on condom-use decisions.
Due to technological restraints from the survey management tool, the intervention was limited in its interactivity and customization. For example, the act of writing an essay can serve as an exercise in self-persuasion; however, many cognitive dissonance interventions emphasize the importance of public advocacy to highlight dissonance. Writing an essay from the privacy of one’s own computer hardly counts as public advocacy. Therefore, future interventions could emphasize this more by taking advantage of more sophisticated technologies. One possibility is to have participants record themselves giving a speech using a webcam. Verbalizing and recording the testimonial could act as a more permanent and potentially public act. Additionally, participants could review their submissions, which would act as further self-persuasion. Another way of increasing the “publicness” of advocacy is to conduct interventions in online group chats so that there is a built-in audience, whether real or confederate. The world of technology is advancing rapidly and future studies should take advantage of these as well as other more sophisticated technologies to increase participant engagement and interaction.

These analyses only focused on vaginal sex because of low endorsement rates for oral and anal sex. However, the spread of STIs is not limited to vaginal intercourse. Of particular note, the Human Papillomavirus (HPV) is currently one of the most common STIs (CDC, 2010a). HPV has already been definitively linked to cervical cancer and increasing linked to vulvar, vaginal, penile, anal and oropharyngeal cancers (Trottier & Burchell, 2009). Findings from our sample suggest that women are commonly engaging other sex acts, particularly oral and that these women are rarely using a condom during these acts. Consistent condom use during all sex acts would significantly reduce the risk and transmission of HPV and its related cancers. Unfortunately, due to low condom usage, the majority of HPV infections occur between the ages
of 15 to 24 (Weinstock et al., 2004). Therefore, it is critical that future interventions emphasize condom use during all act of sexual intercourse.

Finally, the current intervention was purposefully designed to minimize the resources required for intervention. Findings suggest that while the intervention impacted attitudes and intentions, it may have been too brief to impact actual behavior. Research in other areas of health behavior change including smoking cessation (Holtrop, Wadland, Vansen, Weismantel, & Fadel, 2005) and healthy weight (Rodondi et al., 2006), suggests that there is a dose-response relationship; those participants who receive more counseling have better outcomes or greater behavior change. Therefore, future research should examine what is the required “dose” of the intervention to influence actual behavior change. The length of my initial intervention may have been too short. Utilizing more sophisticated web-technology, such as more detailed electronic data collection for the TLFB-SS or asking participants to record their persuasive essay using a web-cam and watch the play back, could increase the length of the intervention. Additionally, the intervention could be broken into multiple sessions, so as to increase the participants’ involvement over time. One way of doing this could be to have participants complete the TLFB-SS and the decisional balance in one session, and then ask them to write a persuasive essay over the following week. Then in a second session, participants could examine their behavior over the intermediate week as well as record their essay using a web-cam. Furthermore, brief “booster” sessions could be helpful in increasing the behavioral impact of the intervention. Participants could be sent monthly emails that could each focus on the different components of the interventions. One booster session could guide participants through a decisional balance exercise examining their behavior over the past month. Another booster session could include the participants persuasive essay which they had written as well as include additional educational
materials. There are many potential methods for bolstering the effects of the intervention, and future research should focus on teasing out exactly which methods have the highest impact without creating too great of a burden for the participants or administrators.

Despite these limitations, the present findings have significant implications. First, these findings highlight the importance of evaluating not only the targeted behavioral outcome, but also the importance of examining the processes that impact those behaviors and the intervention’s influence on those processes. While this particular intervention did impact immediate attitudes and intentions, it did not impact behavior directly; rather it acted on the mediating factors of condom use. Second, this intervention was very brief, but still impacted condom attitudes and intentions, and ultimately impacted the process through which these individual factors influence actual safe sex behavior. These findings suggest that even a brief intervention can successfully influence risky sexual behavior. Additionally, results suggest that face-to-face sexual risk interventions can be effectively adapted to web-based formats. Using a web-based format for a brief intervention can reduce the resources required for behavioral change and also has the potential for broader dissemination of the intervention. As this intervention is low cost and relatively low burden for both the participants and researchers, it would be easily integrated into existing health programing within universities and colleges. Ultimately, web-based interventions provide an opportunity to implement broad-reaching sexual-risk-reduction interventions at a minimal cost.
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References


http://www.cdc.gov/diabetes/pubs/estimates11.htm#5


immunodeficiency virus and sexually transmitted diseases: a randomized controlled trial.

*Jama, 280*(13), 1161-1167.


*Psychology of Addictive Behaviors, 19*, 112.


*Psychological methods, 7*, 83.


interviewing are equally successful in improving multiple lifestyle behaviors in a randomized controlled trial. *Annals of Behavioral Medicine, 41*, 104-118.


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## Baseline Behaviors

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<td>0.08</td>
<td>0.25</td>
<td>0.55</td>
<td>0.58</td>
</tr>
<tr>
<td># of Anal Sex Acts in past 90 Days</td>
<td>0.18</td>
<td>0.76</td>
<td>0-7</td>
<td>5.81</td>
<td>0.22</td>
<td>0.84</td>
<td>0.14</td>
<td>0.68</td>
<td>0.99</td>
<td>0.32</td>
</tr>
<tr>
<td>Percentage of times using a condom during Anal Sex</td>
<td>0.36</td>
<td>0.48</td>
<td>0-1</td>
<td>0.63</td>
<td>0.34</td>
<td>0.47</td>
<td>0.38</td>
<td>0.50</td>
<td>-0.21</td>
<td>0.83</td>
</tr>
<tr>
<td># of Time Drinking in past 90 Days</td>
<td>13.39</td>
<td>10.92</td>
<td>0-63</td>
<td>1.32</td>
<td>13.63</td>
<td>10.70</td>
<td>13.16</td>
<td>11.15</td>
<td>0.44</td>
<td>0.66</td>
</tr>
<tr>
<td>Percentage of times binge drinking</td>
<td>0.52</td>
<td>0.36</td>
<td>0-1</td>
<td>-0.12</td>
<td>0.53</td>
<td>0.35</td>
<td>0.51</td>
<td>0.37</td>
<td>0.49</td>
<td>0.62</td>
</tr>
</tbody>
</table>

## Baseline Intentions and Readiness to Change

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>Range</th>
<th>Skew</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intentions to use a condom</td>
<td>9.09</td>
<td>2.80</td>
<td>1-11</td>
<td>-1.51</td>
<td>9.17</td>
<td>2.73</td>
<td>9.01</td>
<td>2.87</td>
<td>0.57</td>
<td>0.57</td>
</tr>
<tr>
<td>intentions to refrain from drinking 4 or more drinks</td>
<td>5.63</td>
<td>3.35</td>
<td>1-11</td>
<td>0.30</td>
<td>5.55</td>
<td>3.21</td>
<td>5.69</td>
<td>3.50</td>
<td>-0.43</td>
<td>0.45</td>
</tr>
<tr>
<td>Readiness to change Condom</td>
<td>4.14</td>
<td>3.17</td>
<td>1-11</td>
<td>0.61</td>
<td>4.19</td>
<td>3.24</td>
<td>4.05</td>
<td>3.07</td>
<td>0.46</td>
<td>0.65</td>
</tr>
<tr>
<td>Readiness to change Alcohol</td>
<td>3.81</td>
<td>2.75</td>
<td>1-11</td>
<td>0.65</td>
<td>3.92</td>
<td>2.73</td>
<td>3.71</td>
<td>2.78</td>
<td>0.78</td>
<td>0.44</td>
</tr>
</tbody>
</table>

*Group differences analyzed using independent t-tests and Chi squared test*
Table 2 Group differences immediately post intervention and at three month follow up

<table>
<thead>
<tr>
<th>Follow Up Condom Attitudes and Intentions</th>
<th>Alcohol</th>
<th>Condom</th>
<th>t</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness</td>
<td>19.91 ± 3.39</td>
<td>20.30 ± 2.73</td>
<td>-4.27</td>
<td>&lt;.000</td>
</tr>
<tr>
<td>Pleasure</td>
<td>14.99 ± 3.96</td>
<td>15.69 ± 3.49</td>
<td>-2.91</td>
<td>0.00</td>
</tr>
<tr>
<td>Stigma</td>
<td>22.36 ± 2.56</td>
<td>22.60 ± 2.22</td>
<td>-6.94</td>
<td>0.49</td>
</tr>
<tr>
<td>Use</td>
<td>21.38 ± 3.08</td>
<td>21.37 ± 3.10</td>
<td>-0.48</td>
<td>0.63</td>
</tr>
<tr>
<td>Purchase</td>
<td>16.24 ± 5.22</td>
<td>16.44 ± 5.12</td>
<td>-2.00</td>
<td>0.05</td>
</tr>
<tr>
<td>Intentions to use a condom</td>
<td>9.14 ± 2.71</td>
<td>9.48 ± 2.43</td>
<td>-3.03</td>
<td>0.00</td>
</tr>
<tr>
<td>Intentions to refrain from drinking 4 or more drinks</td>
<td>6.03 ± 2.97</td>
<td>5.57 ± 3.27</td>
<td>2.20</td>
<td>0.03</td>
</tr>
<tr>
<td>3 Month Condom Attitudes and Intentions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effectiveness</td>
<td>20.36 ± 3.48</td>
<td>20.68 ± 2.78</td>
<td>-1.59</td>
<td>0.11</td>
</tr>
<tr>
<td>Pleasure</td>
<td>14.97 ± 3.88</td>
<td>14.95 ± 4.03</td>
<td>1.65</td>
<td>0.10</td>
</tr>
<tr>
<td>Stigma</td>
<td>21.98 ± 2.76</td>
<td>22.06 ± 2.49</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Use</td>
<td>21.29 ± 3.25</td>
<td>21.13 ± 3.34</td>
<td>-0.67</td>
<td>0.50</td>
</tr>
<tr>
<td>Purchase</td>
<td>17.17 ± 5.13</td>
<td>16.97 ± 5.17</td>
<td>0.49</td>
<td>0.63</td>
</tr>
<tr>
<td>Intentions to use a condom</td>
<td>8.18 ± 3.19</td>
<td>8.51 ± 3.27</td>
<td>1.16</td>
<td>0.25</td>
</tr>
<tr>
<td>Intentions to refrain from drinking 4 or more drinks</td>
<td>5.22 ± 3.22</td>
<td>5.01 ± 2.87</td>
<td>-0.31</td>
<td>0.76</td>
</tr>
</tbody>
</table>

All ANCOVA models included participants’ baseline intentions to use condoms, intentions to reduce binge drinking, condom attitudes, age, number of partners, the percentage of times they used a condom in the past three months for vaginal sex, the percentage of times they binge drank, and their readiness to change their condom use and drinking behaviors.
Table 3 Multiple Regression Predicting Percentage of Condom Use at Three Months from Multidimensional Condom Attitudes Scale Factors

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.122</td>
<td>0.362</td>
<td>0.736</td>
<td></td>
</tr>
<tr>
<td>Effectiveness BL</td>
<td>0.003</td>
<td>0.001</td>
<td>0.022</td>
<td>0.764</td>
</tr>
<tr>
<td>Purchase BL</td>
<td>-0.004</td>
<td>0.006</td>
<td>-0.043</td>
<td>0.552</td>
</tr>
<tr>
<td>Stigma BL</td>
<td>-0.006</td>
<td>0.016</td>
<td>-0.03</td>
<td>0.720</td>
</tr>
<tr>
<td>Use BL</td>
<td>-0.002</td>
<td>0.012</td>
<td>-0.015</td>
<td>0.853</td>
</tr>
<tr>
<td>Pleasure BL</td>
<td>0.041</td>
<td>0.009</td>
<td>0.356</td>
<td>&lt;.000</td>
</tr>
</tbody>
</table>

R2 | 0.117
Table 4 Mediational analyses of the indirect effect of condom use intentions on the relationship between condom attitudes and actual condom use

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SE</th>
<th>t</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage condom use at follow up regressed on baseline pleasure factor</td>
<td>0.0414</td>
<td>0.0077</td>
<td>5.3444</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Condom use at follow up regressed on post intervention condom intentions</td>
<td>0.2925</td>
<td>0.0481</td>
<td>6.0833</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Post intervention condom intentions regressed on baseline pleasure factor, controlling for percentage condom use at follow up</td>
<td>0.055</td>
<td>0.0113</td>
<td>4.8714</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Percentage condom use at follow up regressed on baseline pleasure factor, controlling for post intervention condom intentions</td>
<td>0.0253</td>
<td>0.008</td>
<td>3.1594</td>
<td>0.0019</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value</th>
<th>SE</th>
<th>LL 95% CI</th>
<th>UL 95% CI</th>
<th>z</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sobel</td>
<td>0.0161</td>
<td>0.0043</td>
<td>0.0077</td>
<td>0.0244</td>
<td>3.7715</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effect</th>
<th>SE</th>
<th>LL 99% CI</th>
<th>UL 99% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.0158</td>
<td>0.0038</td>
<td>0.0066</td>
</tr>
</tbody>
</table>

Note: N = 183. Unstandardized regression coefficients are reported. Bootstrap sample size=5,000. LL = lower limit; CI= confidence interval; UL=upper limit
Table 5 Moderated mediation analyses of the conditional indirect effect of intentions on the relationship between condom attitudes and actual condom use

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>SE</th>
<th>t</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Condom Intentions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>4.691</td>
<td>0.7527</td>
<td>6.2319</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Pleasure Factor at Baseline</td>
<td>0.2925</td>
<td>0.0481</td>
<td>6.0833</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td><strong>Percentage condom use at follow up</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.2396</td>
<td>0.2982</td>
<td>0.8037</td>
<td>0.4227</td>
</tr>
<tr>
<td>Pleasure Factor at Baseline</td>
<td>0.0275</td>
<td>0.008</td>
<td>3.4177</td>
<td>0.0008</td>
</tr>
<tr>
<td>Condom Intentions post intervention (INT)</td>
<td>-0.0053</td>
<td>0.0323</td>
<td>0.1654</td>
<td>0.8688</td>
</tr>
<tr>
<td>Intervention (Group)</td>
<td>-0.4189</td>
<td>0.2014</td>
<td>-2.0795</td>
<td>0.039</td>
</tr>
<tr>
<td>INT X Group</td>
<td>0.042</td>
<td>0.021</td>
<td>2.0058</td>
<td>0.0464</td>
</tr>
<tr>
<td><strong>Intervention</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Conditional indirect effect at Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol Group</td>
<td>0.0107</td>
<td>0.0047</td>
<td>2.2972</td>
<td>0.0216</td>
</tr>
<tr>
<td>Condom Group</td>
<td>0.023</td>
<td>0.0061</td>
<td>3.7685</td>
<td>0.0002</td>
</tr>
</tbody>
</table>

Note: N = 183. Unstandardized regression coefficients are reported. Bootstrap sample size=5,000.
**Figure 1: Study Flow Chart**

Enrolled in Baseline  
N=488

- Removed From Analyses  
  N=66
  - Identified as having primarily female sex partners n=23
  - Incorrectly answered infrequency items n=40
  - >25% missing data n=3

Final Baseline  
N=422

- Condom Group
  - Baseline  
    N=215
    - Declined FU  
      N=60
    - Consented to FU  
      N=155 (72%)
      - Lost to Follow  
        N=54
      - Completed FU  
        N=101 (47%)

- Alcohol Group
  - Baseline  
    N=207
    - Declined FU  
      N=58
    - Consented to FU  
      N=149 (72%)
      - Lost to Follow  
        N=34
      - Completed FU  
        N=115 (56%)