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Repository Citation

Starling, Randall; Helme, Don; Nodulman, Jessica A.; Bryan, Angela D.; Buller, David B.; Donohew, Robert Lewis; and Woodall, W. Gill, "Testing a Risky Sex Behavior Intervention Pilot Website for Adolescents" (2014). *Communication Faculty Publications*. 9.

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Notes/Citation Information

Published in *Californian Journal of Health Promotion*, v. 12, issue 3, p. 24-34.

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Testing a Risky Sex Behavior Intervention Pilot Website for Adolescents

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Abstract

Background and Purpose: Each year, teenagers account for about one-fifth of all unintended pregnancies in the United States. As such, delivering sexual risk reduction educational materials to teens in a timely fashion is of critical importance. Web-based delivery of these materials shows promise for reaching and persuading teens away from risky sexual and substance abuse behaviors. The purpose of this study was to pilot test a web-based program aimed at reducing risky sexual behavior and related outcomes among adolescents in a high school setting. **Methods:** A beta-test of the website was conducted in three public schools in New Mexico, USA with 173 students in 9th and 10th grades recruited from existing health education classes. Participants spent approximately three hours over a period of two days completing the online program in school computer labs. **Results:** Pretest to posttest results indicated that self-efficacy for condom use and condom use intentions, two theoretical mediators of changes in condom use behavior, were significantly changed. Adolescents also reported high satisfaction with the website content. **Conclusion:** *BReady4it* provided an innovative sex and substance abuse education to teenagers that revealed promising positive changes in cognitive constructs that are inversely related to risky sexual behavior among users.

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Keywords: Adolescents, STD, risky sex, website, intervention

Introduction

Data from the Guttmacher Institute (2014) reveals the average age of sexual debut among young people is 17 years old and that approximately half of U.S. high school students have ever had sexual intercourse. According to the Centers for Disease Control and Prevention (CDC), data from the 2011 Youth Risk Behavioral Survey (YRBS) indicate that for many U.S. high school students, the nature of their sexual behavior puts them at risk for sexually transmitted infections (STI) and unplanned pregnancy. For example, 34% of high school students had had sexual intercourse within the three months prior to the survey, and 15% have had sexual intercourse with four or more persons during their life (Eaton et al.,

2013). In addition, contraceptive use appears to be inconsistent, with 40% of sexually active teens reporting they did not use a condom the last time they had sex and 77% stating they did not use birth control pills or Depo-Provera to prevent pregnancy the last time they had sex (Eaton et al., 2013). Additionally, over 22% of sexually active U.S. high school students reported using alcohol or drugs before their last sexual intercourse (Eaton et al., 2013).

The U.S. teenage pregnancy rate continues to be one of the highest in the developed world (McKay & Barrett, 2010) with approximately 82% of teenage births being unplanned; teenagers represent about 20% of all unintended pregnancies annually (Abma, Martinez, & Copen, 2010; Martinez, Copen, & Abma, 2011).

Although only about 25% of the sexually active population is represented by 15-24 year olds, this age group accounts for about half of the 20 million new cases of STIs each year (CDC, 2012). Human papillomavirus (HPV) infections account for about half of newly diagnosed STDs among 15–24-year olds annually (Satterwhite et al., 2013) and about 21% of all new HIV diagnoses in the United States in 2011 were among those aged 13-24 (CDC, 2013). Clearly, additional efforts need to be made to help young people adopt the behaviors that reduce their risk for HIV, other STDs, and unintended pregnancy.

As schools prepare students academically, they may also be a partner in reducing risky sexual behavior and related outcomes among adolescents. Research shows that well-designed and implemented pregnancy/STI/HIV prevention programs for adolescents can reduce risky sexual behavior among teenagers (Tortolero et al., 2010; Coyle, Kirby, Marín, Gómez, & Gregorich, 2004; Sikkema et al., 2005; Jemmott, Jemmott, & Fong, 2010; Villaruel, Jemmott, & Jemmott, 2006; Koniak-Griffin et al., 2003; Shrier et al., 2001; Coyle et al., 2006; Jemmott, Jemmott, Braverman, & Fong, 2005; DiClemente et al., 2009; DiClemente et al., 2004). Unfortunately, sexual risk reduction programming for high school students is not delivered evenly. The School Health Policies and Program Study (Kann, Telljohann, & Wooley, 2007) found that only 28% of U.S. high schools taught 11 key pregnancy, HIV, or other STI prevention topics in a required health education course. Further, while 87% of high schools taught abstinence as the most effective method to avoid pregnancy, HIV, and other STIs in a required health education course, only 58% taught methods of contraception and 38% taught how to correctly use a condom in a required health education course (Kann et al., 2007). This is partially due to the non-existence of federal law requiring sex education in public schools, much less what content should be taught. As such, these decisions are left up to states and individual school districts (Masland, 2013). Additionally, despite the association of substance use and risky sexual behavior among adolescents, and calls for sexual risk reduction interventions to

include substance use content (Norris et al., 2009), only a small number of STI/pregnancy interventions have targeted both behaviors (Griffin, Botvin, & Nichols, 2006; Lazebnik, Grey, & Ferguson, 2001; Bryan, Schmiede, & Broadus, 2009).

Outside of classroom based instruction, the Internet provides another medium by which to deliver STI/pregnancy prevention intervention programming (Buhi et al., 2010). American youth report high Internet access with 93% of teens ages 12- 17 going online; however, only 31% of 12-17 year olds in the United States use the Internet to look for health information (Lenhart, Purcell, Smith, & Zickuhr, 2010; Zhao, 2009). Further, only 17% of adolescents use the Internet to search for sensitive health information, including drug use and sexual health (Lenhart et al., 2010). Despite efforts to provide teens with accurate Internet-based health information, especially as it relates to sex education, many adolescents appear wary of health information on websites (Jones & Biddlecom et al., 2011) and many existing sites contain informational inaccuracies (Buhi et al., 2010). In an effort to provide health education to adolescents through the Internet, these Web sites should include accurate, age appropriate information (Jones et al., 2011).

The Current Study

Multi-media methods can be more effective in altering a number of crucial adolescent health risk behaviors, such as smoking prevention, STI prevention, pregnancy prevention, and substance use prevention (Helme et al., 2011; Noar, Harrington, & Helme, 2010; Donohew, Palmgreen, Lorch, Zimmerman, & Harrington, 2002; Rushing & Stephens, 2011; Roberto, Zimmerman, Carlyle, & Abner, 2007; Palmgreen, Donohew, Lorch, Hoyle, & Stephenson, et al., 2001) when compared to traditional classroom methods. Our team developed a web-based program that addresses prevention and intervention of both substance use and risky sexual behavior among early high school students. The project website, titled *BReady4it*, was subsequently beta tested through public schools in New Mexico, U.S.A, allowing us to gather preliminary data on the potential

effectiveness of the web-based program in altering mediators of changes regarding prevention of substance abuse and risky sexual behavior. The objective of this article is to present findings from the beta test of the *BReady4it* website program. The findings presented reflect only attitudinal changes and not actual changes in behavior.

For an intervention to be effective, it should be designed systematically for the intended target group, using members of that population to provide insight and review of program content in a series of developmental cycles (Baek, Cagiltay, Boling, & Frick, et al., 2008). *BReady4it* was developed through iterative focus groups with adolescents, parents, and school personnel to evaluate curriculum content, multimedia programming, and website look and feel. The result was a multi-media interactive website for the prevention of co-occurring adolescent sexual and substance use risk behavior, designed for 14-16 year old adolescents, and hosted by four ethnically diverse teenage video hosts.

Methods

Description of the Intervention

Between 2009 and 2011 the *BReady4it* website program was iteratively developed via focus groups with students, parents, and high school teachers and administrators. Further, school computer compatibility and Internet access were also assessed. Usability testing of the website was conducted prior to beta-testing the website. These procedures have been used in previous website based prevention and intervention efforts and are described elsewhere (Nodulman et al., 2013; Starling et al., 2014; Buller et al., 2008; Woodall et al., 2007).

BReady4it, designed to be compliant with the latest recommendations for sex education for youth (Advocates for Youth, 2012), was developed specifically for adolescents in the early high school years. Video hosts for the website were selected based on appearing similar in age to the target group and to reflect the multi-ethnic character of the target

population (primarily Hispanic and Anglo). The website program consisted of five units, each derived from our prior work in sexual and substance abuse prevention curricula and was guided by the Theory of Planned Behavior, which states that attitudes toward behavior, subjective norms, and perceived behavioral control shape one's behavioral intentions and behaviors (Ajzen & Madden, 1986; Bryan, Aiken, & West, et al., 1996; Bryan, Rocheleau, Robbins, & Hutchinson, et al., 2005; Bryan, Ray, & Copper, et al., 2007; Bryan, Schmiede, & Broaddus, et al., 2007; Bryan et al., 2009; Donohew et al., 1999; Donohew, Bardo, & Zimmerman, et al. 2004; Donohew, 2009; Helme, et al., 2011). Each unit contained simulations and activities designed to provide relevant intervention information. Participants were provided a brief online sexual encounter assessment to determine their sexual activity status; this information was then used to tailor aspects of the website experience. A functional SQL database was used to manage participant profiles and provide progress as participants navigated through the website program. The five units consisted of 1) introduction and initial assessment, 2) media literacy, 3) relationship formation and maintenance, 4) safe behavioral choices/influences, and 5) decision making. Throughout the website, participants had the opportunity to ask questions anonymously of our project health professionals.

Participants

The *BReady4it* website was implemented in three public high schools in New Mexico. A convenience sample ($n=173$, 57% female, 43% male) of students in grades 9 and 10 (mean age =15.4, $SD = .97$) accessed *BReady4it* in school computer labs. Participants were racially/ethnically diverse (55% Hispanic/Latino, 19% Caucasian, 5% African American, 4% Native American, 3% Asian, 14% other or mixed race) and diverse in terms of SES (51.1% paid full price, 11.4% paid reduced price, and 37.5% received free school lunch).

Measures

Measures of each of the components of the Theory of Planned Behavior articulated to condom use (Schmiede, Broaddus, Levin, &

Bryan et al., 2009) were included in both the pretest and posttest assessments (see Table 1 for

Table 1

Measured Constructs, Number of Items (*k*), Sample Items, and Coefficient Alpha Reliability in the Current Sample

| Measure | <i>k</i> | Sample item | α |
|------------------------------|----------|--|----------|
| Attitudes about condom use | 7 | For me, using condoms every time I have sex would be [bad.....good]. | .94 |
| Self-efficacy for condom use | 8 | I am confident in my ability to use a condom correctly. | .81 |
| Norms about condom use | 4 | Most people my age are using condoms these days. | .77 |
| Intentions for condom use | 10 | How likely is it that you will use a condom every time you have sexual intercourse in the next three months? | .86 |
| Website usability | 10 | I thought the website was easy to use. | .76 |
| Website satisfaction | 10 | The website helped me feel that I could change my condom use, if I want to. | .94 |
| Website perceived impact | 13 | I am sure that this website will have a strong impact on young people my age. | .89 |

number of items, sample items, and reliability of each measure in this sample). Measures to evaluate the usability/likability of the intervention were included only in the posttest.

Participants completed demographic and behavioral (i.e., sexual activity and drug activity) assessments as part of the pretest and before beginning website activities. All measures were administered online via Inquisite, a web-based survey software package.

Procedures

A convenience sample of students, who provided signed parental/guardian consent and assent prior to pilot test activities, participated in a pretest-immediate posttest of the *BReady4it* website. Participants were recruited through health education classrooms in participating high schools. A project staff member briefly presented the project in the classrooms and distributed project information letters with

contact information, parental consent and child assent forms, and blank envelopes. Students were asked to take the information home and return the consent/assent forms in the sealed blank envelope to their teacher within a week. Students were not provided extra credit for participation. Sealed blank envelopes protected student confidentiality from classroom teachers. The envelopes were picked up a week later by a project staff member. Only students who returned a signed/dated parental consent and assent forms were asked to participate in beta testing in the school computer lab.

Participants engaged in beta testing in school computer labs generally after traditional school hours. As participants were gathered in a single computer lab, each was provided a pair of headphones for privacy. Further, students were placed so that there would be an empty seat between them so that questionnaire answers and beta testing activities could not be seen by other participants. Website utilization was monitored with customized registration and tracking programs on the web server. Students spent approximately three hours over a period of two days completing the assessments and beta testing the website. The participants completed an immediate posttest assessment after their final interaction with the website. All study materials were approved by the University of New Mexico Institutional Review Board (IRB) and Albuquerque Public Schools' Research, Deployment, and Accountability (RDA) office prior to initiating study procedures.

Analyses

Although a strong test of the effectiveness of the website intervention would include an analysis of actual behavior change, the limits of this pilot test only allowed for an immediate posttest assessment. Thus, the analysis plan for this pilot project was designed to measure the effects of the intervention on mediators of changes in condom use behavior, condom attitudes, condom self-efficacy, condom norms, and condom intentions. The pretest data were first examined by exploring baseline associations between demographic characteristics (age, gender, race, and sexual activity status) and the TPB constructs. Significant correlates were then

included in subsequent models as covariates. Website intervention effects were examined utilizing a mixed model analysis of covariance wherein the within-subjects factor was time (pretest-posttest) and the between-subjects factors are the covariates. All statistical analyses were conducted with SAS v. 9.3.

Results

Risk Behavior

One hundred seventy-three ($n=173$, 57% female, 43% male) students (mean age =15.4) participated in the study. Approximately 55% of participants identified themselves as Hispanic or Latino, followed by 19% identifying themselves as Caucasian and 14% as other or mixed race. Over 51% of participants reported they paid full price for school lunches and almost 38% stated they received free school lunch. The majority of our participants (89.7%) identified as “sexually attracted to the opposite sex”, 1% identified as “sexually attracted to people of my same sex”, and 9.3% identified as “sexually attracted to people of both sexes,” supporting the use of the term “partner” in place of “boyfriend/girlfriend” throughout *BReady4it* and tailoring of content to sexual orientation (e.g., letting participants select the gender of their “date” in the “Tonight’s the Night” activity). A third (33.4%) of participants had already had intercourse, with median age at first intercourse of 14. Among sexually-active teens, 54% said they had had only one sex partner (22% said two partners and the remaining 24% reported more than two sexual partners); less than half (47%) said that they had “always” used condoms during intercourse; 31% had used marijuana at least once right before sex; and 42% had used alcohol at least once right before sex.

Approximately 55% of participants stated that they had consumed a full drink of alcohol in their lifetime, with 62% of these reporting they had consumed an alcoholic drink in the previous 3 months. Of those who reported drinking within the previous 3 months, 21% reported drinking on average four or more drinks per drinking occasion, 21% said they “sometimes” get drunk, and 7.4% said they “almost always” or “always” get drunk when they drink. Further, 47% of the

sample reported they had tried marijuana during their lifetime and 45% of these participants had smoked marijuana at least once in the last 3 months.

Association of Demographics with TPB Constructs

For these analyses we examined age, gender, race/ethnicity, and sexual activity status. Age was not associated with any of the TPB constructs. Boys had higher self-efficacy for condom use and higher intentions to use condoms in the future than did girls (both $p's < .01$) but there were no gender differences in condom attitudes or norms. Because of low numbers of some racial/ethnic groups, this variable was re-categorized into three groups as Hispanic, White, or other. Using these groupings, the only variable for which there were any racial/ethnic differences was condom norms, where Hispanic participants had significantly more positive norms than the “other” group ($p < .05$) and marginally more positive norms than the white group ($p = .07$). Finally, sexually experienced participants had more negative condom attitudes and less positive norms supporting condom use, but interestingly had higher condom use intentions than their non-sexually experienced peers.

Effects of the Website Intervention on TPB Constructs

Mixed model ANCOVAs were utilized for these analyses and gender, race, and sexual activity status were included as covariates in each model. The key effect of interest in these models is the main effect of time; i.e., whether levels of the TPB constructs changed after the intervention. As can be seen in Table 2, *BReady4it* appears to have influenced two potential mediators of behavior change (Servo, 2008; Armitage & Christian, 2003). Specifically, self-efficacy for condom use increased significantly from pretest to posttest, and condom use intentions increased significantly from pretest to posttest.

Post-test Satisfaction with the Website

Participants completed an immediate usability and satisfaction assessment after their final

interaction with *BReady4it*. These assessments consisted of a 1-5 strongly disagree – strongly

intentions are consistently viewed as two of the strongest correlates of condom use behavior change as a result of an intervention (Albarracin

Table 2

Pretest – Posttest Differences on Theoretical Mediators of Condom Use Behavior Change

| Mediators | Pretest Mean (SD) | Posttest Mean (SD) | <i>F</i> | <i>p</i> |
|----------------------|----------------------|-----------------------|------------------------|----------|
| Condom Attitudes | 4.59 (.85) | 4.63 (.81) | <i>F</i> (1,101)=.00 | .96 |
| Condom Self-Efficacy | 2.94 (.59) | 3.25 (.54) | <i>F</i> (1,123)=28.55 | <.001 |
| Condom Use Norms | 3.15 (.63) | 3.19 (.69) | <i>F</i> (1,121)=.60 | .44 |
| Condom Intentions | 2.16 (.70) | 2.35 (.83) | <i>F</i> (1,117)=9.11 | <.01 |

Note: *F*-values are the main effects of time from a repeated measures analysis of covariance including gender, race, and sexual activity status (ever had sex versus never had sex) as covariates in the model

agree scale. The website was perceived very positively by participants as revealed by their responses on the usability scale ($M=3.74$, $SD=.59$). Responses on the satisfaction scale, $M=4.11$ ($SD=.72$), indicated that students liked the content and thought it was appropriate. Finally, the students agreed that the website would influence their peers ($M=3.75$, $SD=.78$) in reducing risky sexual behavior.

Discussion

The beta test of the *BReady4it* website program revealed several findings. First, results suggest that these adolescents are using alcohol and marijuana at high rates and one-third are sexually active. Among participants who were sexually active, their rates of using alcohol (42%) or marijuana (31%) at least once before sex are higher than the national rate of 22% of 9th grade and 22.3% of 10th grade high school students who reported drinking alcohol or using drugs before last sexual intercourse (Kann et al., 2014). Second, the *BReady4it* website intervention had expected impact on important theoretical measures, lending support to the idea that the website could achieve desired behavioral impact as well in a well-controlled efficacy trial. As demonstrated in the results, self-efficacy and intentions, both potential mediators of behavior change, were significantly changed. Similar results were reported from another study on reducing alcohol-related risky sex (Schmiege et al., 2009) and self-efficacy and

et al., 2005). The design process of the intervention may have been instrumental, as other similar interventions not using age or content appropriate information have not demonstrated the same results (Jones et al., 2011; Bull, Pratte, Whitesell, Rietmeijer, & McFarlane et al., 2009). Third, as a result of adopting methods for making an intervention effective (Baek et al., 2008), *BReady4it* was systematically designed for the intended age group. The website received strongly positive reviews by its adolescent users, and as a result, the efforts taken to carefully and iteratively design *BReady4it* are justified. Failure to specifically tailor an intervention website to the intended participants may negatively impact an intervention (Bull et al., 2009).

Limitations

Despite the promising nature of these results, there are important limitations of the study to acknowledge. The design has well known internal validity weaknesses due to the non-experimental pretest-posttest design (e.g., demand characteristics) and the lack of a follow-up behavioral assessment. The overall sample size is small, and there were relatively few adolescents who were already sexually active. In addition, a limited number of schools (which constitute an important clustering factor in this area of research) participated. These factors clearly temper any firm conclusions from these data. However, the results do suggest potential efficacy.

Conclusion

These findings from the beta test of the *BReady4it* website intervention for early high school adolescents demonstrated that many of them are sexually active, they are using alcohol and marijuana at high rates, are using alcohol and marijuana concurrent with sexual activity, and are thus a good target for an intervention to decrease substance use and related risky sexual behavior. Based upon the promising results from the project beta test a logical step in further research would be conducting a large randomized school-based efficacy trial of the *BReady4it* website. These initial promising

results from a website designed to be culturally inclusive and pilot tested with a predominantly minority population are highly relevant to the potential of this technology to decrease health disparities in substance use and sexual risk.

Acknowledgements

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Drug Abuse or the National Institutes of Health. This research was funded by the U.S. National Institutes of Health (R01 DA018575-02).

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