



University of Pennsylvania
ScholarlyCommons

Publicly Accessible Penn Dissertations

2017

Persuasive Technologies In Hiv Prevention: A Structural Intervention For African American Young Adults

Deepti Chittamuru

University of Pennsylvania, deepti.chittamuru@asc.upenn.edu

Follow this and additional works at: <https://repository.upenn.edu/edissertations>

 Part of the [Communication Commons](#)

Recommended Citation

Chittamuru, Deepti, "Persuasive Technologies In Hiv Prevention: A Structural Intervention For African American Young Adults" (2017). *Publicly Accessible Penn Dissertations*. 2223.
<https://repository.upenn.edu/edissertations/2223>

This paper is posted at ScholarlyCommons. <https://repository.upenn.edu/edissertations/2223>
For more information, please contact repository@pobox.upenn.edu.

Persuasive Technologies In Hiv Prevention: A Structural Intervention For African American Young Adults

Abstract

Background: One of the biggest racial health disparities in the US concerns HIV/AIDS. African Americans have considerably higher rates of HIV/AIDS than do Whites, Hispanics, Asians, and Native Americans. The predominant approach to prevention has been to mount individual- or small-group multisession behavioral interventions. The reach of such interventions is very limited and thus, the field of HIV prevention has called for structural interventions that reach many people in their natural environments. This dissertation evaluates a serial drama, "Reality Check," which is a structural HIV prevention intervention for, 18-24 year old African Americans.

Theory: Bandura's Social Cognitive Theory was used in the development of the intervention. Fishbein and Ajzen's Reasoned Action approach, was used to inform the survey instrument and statistical analysis models.

Intervention: "Reality Check" is a 13-episode serial drama. Each day a new 6-9 minute, episode was streamed online while all previous episodes were available on the study's website. In addition to streaming the episodes, emails giving the locations of local venues where free HIV testing is available were sent, so that the barrier of not knowing will not interfere with viewers' ability to be tested should they decide to get tested.

Method: A randomized controlled trial with baseline and multiple post- intervention assessments was used to evaluate the efficacy of the intervention. A total of 203 African Americans (162 women and 41 men) aged between 18 and 24 years located anywhere in the United States participated in the study. Confidential online longitudinal surveys were conducted at baseline, immediately after the intervention, and three months after the end of the intervention. The primary outcomes were condomless sex and HIV testing.

Results: The intervention reduced the number of times participants reported having condomless sex but did not affect HIV testing. It also reduced homophobia and HIV/AIDS stigma as well as the number of times participants reported having vaginal sexual intercourse. Attrition was remarkably low with 93% and 87% of the participants completing the immediate-post intervention and 3-month follow-up assessments respectively.

Degree Type

Dissertation

Degree Name

Doctor of Philosophy (PhD)

Graduate Group

Communication

First Advisor

John B. Jemmott III

Keywords

African American Youth, Health Communication, HIV/AIDS Prevention, Online Video Based Intervention, Persuasive Technologies, Randomized Controlled Trial

Subject Categories

Communication

PERSUASIVE TECHNOLOGIES IN HIV PREVENTION: A STRUCTURAL
INTERVENTION FOR AFRICAN AMERICAN YOUNG ADULTS

Deepti Chittamuru

A DISSERTATION

in

Communication

Presented to the Faculties of the University of Pennsylvania

in

Partial Fulfillment of the Requirements for the

Degree of Doctor of Philosophy

2017

Supervisor of Dissertation

John B. Jemmott III
Kenneth B. Clark Professor of Communication and Psychiatry
Director, Center for Health Behavior and Communication Research

Graduate Group Chairperson

Joseph Turow

Associate Dean for Graduate Studies
Robert Lewis Shayon Professor of Communication

Dissertation Committee

Michael X. Delli Carpini

Walter H. Annenberg Dean, Annenberg School for Communication
Professor of Communication

John L. Jackson Jr.

Dean, School of Social Policy and Practice
Richard Perry University Professor, Penn Integrates Knowledge Professor

Amy Jordan

Associate Dean for Undergraduate Studies, Adjunct Full Professor

PERSUASIVE TECHNOLOGIES IN HIV PREVENTION: A STRUCTURAL
INTERVENTION FOR AFRICAN AMERICAN YOUNG ADULTS

COPYRIGHT

2017

Deepti Chittamuru

This work is licensed under the
Creative Commons Attribution-
NonCommercial-ShareAlike 3.0
License

To view a copy of this license, visit

<https://creativecommons.org/licenses/by-nc-sa/3.0/us/>

Dedication

I dedicate this dissertation to Amma and Bhagavan, my parents Chittamuru Manohar Reddy and Chittamuru Uma Reddy as well as to my best friend Ravi Yechuri and sister Divya Chittamuru.

Acknowledgment

I am deeply grateful to my advisor Dr. John B. Jemmott III for his guidance and support throughout my PhD. Thank you for helping me find my own voice as a researcher and scholar and encouraging me to push the boundaries of what was possible. Many thanks to my committee Dr. Amy Jordan, Dean Michael X. Delli Carpini and Dean John L. Jackson Jr. for their tremendous generosity with their time, support and wisdom. Thank you to Dean Delli Carpini for enabling me to forge a path through the PhD program that didn't necessarily always hew to the line. Thank you to Dr. Jordan for teaching me how to be a teacher and for helping me find confidence and faith in myself during times of doubt and uncertainty. Thank you to Dean Jackson for all your guidance and for making time in your demanding schedule to offer support and advice to me.

I am grateful to Joanne Murray and other administrative staff members at ASC for helping me navigate the many rules and milestones entailed in being a PhD student. I am especially grateful to Vladimir Gordynskiy for building the online platform for my study as well as to John Dallas Garber for assisting Vlad with this project.

I'm grateful to the friends I made at Penn, Sandra Ristovska and Esha Khurana for all the wonderful times we shared. I am deeply grateful for the extraordinary degree of moral and emotional support offered by my parents, sister and my best friend, Ravi Yechuri without whom I could simply not have accomplished this. Finally, I am tremendously grateful to Amma and Bhagavan for making me into the person I am and for their blessings throughout my life which led to this PhD.

ABSTRACT

PERSUASIVE TECHNOLOGIES IN HIV PREVENTION: A STRUCTURAL INTERVENTION FOR AFRICAN AMERICAN YOUNG ADULTS

Deepti Chittamuru

John B. Jemmott III

Background: One of the biggest racial health disparities in the US concerns HIV/AIDS. African Americans have considerably higher rates of HIV/AIDS than do Whites, Hispanics, Asians, and Native Americans. The predominant approach to prevention has been to mount individual- or small-group multisession behavioral interventions. The reach of such interventions is very limited and thus, the field of HIV prevention has called for structural interventions that reach many people in their natural environments. This dissertation evaluates a serial drama, “*Reality Check*,” which is a structural HIV prevention intervention for, 18-24 year old African Americans.

Theory: Bandura’s Social Cognitive Theory was used in the development of the intervention. Fishbein and Ajzen’s Reasoned Action approach, was used to inform the survey instrument and statistical analysis models.

Intervention: “*Reality Check*” is a 13-episode serial drama. Each day a new 6-9 minute, episode was streamed online while all previous episodes were available on the study’s website. In addition to streaming the episodes, emails giving the locations of local venues where free HIV testing is available were sent, so that the barrier of not knowing will not interfere with viewers’ ability to be tested should they decide to get tested.

Method: A randomized controlled trial with baseline and multiple post-intervention assessments was used to evaluate the efficacy of the intervention. A total of 203 African Americans (162 women and 41 men) aged between 18 and 24 years located anywhere in the United States participated in the study. Confidential online longitudinal surveys were conducted at baseline, immediately after the intervention, and three months after the end of the intervention. The primary outcomes were condomless sex and HIV testing.

Results: The intervention reduced the number of times participants reported having condomless sex but did not affect HIV testing. It also reduced homophobia and HIV/AIDS stigma as well as the number of times participants reported having vaginal sexual intercourse. Attrition was remarkably low with 93% and 87% of the participants completing the immediate-post intervention and 3-month follow-up assessments respectively.

TABLE OF CONTENTS

ACKNOWLEDGMENT -----	IV
ABSTRACT -----	V
LIST OF TABLES -----	IX
LIST OF ILLUSTRATIONS -----	X
INTRODUCTION -----	1
RESEARCH STRATEGY -----	5
<i>Specific Aims</i>	5
<i>Approach</i>	6
LITERATURE REVIEW -----	7
<i>Significance of The Study</i>	7
<i>Impact of Media on HIV Risk Behavior</i>	9
<i>Behavior Change through Entertainment-Education</i>	10
<i>Innovation of The Intervention</i>	12
THEORETICAL FRAMEWORK -----	14
<i>Social Cognitive Theory</i>	14
<i>The Reasoned Action Approach</i>	20
METHODS -----	23
<i>Recruitment and Retention</i>	24
<i>Manipulation Check</i>	26
<i>Intervention</i>	27
<i>Input From Focus Groups and Community Advisory Boards (CABs)</i>	28
<i>Attention-Matched Control Condition</i>	29

<i>Sample Size and Power Analysis</i>	30
<i>Assessments</i>	33
<i>Primary Outcomes</i>	33
<i>Secondary Sexual Behavior Outcomes</i>	34
<i>Secondary HIV Testing Outcomes</i>	38
<i>Homophobia and HIV/AIDS Stigma Outcomes</i>	40
<i>Statistical Analysis Plan</i>	41
RESULTS -----	44
<i>Main Effects of Reality Check HIV/STI Risk-Reduction Intervention on Condom Use and HIV Testing</i>	45
<i>Effect of Time on The Outcomes</i>	47
<i>Moderator Analysis</i>	48
<i>Mediation Analysis of the Intervention Effect on Condomless Sex, Scaled Frequency of Condom Use and HIV Testing</i>	49
DISCUSSION -----	52
CONCLUSION -----	63
REALITY CHECK TABLES -----	65
REALITY CHECK FIGURES -----	78
APPENDIX A: SCREENING SURVEY -----	86
APPENDIX B: REALITY CHECK ONLINE SURVEY -----	87
BIBLIOGRAPHY -----	108

List of Tables

Table 1: Characteristics of theoretical constructs concerning condom use -----	65
Table 2: Characteristics of theoretical constructs concerning HIV testing, attitudes towards HIV/AIDS, and homosexuality attitudes.-----	66
Table 3: Baseline sociodemographic characteristics of African Americans by intervention condition, USA, 2016–2017-----	67
Table 4: Self-reported sexual behaviors and HIV testing in the past 3 months by intervention condition and assessment period, African Americans, USA, 2016–2017-----	68
Table 5: Self-reported attitudes toward homosexuality and HIV/AIDS by intervention condition and assessment period, African Americans, USA, 2016–2017-----	69
Table 6: GEE analysis, significance tests, estimated effects, 95% confidence intervals (CI) for the intervention effect unadjusted and adjusted for baseline prevalence and significant covariates, African Americans, USA, 2016–2017 -----	70
Table 7: Mean (SE) for potential mediators of condom use by intervention condition and assessment period, African Americans, USA, 2016–2017 -----	71
Table 8: GEE linear regression analyses, significance tests, beta estimates, 95% confidence intervals (CI) for the overall intervention effect on potential mediators of condom use unadjusted and adjusted for baseline prevalence and significant covariates, African Americans, USA, 2016–2017 -----	72
Table 9: Mean (SE) for potential mediators of HIV testing by intervention condition and assessment period, African Americans, USA, 2016–2017 -----	73
Table 10: GEE linear regression analyses, significance tests, beta estimates, 95% confidence intervals (CI) for the overall intervention effect on mediators of HIV testing, unadjusted and adjusted for baseline prevalence and significant covariates, African Americans, USA, 2016–2017 -----	74
Table 11: Mediation analysis of intervention effects (HIV/STI intervention vs physical activity intervention) fit to times had sex without condoms in the past three months, at 3 months post-intervention, African Americans, USA, 2016–2017 -----	75
Table 12: Mediation analysis of intervention effects (HIV/STI intervention vs physical activity intervention) fit to scaled frequency of condom use, at 3 months post-intervention, African Americans, USA, 2016–2017 -----	76
Table 13: Mediation analysis of intervention effects (HIV/STI intervention vs physical activity intervention) fit to HIV testing, at 3 months post-intervention, African Americans, USA, 2016–2017 -----	77

List of Illustrations

Figure 1: New HIV Diagnoses Among Youth Aged 13-24, 2015. Source: CDC. Diagnoses of HIV infection in the United States and dependent areas , 2015. HIV Surveillance Report 2016;27.-----	78
Figure 2: The triadic reciprocal causal model of behavioral, environmental and personal determinants proposed by SCT. Adapted from Bandura, A. (2002). Social Cognitive Theory of Mass Communication. In J. Bryant & D. Zillmann (Eds.), <i>Media Effects: Advances In Theory And Research</i> (2nd ed., pp. 121–153). Taylor & Francis.-----	79
Figure 3: The conditional relations between efficacy beliefs and outcome expectancies. Adapted from Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. <i>Psychology & Health</i> , 13(4), 623–649. doi:10.1080/08870449808407422 -----	80
Figure 4: The reasoned action approach model. Adapted from Fishbein, M., & Ajzen, I. (2010). <i>Predicting and changing behavior: The Reasoned Action Approach</i> . New York: Taylor & Francis -----	81
Figure 5: CONSORT map for enrollment into <i>Reality Check</i> randomized controlled trial -----	82
Figure 6: Visualization of the mediation model for the intervention's effects on condomless sex. The unstandardized coefficients (SE) are shown along each path and asterisks were used to reflect statistical significance, *p<.05, **p<.001. -----	83
Figure 7: Visualization of the mediation model for the intervention's effects on scaled frequency of condom use. The unstandardized coefficients (SE) are shown along each path and asterisks were used to reflect statistical significance, *p<.05, **p<.001. -----	84
Figure 8: Visualization of the mediation model for the intervention's effects on HIV testing. The unstandardized coefficients (SE) are shown along each path an asterisks were used to reflect statistical significance, *p<.05, **p<.001. -----	85

Introduction

One of the biggest racial health disparities in the United States concerns HIV/AIDS. African Americans have considerably higher rates of HIV/AIDS than do White, Hispanic, Asian, and Native Americans (CDC 2016). In 2015, youth aged 13 to 24 years accounted for 22% of all new HIV diagnoses in the United States (CDC 2016). As shown in Figure 1, African Americans accounted for 59% of all diagnoses of HIV infection amongst adolescents and young adults (13-24 years) in the United States in 2015 (CDC 2016). African Americans had the highest rate of new HIV infections accounting for 44% of all new infections and were infected 7.9 times more than Whites (CDC 2012). During the same period, 13-24 year olds had the second highest number of new HIV infections (CDC 2012). The incidence of HIV among young African American men who have sex with men (MSM) is especially alarming (CDC 2016). Social factors such as poverty, poor access to preventive health services, and homophobia, which causes some men who have sex with men (MSM) to be secretive about their behavior and reluctant to be tested for HIV, are among the factors that contribute to this disparity. As recently as 2013, more than half the youth (51%), defined as people between 13-24 years of age, living with HIV were unaware of their infection (CDC 2015) and thus may be transmitting it, especially during the highly infectious acute infection stage.

While efforts have been made to prevent HIV/AIDS, young African Americans are still disproportionately affected by it and other sexually transmitted infections (STIs) (CDC 2010, CDC 2012, CDC 2015, CDC 2016). Despite a disproportionate number of new HIV infections occur amongst young adults, especially African American youth, testing for HIV is very low amongst young adults (CDC 2012).

Common reasons for the spread of HIV infection include low rates of testing amongst youth, low rates of condom use, substance abuse and having multiple partners (CDC 2010, CDC 2012, CDC 2015, CDC 2016, CDC 2016). On the other hand, those who test positive for HIV reduce their risk-related behavior dramatically (Marks, Crepaz et al. 2005, Marks, Crepaz et al. 2006). Thus, the CDC has recommended universal HIV testing, but especially testing among those at highest risk (CDC 2015, CDC 2016).

Accordingly, the broad objective of this dissertation was to decrease condomless sex and increase HIV testing among young adult African Americans. It proposed an evaluation of the effects of an innovative, theory-based HIV risk-reduction serial drama intervention, *Reality Check*, among African Americans aged 18 to 24 years delivered as a series of videos streamed online and accessible via any device that can connect to the internet such as a smartphone, laptop or tablet. Such a mode of delivery for an intervention is particularly well suited to the target demographic because they own and use Internet enabled mobile phones in large numbers as the primary way to consume online content (Horrigan 2009, Smith 2013, Smith 2014). *Reality Check* is a structural intervention: it is designed to be implemented in the natural environment of the target demographic that is, African American young adults by being delivered online and being accessible via their smartphones and to intervene in the context in which sexual health behaviors are produced and reproduced (Blankenship, Friedman et al. 2006) amongst them.

Reality Check consisted of 13 episodes approximately 6-9 minutes each. A new episode was made available each day on a secure online video streaming website designed by me and created by information technology personnel at the Annenberg

School for Communication, University of Pennsylvania. This website required participants to log in using a username and password they created at the beginning of the study. The participants were notified via email whenever a new episode was available and were sent daily reminder emails to watch any unwatched videos. Previously shown episodes were available on the website until the participant completed the 3-month follow-up survey.

The randomized controlled trial design included intervention and attention control conditions and employed baseline as well as multiple post-intervention assessments to evaluate the efficacy of the intervention. African American youth aged between 18 and 24 years located anywhere in the United States were recruited as participants. The study sample had 106 and 97 participants in intervention and control conditions, respectively - for a total of 203 participants. Confidential longitudinal surveys were conducted amongst the participants at baseline before, immediately after, and 3 months after exposure to *Reality Check*. These surveys were administered online and the data were transmitted securely to university Internet servers due to the sensitive nature of the information being captured, for example, participants' sexual attitudes and behaviors. The participants had to log in using their username and password to complete the surveys.

The specific aims of this study were to evaluate the effects of *Reality Check* in decreasing condomless sex (primary outcome), increasing HIV testing (primary outcome), intention for HIV testing, and intention for condom use, as well as reducing homophobia, HIV/AIDS stigma and number of times participants had sex compared with the control intervention. This research sought to provide preliminary evidence of the effects of an intervention that can be disseminated in a very cost-effective way, with

substantial reach via digital media such as smartphone based applications and video streaming websites.

In summary, young adult African Americans are becoming infected with HIV and other STIs at alarming rates. The estimated HIV incidence for young African Americans in 2015 was especially high and rivaled those observed in many sub-Saharan African countries (CDC 2016). Since the beginning of the HIV epidemic in the US, the predominant approach to prevention has been to mount individual- or small-group multisession behavioral interventions, typically in community-based organizations and health departments (Kalichman, Carey et al. 1996, Jemmott, Jemmott et al. 1998, Jemmott, Jemmott et al. 1999, El-Bassel, Witte et al. 2003, Jemmott, Jemmott et al. 2005, El-Bassel, Jemmott et al. 2010, Jemmott, Jemmott et al. 2010, Crosby, Charnigo et al. 2014). Although these are effective for many people, their reach is limited and it is widely believed that they will be insufficient to contain the epidemic. Thus, the field of HIV prevention has called for a focus on structural interventions and especially online interventions that reach many people in their natural environments (Rosser, Wilkerson et al. 2011). This dissertation proposes to evaluate a serial drama intervention, *Reality Check*, deployed as a structural intervention in the day-to-day lives of young adult African Americans. The proposed research aims to identify a structural intervention that may help curb the spread of HIV among young African Americans.

Research Strategy

Specific Aims

People who test positive for HIV reduce their HIV risk-related behavior dramatically (Marks, Crepaz et al. 2005, Marks, Crepaz et al. 2006). The CDC recommends universal HIV testing for all people ages 13 to 64 years, but for those at highest risk (CDC 2012). Accordingly, the broad objective of this intervention is to increase HIV testing among young African Americans.

Studies (Singhal and Rogers 2004) have shown that serial dramas that incorporate behavior-change methods can influence health behavior by allowing viewers to identify with characters who model skills and receive positive outcomes as consequences of desirable behavior. Characters in these dramas can become like people that one knows, and sympathetic characters can be credible sources of information about the usefulness of modeled behaviors.

Reality Check targets African Americans aged 13-24 and has a hip-hop music-world theme. Each character has a behavioral trajectory related to HIV and HIV-associated behaviors and attitudes. The storyline and character development were informed by behavior-change principles, formative work, and three community advisory boards (community adults, youth from a Boys and Girls Club, and gay and lesbian youth from a LGBT service organization). This research study has four specific aims:

- Aim 1. Evaluate *Reality Check* in a randomized controlled trial to determine if it increases HIV testing and intentions to get tested for HIV

- Aim 2. Evaluate whether *Reality Check* is associated with decreases in condomless sex and increases in intentions to use condoms
- Aim 3. Evaluate whether *Reality Check* is associated with sexual abstinence
- Aim 4. Evaluate whether *Reality Check* is associated with decreases in homophobia and HIV/AIDS stigma.

Approach

The proposed intervention approach has several advantages. This intervention targets adolescents and young adults with Internet-enabled smartphones, which is an advantage because it accommodates people who would be unwilling to participate in group interventions for any number of reasons, including fear of revealing that they are men who have sex with men (MSM). During the intervention, emails were sent reminding participants to watch the episodes until they watched all videos available to them at the given time.

Each year, the CDC funds many local CBOs to implement efficacious HIV prevention interventions. The CBOs receive funds to have trainers train facilitators to implement the interventions. If the interventions were delivered via digital media such as mobile phone applications or online websites, funds would not be needed to train people to implement them, and CBOs' costs associated with paying facilitators to implement the interventions would be greatly reduced. In summary, then, the potential impact of the proposed strategy is substantial. It targets young African Americans for HIV prevention, one of the highest risk populations in the US, and the intervention could be widely disseminated, is cost-effective, and addresses an important gap in the scientific literature.

Literature Review

This section discusses why this intervention and study are important and how they add to the collective knowledge about HIV prevention interventions especially among African American young adults. It also discusses why HIV testing and condom use is important in preventing HIV as well as the role homophobia plays in aggravating HIV risk and why addressing homophobia and HIV/AIDS stigma is important for preventing HIV. It then goes on to discuss the impact of media on HIV risk behavior and how entertainment-education media can be used to effect behavior change. The section finally ends with a discussion of the ways in which the current intervention is innovative and takes the field of HIV prevention further.

Significance of The Study

One of the most important public health problems in the US is the high rate of HIV in young African Americans among both heterosexuals and men who have sex with men (MSM). African Americans in general have a substantially higher incidence of HIV than any other racial/ethnic subpopulation of the US (CDC 2010, CDC 2012, CDC 2015, CDC 2016). HIV incidence in the US (Hall et al., 2008) show that while Whites are infected at a rate of 11.5 per 100,000, the corresponding figure for African Americans is 83.7 per 100,000. A HIV surveillance report by CDC states that 60% of diagnoses of HIV amongst young adults in the United States are made amongst African Americans (CDC 2012). Furthermore, among African Americans **the largest number of new diagnoses of HIV infections was amongst young people 18 to 24 years of age (CDC 2016)**. An estimated 51% of the youth living with HIV/AIDS in the US are unaware that they are

infected (CDC 2016). The CDC (CDC 2012) reports that 6.7% of the 1.1 million people living with HIV in the US are youth between 13 and 24 years of age. People who test positive reduce their HIV risk-related behavior dramatically (Marks, Crepaz et al. 2005, Marks, Crepaz et al. 2006). It is estimated that people who are unaware that they are HIV positive transmit 54% to 70% of all new HIV infections (Marks, Crepaz et al. 2006). The CDC recommends universal HIV testing for all people ages 13 to 64 years, but especially testing of those at highest risk (CDC 2012).

A community-based survey of sexually active African American adolescents ages 13 to 18 found that only 29% had ever been tested for HIV (Swenson, Rizzo et al. 2009). Barriers to testing included low knowledge of sexually transmitted infection (STI) and low risk-reduction self-efficacy (Swenson, Rizzo et al. 2009). Studies have tied female sex, older age, and higher grade in school to HIV testing in African American adolescents (Arrington-Sanders and Ellen 2008, Swenson, Rizzo et al. 2009). Condom use has long been a mainstay of HIV prevention efforts (Herbst, Sherba et al. 2005, Darbes, Crepaz et al. 2008, Johnson, Scott-Sheldon et al. 2009) with some disagreement regarding the effectiveness of interventions targeting abstinence, but one study recently showed an abstinence-based intervention to be effective over a 2-year follow-up (Jemmott, Jemmott et al. 2010).

Numerous studies have found that African Americans score higher in homophobia compared with White Americans (Heath and Goggin 2009), and this is often attributed to such attitudes among church clergy (Miller 2007), although this appears not to be true for attitudes toward gay rights such as gay marriage (Lewis 2003). Stigma related to homosexuality represents an obstacle to participating in HIV prevention activities,

including HIV testing (Fullilove and Fullilove 1999). Further, homophobic stigma causes some men to lead double lives, having a wife and family in public, but engaging in secretive sex with men as well (Stokes, McKirnan et al. 1996). HIV/AIDS stigma, which is partly based on homophobia, similarly deters people from being tested for HIV, and has many other consequences—fear of disclosure and discrimination in housing and employment, for example—for infected individuals (Herek, Capitanio et al. 2002).

Since the beginning of the HIV epidemic in the US, the predominant approach to prevention has been individual- or small-group multisession behavioral interventions, typically in community-based organizations (CBOs) and health departments (Kamb, Fishbein et al. 1998, NIMH 1998, Koblin, Chesney et al. 2004, Healthy Living Project 2007, Jemmott, Jemmott et al. 2010). Although these are effective, their reach is limited, and it is widely believed that they are insufficient to contain the epidemic (Elford and Hart 2003, Coates 2008, Wohlfeiler and Ellen 2010). Thus, the field of HIV prevention has called for a focus on structural interventions (Sumartojo 2000) and interventions addressing social determinants of health (National Expert Panel on Social Determinants of Health 2009). Therefore, interventions that reach large numbers of people in their natural environment are highly desirable.

Impact of Media on HIV Risk Behavior

Several studies have been conducted to evaluate the impact of media content on HIV risk behavior, studying both intended and unintended effects (Brown and Basil 1995, Gruber and Grube 2000, Brown, L'Engle et al. 2006, Romer, Sznitman et al. 2009, Kerr, Valois et al. 2015). Recent studies examined the influence of news coverage of

HIV on HIV-related attitudes and behaviors in the US (Stevens, Hull et al. 2007, Stevens 2010). Content analyses and time series regression models were used to test the influence of national news coverage of HIV from 1993-2007 on risk perception and HIV testing among African Americans and White Americans. These multi-year analyses relied on data from 24 daily newspapers, generating more than 52,000 articles and a sample of 265,557 respondents nationally. The findings suggest that news coverage of HIV/AIDS has led to significant aggregate declines in HIV testing, particularly among African Americans (Stevens 2010).

An evaluation was conducted of the KNOW/AIDS campaign, an HIV testing campaign, created by Kaiser Family Foundation and Viacom to deliver public service announcements and entertainment-education content on broadcast and network television. The study found that exposure to the campaign was associated with significant increases in HIV testing among sexually active teens 12 months post exposure (Stevens, Hull et al. 2007). Another study investigating the effects of sexual content in the media on adolescents' AIDS-related behavior in an NIH-funded longitudinal web-based survey of adolescents found that sexually active adolescents were more likely to expose themselves to sex in the media and those exposed to sex in the media were more likely to progress in their sexual activity (Bleakley, Fishbein et al. 2008, Bleakley, Hennessy et al. 2008).

Behavior Change through Entertainment-Education

Entertainment-education refers to narrative interventions designed to change behavior while providing entertainment. Serial dramas (soap operas) that incorporate

behavior-change methods have influenced health behavior in several studies (Singhal and Rogers 2004). Such dramas are a mode of health communication that 1) is intrinsically interesting, 2) generates discussion among viewers, potentially influencing social norms, and 3) allows viewers to identify with characters who model skills and receive positive outcomes as consequences of desirable behavior. Characters can become like people that viewers know, and in some cases, want to emulate; thus, sympathetic characters can function as credible sources of advice. Furthermore, evidence shows that narrative messages are more effective in achieving observational learning rather than didactic messages (Hinyard and Kreuter 2007).

Entertainment-education has been applied to numerous social and health problems. Perhaps the earliest efforts were those of Miguel Sabido, and his colleagues in Mexico (with consultation from Albert Bandura) whose “telenovelas” were successful in motivating participation in a national literacy campaign and use of birth control (Bandura 2004). In HIV/AIDS and population control, a radio soap opera called “Twende na Wakati” became the most popular television show in Tanzania and was highly successful in generating the sought-after behavior change (Rogers, Vaughan et al. 1999, Vaughan, Rogers et al. 2000). A very popular American soap opera, “The Bold and the Beautiful” incorporated an HIV storyline in which a heterosexual male was found to be infected; his female partner, who was uninfected, convinced him to stay with her, marry, and adopt an AIDS orphan while honeymooning in Africa. Consultants from the CDC were consulted to ensure the accuracy of the storyline, which was found to generate record numbers of calls to the CDC AIDS hotline (Kennedy, O’Leary et al. 2004). In addition, suggestive evidence was obtained that HIV/AIDS stigma was reduced in Botswana, where the show

aired later (O'Leary, Kennedy et al. 2007). A recent narrative intervention that was shown in STI clinic waiting rooms (Warner, Klausner et al. 2008) used the strategy of reaching a “captive” audience and, with excellent internal and external validity, saw a significant reduction in STI re-infection among patients visiting during months when the video was playing relative to patients visiting during months when it was not playing. *Reality Check* can similarly be played to a captive audience in clinic waiting rooms.

Innovation of The Intervention

The proposed study is a highly innovative departure from the way that HIV prevention programs are currently delivered. Most current programs are delivered to individuals or small groups, or at best “communities” defined as gay bars (Kelly, Murphy et al. 1997) or housing developments (Sikkema, Kelly et al. 2000). CBOs disseminating such interventions report having great difficulty recruiting and retaining participants in these programs, which often involve multiple sessions (Painter, Ngalame et al. 2010). Often monetary incentives are given to induce participation of community members. On the other hand, the type of serial drama intervention to be evaluated here is intrinsically compelling, arouses emotion, and engages people for years or decades. Indeed, some daytime soap operas are among the longest-broadcast shows on television. Some began as radio programs before the invention of the television (e.g., “Search for Tomorrow,” “Love of Life,” and the recently terminated “The Guiding Light”). Entertainment-education efforts have been virtually non-existent in the US because Americans have so many entertainment choices (e.g., television and radio channels) that it would be difficult to ensure that the program would be accessed by many of the target population on a

regular basis. In contrast, delivering the content to the target audience's own smartphones makes it available literally at their fingertips and ensures greater exposure.

African Americans of age 18-24 are more likely to own smartphones than whites of a similar demographic or socio-economic status (Horrigan 2009, Smith 2013, Smith 2014). African Americans are more likely to watch videos or post a video via a smartphone and this trend is only increasing in magnitude (Hamblen 2010). A smartphone-based intervention is eminently suited for this target demographic because they use the mobile phone as the primary way to connect to the Internet and consume online content (Horrigan 2009, Smith 2013, Smith 2014). This mode of delivery also allows the participants to see the episodes whenever and wherever they choose, in the company of whomever they choose or in private. It also facilitates sharing of the content thus increasing dissemination and social diffusion of the intervention. The potential reach of this intervention is large, based on the high levels of program exposure, size of the potential audience, and the potential indirect effects of the program on social norms in the community. Preliminary evidence shows that technology based HIV prevention interventions can often have a significant impact on risk reduction behaviors (Noar, Black et al. 2009, Hirshfield, Chiasson et al. 2012, Mustanski, Garofalo et al. 2013, Schnall, Travers et al. 2014).

Theoretical Framework

Two key characteristics of efficacious HIV/STI risk-reduction interventions are their grounding in behavior-change theory and tailoring to the population or culture based on qualitative research. Social Cognitive Theory (Bandura 1986, Bandura 1998) was employed in the development of *Reality Check*. The reasoned action approach (Fishbein and Ajzen 1975, Ajzen 1991, Fishbein and Ajzen 2010) was used to inform the development of measurement instruments and statistical analyses. Both of these approaches benefit from the use of qualitative methods, including focus groups and key informant elicitation interviews to identify the population-relevant behavioral skills and expected outcomes of behavior. Changes in theoretical variables are hypothesized to mediate the intervention's effects on intention and behavior. Identifying the population-specific beliefs serves to make the theory and the resulting intervention appropriate for the population. Therefore, a mixed methods approach was used in this research study such as employing focus groups to test the drama scripts and concepts in the intervention to ensure they spoke to the beliefs of the target demographic. This theoretical approach has been applied in several RCTs (Jemmott, Jemmott et al. 2005, Jemmott, Jemmott et al. 2007, Jemmott, Jemmott et al. 2010, Jemmott, Jemmott et al. 2010, Jemmott, Jemmott et al. 2010).

Social Cognitive Theory

Social cognitive theory (SCT) has been applied fruitfully to many health issues, and has been used to develop behavioral HIV risk reduction interventions for numerous populations (Suarez-Al-Adam, Raffaelli et al. 2000, O'Leary 2005, O'Leary, Hoff et al.

2005, O'Leary, Jemmott et al. 2008). Social cognitive theory proposes the notion of Reciprocal Determinism that is it argues that people are self-organizing, self-regulating and proactive organisms and do not simply react passively to environmental stimuli (Bandura 1977, Bandura 1986, Bandura 1998, Bandura 2001, Bandura 2002, Bandura 2004). Furthermore, it argues that human beings are not isolated creatures functioning in a vacuum but rather that they function as part of a larger social system thus being subject to socio-structural influences (Bandura 1977, Bandura 1986, Bandura 1998, Bandura 2001, Bandura 2002, Bandura 2004). It states that personal cognitive factors influence behaviors, which, in turn, influence environmental factors (Bandura 1977, Bandura 1986, Bandura 1998, Bandura 2001, Bandura 2002, Bandura 2004). This argument is embodied in Figure 2, which shows the reciprocal causal model of determinants influencing human behavior.

SCT states that people's behaviors both influence and are influenced by the social and physical environment that they exist in and their self-evaluations and self-regulations regarding the behavior in question (Bandura 1977, Bandura 1986, Bandura 1998, Bandura 2001, Bandura 2002, Bandura 2004). Thus, the participants' behaviors inform as well as are informed by their social and cultural environment as well as their cognitions regarding the desirability and costs of the said behaviors for example, condom use and HIV testing.

Outcome Expectancies

Bandura (Bandura 1977, Bandura 1986, Bandura 1998, Bandura 2001, Bandura 2002, Bandura 2004) says that outcome expectancies function as one of the major

determinants of behaviors. They can take three main forms: the physical effects of performing the behavior; the social reactions to performing the behavior; and people's expectations about their own cognitions about themselves when performing the behavior (Bandura 1977, Bandura 1986, Bandura 1998, Bandura 2001, Bandura 2002, Bandura 2004). Positive outcome expectancies are perceived as facilitators or incentives while negative ones are barriers to behavior. Thus, we would have to minimize the effect of negative outcome expectancies while increasing the effect of positive outcome expectancies. One way to change outcome expectancies is through entertainment education (Singhal and Rogers 1999).

In the current context, targeting physical outcome expectations meant choosing messages targeting the participant's beliefs regarding the physical effect of using condoms such as the belief that it will reduce the risk of contracting HIV and other STIs. Messages ended with the recommended action for example, in the serial drama, one of the characters, Tasha, modeled the recommended behavior by deciding to use condoms. The drama also includes messages designed to help participants cope with some of the negative outcome expectancies such as fear of needles while getting tested for HIV. The serial drama was designed to help participants cope with the fear by showing Tasha model the recommended behavior - going to a clinic where cheek swabs are used instead of needles for HIV testing- thus reducing the negative impact of this outcome expectancy.

Messages showing the social approval of people important to the targeted African American youth in the context of this behavior such as friends and peers in their community for example, Tasha's friend Deirdre approving of Tasha getting tested for HIV and using condoms, were expected to address participants' outcome expectations

regarding social reactions. This was expected to bolster the belief that getting tested for HIV and using condoms are socially approved behaviors, which, in turn, was expected to help them combat negative social reactions from some of their friends and partners to the said behaviors.

Thirdly messages that address self-evaluative outcome expectations were included in the drama such as messages that helped the participants feel better about themselves for using condoms and getting tested for HIV. For example, Ali, Tasha's boyfriend approves of her decision to use condoms and exhorts her to get tested after she mentions that her friend recommended it. Such messages were expected to influence the self-evaluative outcome expectations of the participants and help them believe that using condoms and getting tested for HIV is not only recommended by doctors and sex education teachers but is also a virtuous behavior.

Self-Efficacy

Social cognitive theory's most significant contribution to behavior change interventions is the concept of self-efficacy which was later added to other health behavior change theories as well such as health belief model and TRA/TPB (Bandura 1977, Bandura 1986, Strecher, DeVellis et al. 1986, Rosenstock, Strecher et al. 1988, Bandura 1998, Bandura 2001, Bandura 2002, Bandura 2004, McAlister, Perry et al. 2008). Efficacy beliefs refer to "beliefs in one's capabilities to organize and execute the courses of action required to produce given levels of attainments." (Bandura 1998).

Figure 3 shows how efficacy beliefs and outcome expectancies regarding a given behavior are related to each other according to social cognitive theory (Bandura 1998).

While outcome expectancies are mainly beliefs about the physical, social and self-evaluative effects of performing the recommended behavior that is, the physical effects of using condoms or getting tested for HIV, the social reactions of their friends and spouses upon hearing of such behavior and finally the effect of performing these behaviors on individuals' own self-image and evaluations of themselves, efficacy beliefs are mainly beliefs about the individuals' capability to perform the specific behavior that is, individuals' beliefs regarding their ability to get tested for HIV and use condoms every time they have sex. Self-efficacy can be increased mainly through four ways as listed below (Bandura 1977, Bandura 1986, Bandura 1998, Bandura 2001, Bandura 2002, Bandura 2004).

1. By facilitating "mastery experiences"
2. Through exposure to vicarious experiences
3. Through social or verbal persuasion
4. By helping the participants interpret their emotional and somatic responses correctly

Mastery experiences are defined as the successful performance of the desired behavior (Bandura 1998). For example, in the current intervention, *Reality Check*, Tasha models a mastery experience when she successfully overcomes her fear and gets tested for HIV. Similarly, Shondra models another mastery experience, when she says she will abstain from having sex with Trevor. These messages also showcase "vicarious experiences"- messages in which their peers who have successfully performed the behavior and talk about how and why they did it. This exposure to peer testimonials increases the participants' self-efficacy by offering them credible models of behavior

which help them believe that people like themselves can and do perform the recommended behaviors such as getting tested for HIV and using condoms when having sex. A resilient sense of efficacy requires that the participants successfully overcome obstacles in order to perform the behavior (Bandura 1998). In *Reality Check*, we show peers having awkward but important conversations about condom use and getting tested for HIV. Furthermore, these vicarious experiences facilitate observational learning (Singhal and Rogers 1999, McAlister, Johnson et al. 2000) through modeling of the peers in the messages. Observational learning is defined as “Learning to perform new behaviors by exposure to interpersonal or media displays of them, particularly through peer modeling” (McAlister, Perry et al. 2008). Therefore, observational learning then increases the participants’ self-efficacy regarding condom use and getting tested for HIV (McAlister, Perry et al. 2008).

Social cognitive theory has a long history of use in the development of entertainment-education interventions, beginning when Bandura consulted with Miguel Sabido on his telenovelas in Mexico (Bandura 2004). Additionally, SCT has informed an HIV storyline in the soap opera “The Bold and the Beautiful” and in evaluating its effects (Kennedy, O’Leary et al. 2004, O’Leary, Kennedy et al. 2007). Suggestive evidence has been reported that HIV/AIDS stigma in Botswana was reduced among viewers of “The Bold and the Beautiful” storyline in which HIV infection was treated in a non-stigmatizing, humane manner, as compared with non-viewers (O’Leary, Kennedy et al. 2007).

Media interventions can increase skills and self-efficacy to execute behaviors by having characters model “effortful coping,” that is, when they persist in meeting

challenges to a behavior change until they are successful. An example from *Reality Check* involved Tasha, whose goal was to be tested for HIV. Her first attempt, while alone, results in her being too afraid to go through with the test; she is able to succeed with the companionship of Ali, her boyfriend, even though she is so afraid that she is shaking. In another example, Shondra has a manager, Dion, who, after her music demo is made, hits on her with the implication that he will not continue to represent her if she refuses. Although she is attracted to Dion, and certainly wants a successful career in the music business, she wants to maintain her virginity. She is able to resist his advances, calling upon her religious beliefs in the form of a cross on her necklace. Media interventions can influence outcome expectancies by showing characters being rewarded when they successfully execute a behavior. For example, in *Reality Check* Ali tests positive for HIV, but learns that he can live a long and healthy life if he takes his medication, and his (uninfected) girlfriend, Tasha, remains deeply committed to their relationship.

The Reasoned Action Approach

While social cognitive theory (Bandura 1986) was used to choose the target topics and craft the persuasive messages, the reasoned action approach (Fishbein and Ajzen 2010) was used to identify which specific beliefs, norms and attitudes should be targeted by the intervention. The reasoned action approach (Fishbein and Ajzen 2010) is an extension of the theory of planned behavior (Ajzen 1991) which itself is based on the theory of reasoned action (Fishbein and Ajzen 1975). Figure 4 describes the relationships among the various constructs and behavior in the reasoned action approach (Fishbein and Ajzen 2010). The reasoned action approach states that identifying a specific behavior

rather than a behavioral category, as the target of a behavior change communication is important (Fishbein and Ajzen 2010). A behavior is defined as having the following components: the action (using), the target (condoms), time (every single time) and the context (while having sex) (Fishbein and Ajzen 2010).

The reasoned action approach states that three main constructs namely, attitudes, norms and perceived behavioral control influence intention to perform a behavior which in turn predicts the likelihood of the behavior being performed (Fishbein and Ajzen 2010). There are two types of attitudes – instrumental and experiential attitudes (Fishbein and Ajzen 2010). Attitudes in turn are influenced by the strength of behavioral beliefs that is beliefs about the physical, emotional and social effects of performing the behavior and outcome evaluations which are evaluations regarding how enjoyable, valuable or important these outcomes might be (Fishbein and Ajzen 2010).

According to the reasoned action approach there are two types of norms – injunctive norms and descriptive norms. Injunctive norms are those based on beliefs about what the participants ought to do while descriptive norms are those based on beliefs about what everyone around them is doing in reality (Fishbein and Ajzen 2010). Norms are influenced by the strength of normative beliefs and by the person's motivation to comply with the same (Fishbein and Ajzen 2010).

The concept of perceived behavioral control (Fishbein and Ajzen 2010) in the reasoned action approach is akin to self-efficacy in social cognitive theory (Bandura 1982, Bandura 1986, Bandura 1998). The reasoned action approach proposes that perceived behavioral control is influenced by the strength of control beliefs which are

beliefs about barriers to adopting the recommended behavior and beliefs about factors that facilitate the behavior in addition to being influenced by the actual control the participants have over each of the said barriers and factors (Fishbein and Ajzen 2010). In an NIH-funded study to identify beliefs and sociodemographic variables that predicted risky sexual behavior among HIV seropositive African American men who self-identified as homosexual, bisexual, or heterosexual, logistic regression analyses showed that men with poor AIDS knowledge, who were MSM and perceived barriers, were significantly less likely to use condoms during anal sex than were other men (Coleman and Ball 2007). *Reality Check* aims to reduce these perceived barriers to condom-use thereby increasing the participants' self-efficacy for condom-use. *Reality Check* achieves this by having its main characters modeling partner negotiation skills for condom-use and by showing its characters overcoming other perceived barriers to condom-use.

The reasoned action approach (Fishbein and Ajzen 2010) was used in the current study to inform the design of measures and variables to capture the main outcomes of interest and theoretical mediators in the survey instrument. This approach was also used to inform the data analysis plan and to hypothesize as to which theoretical constructs act as mediating variables and affect intentions and behavior. The survey instrument used semantic differential scales and Likert scales to capture outcome expectancies, beliefs about subjective and descriptive norms, self-efficacy beliefs, attitudes and intentions to use condoms during sex and to get tested for HIV as well as for physical activity.

Methods

In the present study, participants, African Americans 18 to 24 years of age, were randomized to *Reality Check*, a 13-episode online video-based HIV/STI risk-reduction intervention designed to reduce condomless sex and increase and HIV testing or a 13-episode online video-based physical activity intervention, which served as the attention-matched control group. The dissertation thesis hypothesized that compared with the attention-control group, controlling for baseline prevalence of the criterion, the HIV/STI risk-reduction intervention would reduce condomless sex and increase HIV testing during the 3-month post-intervention period, which were the primary outcomes. To better understand the results, mediation analyses on theoretical constructs hypothesized to predict condom use and HIV testing were also performed. Secondary outcome variables included the scaled frequency of condom use, consistent condom use, unprotected sex, homophobia, and HIV/AIDS stigma.

Institutional review board at the University of Pennsylvania approved this study. The study included African Americans between the ages of 18 and 24 irrespective of their HIV status and sexual orientation self-identification. Potential participants were screened for eligibility using a self-administered anonymous online questionnaire. The complete screening questionnaire is shown in Appendix A. Interested potential participants were eligible to participate if they were men or women who reported to be between the ages of 18 and 24, self-identified as black or African American, had a Facebook ID, a smartphone with access to the Internet to watch videos and take online surveys, and reported having sexual intercourse in the previous 90 days. Those eligible were invited to submit their contact information such as name, phone number, email address and

Facebook ID. The system then sent an email with a link to webpage where they could create an account. This extra step of requesting they submit an email address and then the system sending them an email with a link to the account creation webpage rather than redirecting them directly to the account creation page after they were found eligible was introduced to ensure the potential participants were submitting a valid email address. This was vital since the whole study was deployed online involving no face-to-face contact with participants and hence the main mode of contact and interaction between the study and the participants for sending them reminders, announcements and reimbursements was email. After the participants created an account on the research study's website, the system redirected them to the confidential baseline survey. Only participants who completed the baseline survey were randomized by the system to one of the two study conditions – intervention or control. Informed consent while blind to group assignment was required for participation and participants provided it at the time of account creation before they could start the baseline survey online. The same survey was administered immediately post intervention and at 3 months post intervention. Appendix B shows the online questionnaire used in the study in full detail.

Recruitment and Retention

Participants were recruited from multiple states in USA (a) through advertising on Facebook and Instagram, (b) through recruitment flyers posted on college campuses, (c) through college mailing lists, and (d) through referrals from participants, that is, respondent driven sampling. The *Reality Check* ads on Facebook had 45,608 impressions.

According to Facebook, impressions are defined as the number of times a post from *Reality Check*'s page is displayed.¹

The *Reality Check* ads on Facebook and Instagram were clicked on 1071 times. But no one signed up via the ads. Initially a total of \$35 was offered over nearly four months to participate in the study and when no one signed up over 4-6 weeks of advertisement the reimbursement was increased to \$65 and still no one signed up over an additional 4-6 weeks of advertisement. Then the reimbursement was once again increased to the amount of \$100 at which point participants started signing up for the study.

A multi-phase increasing payment scheme was used to reimburse the participants for taking part in the study. The participants received \$15, \$25 and \$50 when they completed the baseline, immediate post-intervention and 3-month follow-up survey respectively. Each survey took 20-30 minutes to complete. They received an additional \$10 if they had watched all the episodes or videos before taking the immediate post-intervention survey. Daily email reminders were sent by the system to participants who had not watched the videos available to them. Similarly, daily email reminders were sent to the participants who were eligible to take either the immediate post-intervention or 3-month follow-up survey and had not yet completed it. Weekly SMS reminders were sent

¹ https://www.facebook.com/help/274400362581037?helpref=uf_permalink

People may see multiple impressions of the same post. For example, if someone sees a Page update in News Feed and then sees that same update when a friend shares it that would count as 2 impressions.

to participants who were eligible to take the immediate post-intervention or 3-month follow-up survey and had not yet completed it.

Manipulation Check.

Since the system could not track whether the participants had played a video, watching a video was defined as a participant logging into the system and spending time on the web-page containing a given video. Each video or episode was embedded on a separate webpage so the system could track how long a participant spent on individual webpages containing unique videos. One limitation of such a definition of “watching a video” was that it did not consider participants who just logged in and visited a video page or even clicked on a video and left the tab open while doing other things on the Internet.

The participants in the study watched a mean of 11 or 85% of the 13 videos. A large majority of the participants that is 82% (165/203), watched at least 10 of the 13 videos or episodes available to them. More than half, 58% (117/203) of the participants watched all 13 videos or episodes before completing the immediate post-intervention survey; while an additional 24% (48/203) of the participants watched 10-12 of the 13 videos before completing the immediate-post intervention survey. Only 18% (38/203) of the participants watched less than ten of the thirteen videos available to them before completing the immediate post-intervention survey.

Intervention

Reality Check was a 13-episode serial drama. Each episode was between 6 to 9 minutes in length so that it could be viewed in its entirety in a very short time. It was originally produced in 3 min segments of 27 episodes to suit its original mode of delivery, which was via Transit TV on buses. But for the current intervention, since *Reality Check* was being streamed online, multiple episodes were merged to make only 13 episodes. This was done to reduce the number of clicks required to access the intervention and thus increase the usability of the intervention. The *Reality Check* series was completed in March 2010 with funding from the Minority AIDS Initiative of the DHHS. The series targets African Americans ages 14-24 and has a hip-hop music world theme. Each character has a behavioral trajectory related to HIV and HIV-related behaviors and attitudes. Two writers, with CDC guidance, crafted the script based on behavior change principles integrated with the findings of the formative research. Millennium Filmworks produced the series under the direction of Maurice Madden.

The main characters, with their behavioral trajectories, are as follows: **Tasha** is a performer who has been featured in many music videos. She has had a STI. Thanks to the advice of her friend Deirdre, Tasha has decided that she wants to be tested for HIV. **Ali** is a music producer in his early 20s. He is becoming attracted to Tasha, whose past as a video vixen has included several romantic relationships. Ali's behavioral goal is to use condoms. **Shondra** is Ali's younger sister. She is still in high school, where she is doing well. She aspires to music stardom under Ali's management. She is religious and a virgin; her behavioral goal is to maintain sexual abstinence. **Randall** is Shondra's best friend; he is also in high school. He has been struggling with feelings for other boys and

is becoming romantically involved with one, but has not told his parents. When they accidentally find out, they themselves must come to terms with his sexual orientation.

Deirdre is Tasha's best friend. She is a single mother who worries about Tasha and advises her to use condoms and get tested for HIV. **Dion** is a very successful music producer who is interested in Shondra both professionally and personally, and wants to become her manager.

Over the course of the 13 episodes, these interweaving storylines play out, with everyone eventually achieving their positive goal. While the episodes are streamed, all previously released episodes will be available for viewing on the *Reality Check* website. In addition to streaming the episodes, the daily emails announcing the availability of a new episode and all the daily reminder emails to watch the episodes contained links to a website where the participants could find information about the locations of local venues where free HIV testing is available. This was done so that the barrier of not knowing will not interfere with viewers' ability to be tested should they decide to. This information was also included in all emails sent to participants in the control condition so that the effect of sharing website links to the information on where free HIV testing is available could not be confounded with the effect of the Reality Check intervention.

Input From Focus Groups and Community Advisory Boards (CABs)

Reality Check was developed with input from focus groups and community advisory boards (CABs). One important characteristic of efficacious health promotion interventions is tailoring to the population or culture based on formative research. Tailoring increases source - receiver similarity, enhancing the persuasive impact of

Reality Check (McGuire 2001). Formative focus groups were conducted with 38 African American high school students. During these sessions, and using the behaviors targeted for change, the students played the “Pathways to Change” game (Petraglia, Galavotti et al. 2007) which provides a method for incorporating behavior change principles into entertainment-education storylines by identifying several classes of barriers and facilitators to action. The overarching context of *Reality Check*, the hip-hop music industry, was suggested by these students, as were rough sketches of the main characters and their behavioral objectives. Some students also wrote storylines involving specific characters.

Three separate CABs--community adults, African American Boys and Girls club members, and African American clients at a LGBT agency for youth—reviewed all of the scripts and rough cuts of the episodes of serial drama. The storyline involving Randall, the gay youth, was suggested by the LGBT clients, as was the name of the series, *Reality Check*. The CABs offered several suggestions regarding character and storyline development, language, and music. In the end, the LGBT group expressed their belief that the Randall storyline would be effective in reducing homophobia, and the Boys and Girls club CAB called the series “exciting sex ed” and commented that they might miss their bus stop if they were watching the show. Music used in the series was submitted as part of a contest at a hip-hop radio station event.

Attention-Matched Control Condition

In the control condition participants watched a series of thirteen 6-9 minute videos from YouTube on physical activity and exercise. The videos were tailored to be gender

specific and hence varied between men and women because African American women mentioned ruining their hairstyles by sweating into them while working out or while washing it post-exercise as obstacles to exercising whereas African American men did not have similar concerns. Therefore, some of the videos for women addressed the issue of managing their hair while exercising. Additionally, men and women seemed to have different goals and reasons for doing exercise which led to differences in the kinds of exercises each gender preferred. Men seemed to prefer strength building and muscle building exercises such as weight-lifting while women seemed to prefer aerobic exercises and muscle toning exercises. Since people were more likely to watch exercise videos aligned with their preferences some of the strength building videos sent to men were replaced with aerobic exercise videos for women even while both genders received a mix of both strength building and aerobic exercises.

Sample Size and Power Analysis

A statistical power analysis was performed to calculate the sample size required to detect a clinically significant effect of the HIV/STI risk-reduction intervention on the primary outcomes compared with the attention-control group. The primary outcomes were condomless sex, that is, the number times the participant reported have sex without using condoms in the past 3 months for sexual behaviors and a binary variable for HIV testing in the past 3 months with 1=Yes, 0=No.

Condomless sex. A meta-analysis of HIV risk reduction interventions (Kalichman, Carey et al. 1996) reported a weighted average effect size of Cohen's $d=0.25$ for condom use with a range from 0.11 to 0.53. The mean effect size for condom use

for computer-based interventions was Cohen's $d = 0.26$ (Noar, Black et al. 2009). Rho, the correlation between repeated observations was assumed to be 0.35. A sample size calculator PASS 13 (Hintze 2014) was used to calculate the required sample for the study based on the follow parameters:

1. Assumed standard deviation of the outcome variable = 1
2. Power = 0.8
3. Cohen's $d = 0.26$ (Noar, Black et al. 2009)
4. One sided significance level (t test) = 0.05 that is ($\alpha = 0.05$)
5. Rho (Correlation among repeated measures) = 0.35
6. Number of points in time for repeated measures = 3

A one-tailed significance test was used because the direction of the intervention effect (positive) was known a priori. The intervention is expected to increase the likelihood of condom use and HIV testing among participants exposed to it. As per the calculation above 104 participants per condition are required to detect the effects of the intervention. A meta-analysis of computer based HIV prevention interventions (Noar, Black et al. 2009) report a mean attrition rate of 30% in the interventions included in their analysis. Therefore, accounting for attrition, we estimate that at least 134 participants per condition which implies a total of 268 participants are required, to detect main effects of the intervention with statistical power of 80% or 0.8 degree of statistical power. Statistical power of 0.8 or 80% refers to the probability that statistical test will reveal a significant difference when such a difference actually exists.

HIV testing. Even though a disproportionate number of new HIV infections occur amongst youth (CDC 2016), especially African American youth, testing for HIV is very

low in this population (CDC 2012). In 2009, more than half (59.5%) of people 13 to 24 years of age living with HIV were unaware of their infection. The 2009 National Health Interview Survey (CDC 2010) reported that overall 39.8% of people 18 and older were tested for HIV, 58.2% of African Americans 18 and older were tested, and 34.4% of youth 18-24 were tested. Data were not presented separately for African Americans aged 18-24 years. Therefore, the percentage of African Americans 18-24 ever tested was estimated as $(58.2/39.8) * 34.4 = 50.3\%$. In the 'Many Men, Many Voices' project, a 33% increase in the likelihood of the intervention group getting tested was reported when compared to a control group (Wilton, Herbst et al. 2009). A relatively conservative effect size was selected and at least a 15% increase in the likelihood of HIV testing is expected in the intervention group compared with control group as a clinically and substantively important effect size. A sample size calculator PASS 13 (Hintze 2014) was used to calculate the required sample for the study based on the follow parameters:

1. Power = 0.8
2. Proportion of people getting tested for HIV in Control Condition is 50%
3. Proportion of people getting tested for HIV in Treatment Condition is 65%
4. One sided significance level (t test) = 0.05 that is ($\alpha = 0.05$)
5. Rho = 0.35
6. Number of points in time for repeated measures = 3

As per the calculation above 76 participants per condition are required to detect the HIV testing effects of the intervention. A meta-analysis of computer based HIV prevention interventions (Noar, Black et al. 2009) report a mean attrition rate of 30% in the interventions included in their analysis. Therefore, accounting for attrition, we

estimate that at least 99 participants per condition summing to a total of 198 participants are required, to detect main effects of the intervention with statistical power of 80% or 0.8 degree of statistical power.

Assessments

The participants completed confidential online questionnaires at baseline, immediately post-intervention and 3 months post intervention. Sociodemographic variables such as age, education, employment, and marital status were collected. Sexual behavior and physical activity variables as well theoretical constructs mediating above mentioned behaviors such as attitudes, outcome expectancies, self-efficacy, subjective and descriptive norms regarding condom use, HIV testing and physical activity were assessed at baseline and three months post-intervention. The theoretical constructs mediating both sexual and physical activity behaviors as well as physical activity behaviors were also assessed immediately post-intervention.

Primary Outcomes

There were two primary outcomes in this study namely condomless sex and HIV testing. Condomless sex was a count variable capturing the number of times a participant reported having sex without using a condom in the past 90 days. HIV testing was a binary variable reflecting whether the participants reported having been tested for HIV in the past 90 days.

Secondary Sexual Behavior Outcomes

Secondary outcomes of sexual behavior included scaled frequency of condom use, consistent condom use, unprotected sexual intercourse and number of times participants had sex. Analyses of number of times participants had anal sex and condomless anal sex was planned but is not discussed here due to the very small number of participants who reported having anal sex and condomless anal sex.

Scaled frequency of condom use in the past 90 days was measured with a 5 point Likert scale response ranging from “never” to “always”. Consistent condom use was a binary variable reflecting whether the participants reported using a condom every time they had anal or vaginal intercourse in the past 90 days. It was based on a comparison of the sum of the reported anal and vaginal intercourse acts in the past 90 days and the sum of the reported condom-protected anal and vaginal intercourse acts in the past 90 days. Participants who reported at least one intercourse act and whose number of reported protected acts equaled their number of acts were coded as practicing consistent condom use. Participants who reported at least one intercourse act and whose reported number of protected acts was less than their number of acts were coded as not practicing consistent condom use. A widely used measure in HIV prevention trials (Fonner, Kennedy et al. 2014), considerable evidence indicates that self- reported consistent condom use is associated with a reduced risk of STI, including HIV (Saracco, Musicco et al. 1993, Weller 1993, de Vincenzi 1994, Davis and Weller 1999, Warner, Newman et al. 2004).

Unprotected intercourse was a binary variable indicating whether the participants reported having vaginal or anal intercourse in the past 90 days without using a condom. It

was constructed by subtracting the sum of the condom-protected anal and vaginal intercourse acts from the total number of anal and vaginal intercourse acts in the past 90 days. If the difference was one or greater the participant was coded as having unprotected intercourse; if the difference was zero or if the person reported no vaginal or anal intercourse in the past 90 days, the person was coded as not having unprotected intercourse.

Number of times participants had sex was a count variable capturing the number of times a participant had vaginal sexual intercourse in the past 90 days. Number of times participants had anal sex was a count variable capturing the number of times a participant had anal intercourse in the past 90 days. Condomless anal sex was a count variable capturing the number of times a participant had anal intercourse without condoms in the past 90 days.

Table 1 presents the number of items, response format, and Cronbach's alpha for the theoretical constructs used as mediators of condom use. As seen in Table 1, the consistency or reliability of the scales as measured by Cronbach's alpha were moderate to high for all scales except the scale for self-evaluative outcome expectancy of condom use.

Attitudes and Intentions

Attitudes and intentions were measured (Fishbein and Ajzen 1975) because they are theoretical constructs in the reasoned action approach (Fishbein and Ajzen 2010) which is an extension of the theory of planned behavior (Ajzen 1991), which in turn is an extension of theory of reasoned action (Fishbein and Ajzen 1975). Attitudes were

measured as a 5-item Likert scale created based on scales used in previous research studies (Jemmott and Jemmott 1990, Jemmott and Jemmott 1991). An example item is “How foolish or wise would it be to use a condom every time you have sex in the next three months?” Intentions were measured as a four item Likert scale created based on scales used in previous research studies (Jemmott and Jemmott 1990, Jemmott and Jemmott 1991). An example item is “I plan to use condoms if I have sex in the next 3 months.”

Outcome Expectancies

Two types of outcome expectancies regarding condom use were assessed in this study. Prevention outcome expectancy, the belief that condoms can reduce the risk of HIV, other STI, and pregnancy, was assessed with a scale used in previous research (Jemmott, Jemmott et al. 1992, Jemmott, Jemmott et al. 1992, Jemmott and Jemmott 1992, Jemmott, Jemmott et al. 1998, Jemmott, Jemmott et al. 1999). An example item is “Condoms help prevent AIDS.” Self-evaluative outcome expectancy, the expected emotional reaction as a consequence of using condoms (NIMH 2001, O’Leary, Hoff et al. 2005, O’Leary, Wolitski et al. 2005), was measured with a scale based on previous research (NIMH 1998). The two items comprising the self-evaluative outcome expectancy scale for condom use are as follows: “I feel good about myself when I use condoms” and “I feel bad about myself when I do not use condoms”. It is possible that the consistency for the self-evaluative outcome expectancy scale was low because as seen above the first of the two Likert items in the scale measured the same belief in the opposite direction compared to the second Likert item and they were presented immediately after each other. The self-evaluative outcome expectancy scale for condom

use in this study includes only two of three items used in previous studies to shorten the online survey.

Self-efficacy

The self-efficacy scale used in the current study is a combination of select items from three types of self-efficacy regarding condom use employed in previous research studies. Negotiation self-efficacy, the participants' belief that they can convince their partners to use condoms was assessed with items selected from a scale used in previous research (Sanderson and Jemmott 1996, Jemmott, Jemmott et al. 1998, Jemmott, Jemmott et al. 2005). An example item is "I can get my sexual partner to use a condom, even if he or she doesn't want to." Technical skill self-efficacy, the participants' belief that they know how to use condoms (Jemmott, Jemmott et al. 1992, Sanderson and Jemmott 1996, Jemmott, Jemmott et al. 1998, Jemmott, Jemmott et al. 2005), was assessed with items selected from a scale that predicted intention to use condoms in the pilot survey of African American MSM. An example item is "I can put a condom, without turning my sexual partner off." Impulse-control self-efficacy, the participants' belief that they can control themselves sufficiently when sexually aroused to use a condom (Jemmott, Jemmott et al. 1998, Jemmott, Jemmott et al. 2005, O'Leary, Jemmott et al. 2008), was measured with items selected from a scale used in previous research (Jemmott, Jemmott et al. 1998, Jemmott, Jemmott et al. 2005). An example item is "If I am sexually aroused, I can stop before sex to use a condom."

Subjective and Descriptive Norms

The survey also assessed two theoretical constructs that, though not targeted by

the intervention, are constructs in the proposed theoretical framework (Bandura 1998, Fishbein and Ajzen 2010). Subjective norm is the participants' belief regarding whether people important to them would approve of their using condoms (Fishbein and Ajzen 2010). An example item is "Most people who are important to me would think it is okay for me to use a condom." Condom-use descriptive norm is the participants' belief regarding their closest friends frequency of using condoms (Fishbein and Ajzen 2010). An example item is "On average, how often do your 5 closest friends use condoms when they have sexual intercourse?"

Secondary HIV Testing Outcomes

Table 2 presents the number of items, response format, and Cronbach's alpha for the theoretical constructs used as mediators of the intervention effect on HIV testing. As seen in Table 2, the consistency or reliability of the scales as measured by Cronbach's alpha were moderate to high for all scales except the scale for self-evaluative outcome expectancy of HIV testing.

Attitudes and Intentions

Attitudes were measured as a 4-item Likert scale created based on scales used in previous research studies (Jemmott and Jemmott 1990, Jemmott and Jemmott 1991). An example item is "How foolish or wise would it be to get tested for HIV in the next 3 months?" Intentions were measured as a 3-item Likert scale created based on scales used in previous research studies (Jemmott and Jemmott 1990, Jemmott and Jemmott 1991). An example item is "I plan to get tested for HIV in the next 3 months."

Outcome Expectancies

The survey assessed only self-evaluative outcome expectancy for HIV testing that is the expected emotional reaction as a consequence of getting tested for HIV. This scale was based on the self-evaluative outcome expectancy scale for using condoms (NIMH 2001, O'Leary, Hoff et al. 2005, O'Leary, Wolitski et al. 2005). The two items comprising the self-evaluative outcome expectancy scale for HIV testing are as follows: "I feel good about myself when I get tested for HIV" and "I feel bad about myself when I do not get tested for HIV once in every 6 months". It is possible that the consistency for the self-evaluative outcome expectancy scale was low because as seen above the first of the two Likert items in the scale measured the same belief in the opposite direction compared to the second Likert item and they were presented immediately after each other. The self-evaluative outcome expectancy scale for HIV testing in this study includes only two of three possible items adapted from previous studies in order to keep the online survey as short as possible.

Self-efficacy

The self-efficacy scale used in the current study is based on self-efficacy scales developed for condom use in other studies (Jemmott, Jemmott et al. 2005) with a few items added based on the theory of planned behavior (Ajzen 1991). An example item is "I am confident that I can overcome obstacles that might prevent me from getting tested for HIV in the next 3 months."

Subjective and Descriptive Norms

Although subjective and descriptive norms were not targeted by the intervention,

they are constructs in the proposed theoretical framework (Bandura 1998, Fishbein and Ajzen 2010) and thus were measured by the survey as potential mediators. Subjective norm is the participants' belief regarding whether people important to them would approve of their getting tested for HIV (Fishbein and Ajzen 2010). An example item is "Most people who are important to me would think it is okay for me to get tested for HIV." HIV testing descriptive norm is the participants' belief regarding their closest friends' frequency of getting tested for HIV (Fishbein and Ajzen 2010). An example item is "On average, how often do your 5 closest friends get tested for HIV?" Measures of subjective and descriptive norms for HIV testing were developed by adapting measures of the same two theoretical constructs for condom use employed in other studies (Jemmott, Jemmott et al. 2010, Jemmott, Jemmott et al. 2015).

Homophobia and HIV/AIDS Stigma Outcomes

Since the intervention aims to reduce homophobia and HIV/AIDS stigma, the survey measured attitudes toward homosexuality and HIV/AIDS using a scale from a previous study (Siebert, Chonody et al. 2009). The scale in the original study consisted of Likert items on two dimensions. The Cognitive/Social Distance factor comprised fourteen Likert items and the Affective/Attraction-Advances comprised an additional 5 Likert items. Only the 14 Likert items comprising the Cognitive/Social Distance factor (Siebert, Chonody et al. 2009) were used in the current study to measure participants' attitudes toward homosexuality. A scale developed to measure AIDS related stigma in South Africa (Kalichman, Simbayi et al. 2005) was used to measure attitudes towards AIDS amongst participants in the current study.

Statistical Analysis Plan

Descriptive statistics were used to summarize the participants at baseline on socio-demographic variables. Chi-squared (χ^2) tests and logistic regression models were used to analyze attrition. Any response greater than five standard deviations from the mean of the variable was identified as an outlier. If outliers existed among responses captured at the 3-month post-intervention assessment for sexual behavior outcomes they were excluded from analysis. An intention-to-treat approach was employed to assess intervention effects and in all other analyses: that is, eligible participants were included in the analysis as originally randomized, regardless of their level of intervention completion.

The efficacy of the HIV risk-reduction intervention at 3-month follow-up compared with the physical activity intervention was tested using binomial and multinomial logistic regression models for binary (e.g., HIV testing) and multinomial (condom use rated frequency) behavioral outcomes. For count variables capturing behavior outcomes (e.g., frequency of condomless sex) Poisson regression models were used. The efficacy of the HIV risk-reduction intervention compared with the physical activity intervention in affecting theoretical constructs hypothesized to be mediators of condom use and HIV testing was tested using GEE regression models with clustering for repeated measures over time –at baseline, immediate-post intervention and 3-month follow-up. GEE analysis with repeated measures was used to fit models for effect of the intervention on attitudes toward homosexuality and HIV/AIDS averaged over immediate-post and 3-month follow-up. These regression models were fit both with and without controlling for baseline measure of the behavior outcome or mediator. The models were

fit with robust standard errors and contrast statements were specified to obtain estimated odds ratios and their corresponding 95 % confidence intervals (CI).

The regression models included time-independent covariates, baseline measure of the outcome and intervention condition. In addition, regression models that included as covariates age, gender and education were fitted with and without controlling for baseline measure of the behavior outcome or mediator. The analyses were performed using an intent-to-treat model with participants analyzed based on their intervention assignment, regardless of the number of videos they watched in the intervention or the number of data-collection sessions they participated in. Tests for the effects of time that is the difference between the 3-month follow-up and baseline measures irrespective of condition for sexual behavior outcomes and HIV testing and the difference between 3-month follow-up, immediate-post intervention and baseline measures irrespective of condition for attitudes toward homosexuality and HIV/AIDS were conducted using GEE analysis. Analyses were completed using SAS V9.4.

Moderation analyses investigated whether age, gender and education or any combination thereof moderated the intervention effect. Logistic, Poisson and multinomial regression models were fitted to identify moderators of the intervention's effect on behavioral outcomes at 3-month follow-up measured as binary, count and multinomial variables respectively. Baseline measures of the behavioral outcomes in each model were included as covariates.

Mediation was assessed using a product-of-coefficients approach (MacKinnon, Lockwood et al. 2002, Mackinnon, Lockwood et al. 2004), where the alpha (α) path

denotes the effect of the intervention on a potential mediator at the immediate post-intervention assessment, the beta (β) path denotes the effect of the potential mediator on condomless sex in the past three months measured at the 3-month post-intervention follow-up assessment, and the product of α and β ($\alpha\beta$) quantifies the mediated effect of the intervention. Mediation was determined by testing whether the $\alpha\beta$ product differs significantly from '0'. Each theoretical construct was evaluated separately for mediation of effects of the intervention on the primary outcome, number of times had sex without condoms in the past three months. The α paths were assessed using linear regression models on theoretical constructs at the immediate post-intervention assessment, adjusting for baseline of the theoretical construct and number of times had sex without condoms in the past three months. The β paths were assessed using Poisson regression models with, intervention condition, and baseline measures of the theoretical construct and condomless sex as covariates. Estimated mean differences and 95% CI are reported for the α paths. Estimated mean differences and 95% CI are reported for the β paths. Odds ratios were obtained for binary behavioral outcomes such as HIV testing by exponentiating beta estimates (β) generated in logistic regression models. Since the distribution of the estimated $\alpha\beta$ products is non-normal, asymmetric 95% confidence intervals (ACI) calculated using the bootstrap quantile method (Mackinnon, Lockwood et al. 2004) with 5,000 replicates are reported. The $p < 0.05$, two-tailed statistical significance criterion was used in all statistical analyses except for the power analysis where $p < 0.05$, one-tailed statistical significance criterion was used. Moderation and mediation analyses were conducted using the PROCESS macro v2.16 (Hayes 2016) in SPSS version 21.

Results

Table 3 presents characteristics of participants by condition. The participants were 203 young adult African Americans: 106 in the HIV/STI risk-reduction intervention and 97 in the physical activity control intervention. Participants' age ranged from 18 to 24 years (mean = 20.52; SD = 1.65). About 80% of the participants were women and 20% were men. A majority of the participants (69%) were employed, with 53% and 16% being employed full time and part time respectively and the remaining 31% being unemployed. Almost all the participants were educated, with 74% of them having at least some college, while the remaining 25% had completed high school, and only 1% having no formal schooling. A high percentage, 75% of the participants were ever tested for HIV and none of them had been told they had HIV.

As shown in Figure 5, the CONSORT map, very high percentages of participants completed the post-intervention assessments: 189 or 93% completed the immediate post-test; 176 or 87% completed the 3-month post-intervention follow-up. Attrition at 3-month follow-up did not vary significantly between intervention and control conditions as tested using the Chi Square test ($p=.2299$). Of the original 203, 94% (191/203) attended at least one of the two post-intervention assessments. The HIV/STI risk-reduction and control conditions did not differ significantly in the percentage attending at least one follow-up ($p=.1033$) as tested by the Chi Square test.

Baseline measures of sexual behavior outcomes and HIV testing did not predict completing the 3-month follow-up assessment. In addition, baseline sociodemographic characteristics (e.g., age, employment status, and marital status) except education

($p=.0009$) did not predict returning to complete the 3-month follow-up assessment. More educated participants were more likely to complete the 3-month follow-up assessment.

Main Effects of *Reality Check* HIV/STI Risk-Reduction Intervention on Condom Use and HIV Testing

Table 4 presents the descriptive statistics for sexual behavior outcomes and HIV testing by intervention condition and assessment period. Table 5 presents the means and standard errors for attitudes toward homosexuality and HIV/ADS stigma by intervention condition and assessment period. Table 6 presents estimated intervention effects on sexual behavior outcomes, HIV testing as well as on attitudes toward homosexuality and HIV/AIDS unadjusted and adjusted for baseline responses and other relevant covariates at baseline.

As shown in Table 6, in the HIV/STI risk reduction condition, the number of times the participants reported having condomless sex decreased significantly at the 3-month follow-up compared with control condition ($p<.0001$) while adjusting for baseline number of times they had sex without condoms and education. The HIV/STI risk-reduction and physical activity interventions did not differ significantly on rated frequency of condom use, unprotected sexual intercourse, and consistent condom use, at 3-month follow-up assessment both while adjusting and not adjusting for baseline measures of the respective behaviors and education.

In the HIV/STI risk reduction condition, the number of times the participants who reported having sex decreased significantly at the 3-month follow-up compared with control condition both while not adjusting for baseline number of times they had sex

($p < .0001$) and while adjusting for the baseline number of times they had sex and education ($p = .0479$).

The HIV/STI risk-reduction and physical activity interventions did not differ significantly on HIV testing, a binary outcome, at 3-month follow-up assessment both while adjusting and not adjusting for baseline measures of HIV testing and education. Additionally, an exploratory GEE analysis regression model was fitted for HIV testing, which included only participants who had reported not being tested for HIV at baseline. This model included only 112 of the 203 participants in the study. Even in the latter model which included only participants who had not been tested for HIV at baseline, the HIV/STI risk-reduction and physical activity interventions did not differ significantly on HIV testing at 3-month follow-up assessment both while adjusting and not adjusting for baseline measures of HIV testing and education.

In the HIV/STI risk reduction condition, the participants reported significantly more positive attitudes toward homosexuality averaged over immediate-post and the 3-month follow-up compared with control condition both while not adjusting for baseline attitudes toward homosexuality ($p = .0043$) and while adjusting for baseline attitudes toward homosexuality and education ($p = .0348$). In the HIV/STI risk reduction condition, the participants reported significantly less negative attitudes toward HIV/AIDS averaged over immediate-post and the 3-month follow-up compared with control condition while not adjusting for baseline attitudes toward HIV/AIDS ($p = .0316$). HIV/STI risk-reduction and physical activity interventions did not differ significantly on attitudes toward HIV/AIDS while adjusting for baseline measure of the attitude and education.

Education was a significant predictor of attitudes toward homosexuality and HIV/AIDS. The more educated participants reported more positive attitudes toward homosexuality ($p=.0004$) while not adjusting for baseline measures of attitudes toward homosexuality and intervention condition. The more educated participants reported less negative attitudes toward HIV/AIDS both while not adjusting for baseline attitudes toward HIV/AIDS ($p<.0001$) and while adjusting for baseline measure of the same attitude and intervention condition ($p=.0406$).

Effect of Time on The Outcomes

Irrespective of condition the participants reported a decrease in condomless sex at 3-month follow-up assessment compared with baseline ($p=.0229$). Irrespective of condition, participants reported greater condom use as measured by higher scores on the scaled frequency of condom use at 3-month follow-up assessment compared with baseline ($p=.0256$). Irrespective of condition, participants were more likely to report consistent condom use, a binary outcome, at 3-month follow-up assessment compared with baseline ($p=.0067$). Irrespective of condition, participants were less likely to report having had unprotected sexual intercourse, a binary outcome, at 3-month follow-up assessment compared with baseline ($p=.0093$). There was no significant effect of time on the number of times participants reported having vaginal intercourse, anal intercourse and unprotected anal intercourse. There was no significant effect of time on the participants' attitudes toward homosexuality, but irrespective of condition the participants reported less negative attitudes toward HIV/AIDS at 3-month follow-up assessment compared with baseline ($p=.0133$).

Moderator Analysis

Age, education and gender were included in moderator analyses of the intervention's effect on the participants. The intervention's efficacy did not differ by age, education or gender even though irrespective of condition education was a significant predictor of number of times participants had sex and number of times they had sex without condoms. The more educated participants reported higher number of times they had sex ($p < .0001$) as well as greater number of times had sex without condoms ($p < .0001$) when compared to less educated participants while adjusting for baseline measures of the respective sexual behaviors and intervention condition.

Table 7 shows the means and standard errors for the theoretical constructs mediating condom use by intervention condition and assessment period. Table 8 presents estimated intervention effects on the theoretical mediators of condom use unadjusted and adjusted for baseline responses of the same and other relevant covariates at baseline. Table 9 shows the means and standard errors for the theoretical constructs mediating HIV testing by intervention condition and assessment period. Table 10 presents estimated intervention effects on the theoretical mediators of HIV testing unadjusted and adjusted for baseline responses of the same and other relevant covariates at baseline.

Participants in the HIV risk reduction intervention reported increases in self-efficacy beliefs ($p = .0371$), positive outcome expectancies ($p = .0069$) and prevention beliefs ($p = .0053$) of condom use compared to the control condition averaged over immediate-post intervention and 3-month follow-up assessments not adjusting for baseline measures of the same and education level of the participants. Participants in the

HIV risk reduction intervention reported increases in positive outcome expectancies ($p=.0219$) and prevention beliefs ($p=.0326$) of condom use compared to the control condition averaged over immediate-post intervention and 3-month follow-up assessments even while adjusting for baseline measures of the same and education level of the participants.

Participants in the HIV risk reduction intervention and control condition did not differ significantly on any of the mediators of HIV testing averaged over immediate-post intervention and 3-month follow-up assessments, unadjusted for baseline measures of the of the respective mediators and education level of the participants. Participants in the HIV risk reduction intervention reported increases in positive outcome expectancies ($p=.0338$) of HIV testing compared to the control condition averaged over immediate-post intervention and 3-month follow-up assessments adjusting for baseline measures of the same and education level of the participants.

Mediation Analysis of the Intervention Effect on Condomless Sex, Scaled Frequency of Condom Use and HIV Testing

The results of the mediation analysis for number of times participants had sex without condoms are presented in Table 11. Figure 6 shows the theorized paths for mediated effect of the intervention on condomless sex. The alpha (α) path was significant for three of the five mediators targeted by the intervention. That is compared with the physical activity intervention or control condition, *Reality Check* significantly increased three of the five theoretical constructs it targeted, adjusting for baseline measures of the theoretical construct and number of times had sex without condoms: condom-use

outcome expectancy ($p=.0004$), condom-use self-efficacy ($p=.0165$) and condom use intentions ($p=.0414$). The intervention did not significantly increase condom-use subjective norms or condom-use descriptive norms. The beta (β) path was significant for only one of the five theoretical constructs but this construct was not targeted by the intervention: condom-use descriptive norm ($p=.0180$). That is only one theoretical construct the intervention targeted, condom-use descriptive norm, had a significant effect on condomless sex. There were no significant mediators for *Reality Check*'s effect on condomless sex. That is the $\alpha\beta$ product indicating *Reality Check*'s indirect effect on condomless sex was not significant for any of the mediating theoretical constructs.

The results of the mediation analysis for scaled frequency of condom use are presented in Table 12. Figure 7 shows the theorized paths for mediated effect of the intervention on the scaled frequency of condom use. The alpha (α) path was significant for two of the five mediators targeted by the intervention. Compared with the physical activity intervention or control condition, *Reality Check* significantly increased two of the five theoretical constructs it targeted, adjusting for baseline measures of the theoretical construct and scaled frequency of condom use: condom-use outcome expectancy ($p=0.0017$) and condom-use self-efficacy ($p=0.0217$). The intervention did not significantly increase condom-use subjective norms, condom-use descriptive norms or condom-use intentions. The beta (β) path was significant for two of the five theoretical constructs: condom-use subjective norm ($p=0.0219$) and condom-use descriptive norm ($p=0.0004$). Two theoretical constructs one targeted by the intervention namely, condom-use subjective norm and another not targeted by the intervention namely, condom-use descriptive norm, had a significant effect on the scaled frequency of condom use. There

were no significant mediators for *Reality Check*'s effect on the scaled frequency of condom use. That is the $\alpha\beta$ product indicating *Reality Check*'s indirect effect on scaled frequency of condom use was not significant for any of the mediating theoretical constructs.

The results of the mediation analysis for HIV testing are presented in Table 13. Figure 8 shows the theorized and actual paths for mediated effect of the intervention on HIV testing. The alpha (α) path was significant for only one of the five mediators targeted by the intervention. That is compared with the physical activity intervention or control condition, *Reality Check* significantly increased one of the five theoretical constructs it targeted, adjusting for baseline measures of the theoretical construct and HIV testing: HIV testing outcome expectancy ($p=.0184$). The intervention did not significantly increase HIV testing subjective norms, HIV testing descriptive norms, HIV testing self-efficacy or HIV testing intentions. The beta (β) path was significant for only one of the five theoretical constructs the intervention targeted: HIV testing subjective norm ($p=.0389$). That is one theoretical construct the intervention targeted, HIV testing subjective norm had a significant effect on HIV testing. There were no significant mediators for *Reality Check*'s effect on HIV testing. That is the $\alpha\beta$ product indicating *Reality Check*'s indirect effect on HIV testing was not significant for any of the mediating theoretical constructs.

Discussion

The hypothesis that the HIV risk-reduction intervention would decrease condomless sex amongst young adult African Americans, while controlling for baseline measure of the same was supported by the results. Condomless sex was chosen as the most important sexual behavior of interest in regards to this population because it is the behavior most closely associated with the risk of STIs(Jemmott, Jemmott et al. 1998). Condom use measures were not used as primary outcomes for the current demographic that is, young adults because some of them may not have sex within the 3-month reporting periods at baseline or follow-up and therefore will be excluded from outcome analyses. Condomless sex does not have that problem because people are included in the analysis irrespective of whether they had sex.

The HIV risk-reduction intervention also reduced the number of times participants had sex compared with the control group both adjusting and not adjusting for baseline measure of the same behavior. This offered support for the hypothesis that the intervention will promote sexual abstinence. The number of times a person has sex is associated with increased risk of incidence of HIV infection (Jemmott, Jemmott et al. 1998). But the HIV risk-reduction intervention did not increase consistent condom use, scaled frequency of condom use or decrease the binary variable measuring unprotected sexual intercourse.

In accordance with other RCTs this study also found that a variety of sexual risk behaviors decrease over time (O'Leary, Hoff et al. 2005, El-Bassel, Jemmott et al. 2010, Koblin, Bonner et al. 2012, Jemmott, Jemmott et al. 2015). Irrespective of condition

participants reported an increase in scaled frequency of condom use, and consistent condom use as well as a decrease in number of times they had sex and condomless sex. One speculates that this could have been caused by a couple of reasons. Firstly, people who chose to participate in the study might already have been interested in learning about and adopting safe sexual behaviors. Such self-selection into the study could have led to an overall decrease in risky sexual behaviors. Secondly the very act of answering the questions in the online survey multiple times in fourteen weeks could have functioned as a HIV risk reduction intervention by making the dangers of risky sexual behaviors and the desirability of adopting safe sexual behaviors salient to the participants. They might have acted on this new salience by trying to reduce their risky sexual behaviors thus leading to an increase in condom use and decrease in sexual activity and unprotected sex over time across all participants irrespective of condition.

This study was similar to other studies in finding limited intervention effects on sexual risk behaviors (Halpern, Mitchell et al. 2008, Bull, Pratte et al. 2009, Noar, Black et al. 2009, Hirshfield, Chiasson et al. 2012, Mustanski, Garofalo et al. 2013, Schnall, Travers et al. 2014). For example one study (Blas, Alva et al. 2010) found some effect on intentions to get tested for HIV but found no difference between intervention and control condition for actual behavior. One other study (Bull, Pratte et al. 2009) found the intervention had affected outcome-expectancy for condom use, intentions to condom use and self-efficacy for using condoms but found no difference between intervention and control condition for sexual behavior. Another study with adolescents decreased sexual activity amongst participants in the computer based HIV risk reduction condition but did not decrease unprotected sexual intercourse (Lightfoot, Comulada et al. 2007). Yet

another study with men who have sex with men (MSM) found that the intervention decreased unprotected anal sex but did not decrease number of sexual partners or increase intentions to use condoms (Mustanski, Garofalo et al. 2013). Multiple studies found no difference in sexual behaviors between the intervention and control conditions (Coleman, Jemmott et al. 2009, Koblin, Bonner et al. 2012, Jemmott, Jemmott et al. 2015). One study with adolescent girls found that the video based HIV risk reduction intervention reduced sexual activity but did not increase condom use (Downs, Murray et al. 2004).

Contrary to expectation, the hypothesis that the HIV risk-reduction intervention would increase HIV testing amongst young adult African Americans aged between 18 and 24 years of age, compared with the attention-matched control group was not supported. One reason for not detecting an intervention effect for HIV testing might have been because the power analysis was conducted for the outcome of, “Ever having been tested for HIV”, whereas the outcome used for analysis in the current study was, “HIV testing in the past 3 months”. This could have led to the study being under-powered for the outcome used in analysis for the current study. Another reason for not detecting an intervention effect for HIV testing might have been because participants who reported having been tested for HIV in the past 3 months at baseline were unlikely to get tested again in the following 3.5 months, when the 3-month post-intervention follow-up survey was conducted. Therefore, an exploratory GEE analysis regression model was fitted for HIV testing, only including participants who had reported not being tested at baseline. This model did not show a significant intervention effect on HIV testing. But this could have been a consequence of the model being under-powered because this analysis included only 112 of the 203 participants.

Reality Check also reduced homophobia compared with the control intervention. To the best of the author's knowledge there is only one intervention that had a significant effect on attitudes toward homosexuality and decreased HIV/AIDS stigma (Brown, Macintyre et al. 2003). But there seem no other interventions especially technology based interventions for young adults that have been evaluated for their effects on HIV/AIDS stigma or attitudes toward homosexuality using a randomized controlled trial. Therefore, the current study breaks new ground by using a randomized controlled trial to find strong evidence that the current intervention reduced homophobia and HIV/AIDS stigma amongst African American young adults. This study adds to the collective knowledge regarding HIV prevention by identifying a technology based intervention that effectively reduces homophobia and HIV/AIDS stigma and has the added advantage of being easily disseminable on a large scale by virtue of being an online intervention.

Even though there have been calls for mediation analyses of intervention effects (Beadnell 2007), as of this writing there seem to be no systematic mediation analyses of effects for any technology or video based HIV risk reduction interventions. Some studies on technology based HIV risk reduction interventions reported about the interventions' effect on theoretical mediators of sexual behaviors and HIV testing such as self-efficacy, intentions and outcome expectancies hypothesized to account for the mechanism of its impact (Downs, Murray et al. 2004, Lightfoot, Comulada et al. 2007, Blas, Alva et al. 2010, Hirshfield, Chiasson et al. 2012, Schnall, Travers et al. 2014), while other studies have conducted systematic mediation analyses of multiple mediated paths of effects for in-person HIV risk reduction interventions (Jemmott, Jemmott et al. 2015, Zhang, Jemmott et al. 2015). But no systematic mediation analyses of technology based or online

video based HIV risk reduction interventions for any target demographic seem to exist. One trial reported that the intervention did not change theoretical constructs from Social Cognitive Theory such as self-efficacy and outcome expectancies compared with the control group (Koblin, Bonner et al. 2012). Seven other studies reported significant intervention effects on theoretical mediators such as self-efficacy, attitudes and outcome expectancies (Hirshfield, Chiasson et al. 2012) but did not take it forward to examine if these mediators informed by behavior change theory in turn had an effect on the targeted outcome behavior.

The present mediation analysis provides insight into why the intervention did not have an effect on one of the primary outcomes namely HIV testing though it did successfully reduce the number of times participants had condomless sex. Generally, mediation analysis throws light on two groups of relationships. First, it identifies which potential mediators were affected by the intervention and second it looks at which potential mediators were associated with changes in the outcome. Mediation analyses were conducted for three behavior outcomes namely, number of times participants had sex without condoms, scaled frequency of condom use and HIV testing

In the mediation analysis for number of times participants had sex without condoms, the intervention changed three of the five mediators included in the analysis namely, condom use outcome expectancy, condom use self-efficacy and condom use intentions. Mediation analysis for the intervention's effect on scaled frequency of condom use shows that, the intervention changed two of the five mediators included in the analysis namely, condom use outcome expectancy and condom use self-efficacy. These were constructs from social cognitive theory and the reasoned action approach the

intervention targeted (Bandura 1977, Ajzen 1985, Ajzen and Madden 1986, Bandura 1986, Ajzen 1991, Bandura 1998, Bandura 2001, Bandura 2002, Bandura 2004). Other studies evaluating computer-based HIV risk reduction interventions for adolescents have reported affecting condom use self-efficacy, condom use intentions and condom use attitudes (Roberto, Zimmerman et al. 2007, Halpern, Mitchell et al. 2008, Bull, Pratte et al. 2009, Markham, Shegog et al. 2009, Marsch, Grabinski et al. 2011, Guse, Levine et al. 2012). But only the descriptive norm of condom use in the current mediation analysis seems to have been associated with the number of times participants reported having sex without condoms. The mediation analysis for the intervention's effect on scaled frequency of condom use shows that both subjective and descriptive norms were associated with the said sexual behavior. Since the intervention affected neither descriptive norms for condom-use nor subjective norms for condom-use in the current study there was no mediated effect of the intervention on both sexual behaviors namely the number of times the participants reported having condomless sex and the scaled frequency of condom use. The current study is in accordance with other computer based HIV risk reduction intervention trials for adolescents in showing that the intervention affected condom use self-efficacy and prevention beliefs regarding condom use (Halpern, Mitchell et al. 2008) but unlike other studies the intervention did not affect condom use norms (Halpern, Mitchell et al. 2008, Guse, Levine et al. 2012).

To the best of the author's knowledge studies evaluating technology based HIV testing interventions for adolescents have not conducted mediation analysis (Lou, Zhao et al. 2006, Halpern, Mitchell et al. 2008, Blas, Alva et al. 2010). The mediation analysis of HIV testing in the current study shows that the intervention affected only one of the five

mediators included in the model: it increased positive outcome expectancies for HIV testing. That meant the intervention did not have a significant effect on subjective norms, descriptive norms, self-efficacy and intentions for HIV testing. Only subjective norms were associated with HIV testing in the mediation model and since the intervention did not affect subjective norms there was no significant mediated effect of the intervention on HIV testing in the current study. In contrast to the current study other computer based HIV testing interventions have affected intentions for HIV testing (Blas, Alva et al. 2010) and self-efficacy measured as perceived difficulty to get tested for HIV (Halpern, Mitchell et al. 2008) but neither study reports affecting the behavior itself.

Contrary to other studies based on the reasoned action approach (Fishbein and Ajzen 2010) as well as the theories of reasoned action (Fishbein and Ajzen 1975) and planned behavior (Ajzen 1991) that found attitudes were stronger predictors of intentions and consequently behaviors when compared to norms (Sheeran, Norman et al. 1999, Albarracín, Johnson et al. 2001) the current study found that subjective and descriptive norms were better predictors of condom use and subjective norms were better predictors of HIV testing when compared with attitudes toward the respective behaviors. The results of the mediation analyses have implications for developing efficacious technology and video based interventions for young adult African Americans. The mediation analyses show that to be effective HIV risk reduction interventions for this population need to focus on subjective and descriptive norms for condom use and descriptive norms for HIV testing. That makes sense given the outsized role that peer-influence and perceived norms play in shaping a variety of behavior choices among young adults in general.

Because of the above discussed phenomenon enhancing intervention effects on descriptive norms might increase the efficacy of interventions for African American young adults more generally. Pursuing changes in descriptive norms require a different intervention strategy: interventions focused on individuals are unlikely to affect descriptive norms because there is no opportunity in the intervention for the participants to perceive that their closest friends' condom use or HIV testing behaviors have changed since the friends have not received any intervention. So a social media based intervention either with friends or even strangers from the same demographic is more likely to affect descriptive norms for condom use and HIV testing. Such an intervention, could possibly change the friends' behaviors, which would affect the participants' descriptive norm, which would, in turn, increase condom use and HIV testing, particularly if the intervention also increased other mediators such as self-evaluative outcome expectancies regarding condom use and HIV testing, intentions to use condoms and get tested for HIV, self-efficacy and subjective norms for condom use and HIV testing. Another implication based on the results of the current study is that developing an interactive technology based intervention that increases the participants' engagement with the intervention as well as with other participants in the intervention might be more effective than the current study which only needs the participants to be passive consumers of educational entertainment content online. Additionally, one more recommendation based on the results of this study for creators of video based interventions is that they consider the wide variety of technology platforms available today for dissemination. Thus, it is recommended that they create multimedia interventions that allow themselves to be easily disseminated not just through traditional platforms such as TV shows or YouTube

videos but can also be adapted to evolving communication modes such as mobile apps and video games.

Some of the limitations of this study are considered here. Only 20% of the participants in the study were males and in general the participants were more educated when compared to the average education level of young adult African Americans. These limitations in recruitment could affect the generalizability of the results from this study. Thus, the findings may not generalize to all African American young adults because participants were not randomly selected; they were only randomly assigned to conditions. Even though there were two primary outcomes namely condomless sex and HIV testing the eligibility criteria only required that potential participants should have had sex in the past three months. Failure to check whether potential participants had been tested for HIV in the past three months as eligibility criteria resulted in recruitment of nearly 75% of participants who had already been tested for HIV. Therefore, if a study similar to the current one is conducted in the future it is recommended that in addition to requiring the potential participants be sexually active recently, the eligibility criteria should also include that the potential participants not have been tested for HIV in recent months.

Though development of the intervention was informed by social cognitive theory (SCT), evaluation of the study measured the intervention's impact only on some variables from SCT such as outcome expectancies and self-efficacy. This study did not validate the degree to which some key mechanisms of effect explicated in SCT held true for this intervention. For example, SCT argues that the intervention has an impact because the participants identify with the actors in the serial drama and when they see actors being rewarded for adopting recommended behaviors the participants are more likely to adopt

the same behaviors. One of the limitations of the current study is that it did not measure how much the participants identified with the actors or whether the participants perceived the consequences of actors adopting the recommended behaviors as rewarding for the actors in the serial drama.

Behavior was measured with self-reports, which may be subject to social desirability bias, although the use of online surveys might have mitigated potential issues with self-reports. Also, objective indicators of sexual-risk behavior such as biologically confirmed STIs would improve the study. The reliability of the theoretical constructs ranged from 0.50 to 0.92 and 0.41 to 0.97 for condom use and HIV testing respectively. Higher reliability would have increased the statistical power for the mediation analyses; hence, we may have underestimated mediation (Hoyle and Kenny 1999). A general limitation of mediation analyses is that they are correlational; evidence from factorial experiments manipulating intervention components and hypothesized mediators would be more cogent, albeit much more challenging to implement in practice (MacKinnon 2008). Another limitation of this study similar to most video based interventions involving real people as characters is that styles of language, clothing and appearance as well as propriety of locations and settings can become dated very quickly since these expectations and fashions change particularly rapidly among young adults. This could lead to the participants finding it harder to identify with characters in serial drama or video based interventions over time. Using non-human cartoons or comic book characters and creating animated video content can be one way of getting around this issue and increasing the length of time that video based HIV prevention interventions stay relevant to young adults.

The current study had several strengths. Behavior-change theory was combined with extensive formative research in the form of focus groups, interviews and consultations with community advisory boards to develop an intervention that was both informed by theory and tailored to the target demographic. The study employed a randomized controlled trial design and a dose- and modality-equivalent control intervention aimed at controlling for participants' attention. The retention rate was very high and did not differ by intervention condition. Mediation analysis was used to examine and identify the aspects of the intervention that worked and the aspects that did not. Furthermore, mediation analysis was used to suggest improvements that could make the intervention more efficacious. This study used a structural intervention that was delivered in the native environment of the target demographic- the Internet, where they consume most of the video content in their lives. The intervention used in this study was designed to be scalable to very large audiences and was inexpensive to deploy or implement in a multitude of locations and contexts since it was an online video based intervention. The only real cost for such interventions is at the development stage, once developed the effort and costs of implementing them are negligible.

Conclusion

This dissertation discusses the design, implementation and evaluation of a theory-informed entertainment-education based HIV risk reduction intervention that employs online video streaming. This intervention was targeted at young adult African Americans, one of the populations at highest risk for HIV in the United States. Social cognitive theory and the reasoned action approach were employed to design the intervention and measure the effect it had on the participants. GEE analysis models were fitted to identify the main effects of the intervention as well as to generate statistical models for mediated effect of the intervention on behavior outcomes using theoretical constructs from SCT and the reasoned action approach as mediators.

Consistent with several other trials, there was mixed evidence that the intervention reduced some sexual-risk behaviors while not affecting others targeted by it. The intervention reduced number of times participants had sexual intercourse and number of times they had condomless sex. Meta-analytic evidence indicates people who engage in sexual intercourse especially condomless sexual intercourse are more likely to develop an incident HIV infection compared with young adults who are abstinent from sex altogether (Underhill, Operario et al. 2007), it did not increase HIV testing which was a primary outcome, or affect other behavioral outcomes such as scaled frequency of condom use. The intervention broke new ground by reducing homophobia amongst African American young adults; it also reduced HIV/AIDS stigma.

There exists a shortage of effective computer-based structural HIV risk reduction interventions for African American young adults. This study contributes to the literature

by identifying new directions for intervention development and research with this population. To summarize, this randomized controlled trial, targeted a high-risk population, deployed a tailored structural Internet-based intervention, went further than previous studies in examining and discussing the mediating mechanisms in a theory-informed intervention that employed entertainment-education.

Reality Check Tables

Table 1: Characteristics of theoretical constructs concerning condom use

Construct	Number of items	Type of response	Alpha
Condom-use attitudes*	5	5-Point Likert	.78
Condom-use subjective norm	3	5-Point Likert	.88
Condom-use descriptive norm	3	5-Point Likert	.82
Condom-use self-efficacy	7	5-Point Likert	.78
Condom-use self-evaluative outcome expectancy	2	5-Point Likert	.50
Condom-use prevention outcome expectancy	3	5-Point Likert	.84
Condom-use outcome expectancy	5	5-Point Likert	.68
Condom-use intentions	4	5-Point Likert	.92

Ratings on the Likert scales could range from 1 (Disagree strongly) to 5 (Agree strongly) except for condom-use descriptive norm where the ratings could range from 1 (never) to 5 (every time). Alpha is Cronbach's coefficient alpha for the post-intervention assessment of the construct, which was analyzed as the potential mediator

*Ratings on the Likert scale for condom use attitudes could range from 1 (Very Bad/Very Foolish/Very Unpleasant/Very Dangerous/Very Unenjoyable) to 5 (Very Good/Very Wise/Very Pleasant/Very Safe/Very Enjoyable)

Table 2: Characteristics of theoretical constructs concerning HIV testing, attitudes towards HIV/AIDS, and homosexuality attitudes.

Construct	Number of items	Type of response	Alpha
HIV testing attitudes*	4	5-Point Likert	.76
HIV testing subjective norm	3	5-Point Likert	.88
HIV testing descriptive norm	3	5-Point Likert	.90
HIV testing self-efficacy	3	5-Point Likert	.90
HIV testing self-evaluative outcome expectancy	2	5-Point Likert	.41
HIV testing anxiety	2	5-Point Likert	.57
HIV testing intentions	3	5-Point Likert	.97
HIV/AIDS attitudes	9	5-Point Likert	.90
Homosexuality attitudes	14	5-Point Likert	.91

Ratings on the Likert scales could range from 1 (Disagree strongly) to 5 (Agree strongly) except for HIV testing descriptive norm where the ratings could range from 1 (never) to 5 (every time). Alpha is Cronbach's coefficient alpha for the post-intervention assessment of the construct, which was analyzed as the potential mediator

*Ratings on the Likert scale for condom use attitudes could range from 1 (Very Bad/Very Foolish/Very Unpleasant/Very Dangerous/Very Unenjoyable) to 5 (Very Good/Very Wise/Very Pleasant/Very Safe/Very Enjoyable)

Table 3: Baseline sociodemographic characteristics of African Americans by intervention condition, USA, 2016–2017

Characteristic	Total No. (%) Or Mean (SD)	HIV/STI Intervention No. (%) Or Mean (SD)	Physical Activity Intervention No. (%) Or Mean (SD)
No.	203	106/203 (52%)	97/203 (48%)
Mean (SD) Age (years)	20.52 (1.65)	20.41 (1.68)	20.63 (1.62)
Gender			
Men	41/203 (20%)	25/106 (24%)	16/97 (16.5%)
Women	162/203 (80%)	81/106 (76%)	81/97 (83.5%)
Phone Type			
No. (%) Android	33/201 (16%)	15/106 (14%)	18/95 (19%)
No. (%) iPhone	168/201 (84%)	91/106 (86%)	77/95 (81%)
No. (%) Employed			
No. (%) Unemployed	63/203 (31%)	38/106 (36%)	25/97 (26%)
No. (%) Full Time	108/203 (53%)	53/106 (50%)	55/97 (57%)
No. (%) Part Time	32/203 (16%)	15/106 (14%)	17/97 (17%)
Education			
No. (%) No Formal Schooling	2/203 (1%)	1/106 (1%)	1/97 (1%)
No. (%) Less Than High School Diploma	0/203 (0%)	0/106 (0%)	0/97 (0%)
No. (%) A High School Diploma (or GED)	51/203 (25%)	28/106 (26%)	23/97 (24%)
No. (%) Some College or 2 Year Degree	109/203 (54%)	52/106 (49%)	57/97 (59%)
No. (%) 4 Year College	34/203 (17%)	21/106 (20%)	13/97 (13%)
No. (%) Post-graduate Work	7/203 (3%)	4/106 (4%)	3/97 (3%)
Marital Status			
No. (%) Never Married	199/203 (98%)	102/106 (96%)	97/97 (100%)
No. (%) Married	3/203 (2%)	3/106 (3%)	0/97 (0%)
No. (%) Separated	1/203 (0%)	1/106 (1%)	0/97 (0%)
Ever tested for HIV	155/203 (76%)	80/106 (75%)	75/97 (77%)

Table 4: Self-reported sexual behaviors and HIV testing in the past 3 months by intervention condition and assessment period, African Americans, USA, 2016–2017

Self-reported behavior	Baseline	3-Month
Mean (SE) Times had sex without condom		
HIV/STI Intervention	10.56 (23.13)	7.30 (13.07)
Physical Activity Intervention	7.62 (13.36)	7.26 (15.57)
Mean (SE) Scaled frequency of condom use		
HIV/STI Intervention	3.13 (1.55)	3.32 (1.62)
Physical Activity Intervention	3.00 (1.57)	3.28 (1.61)
No (%) Unprotected intercourse		
HIV/STI Intervention	74/106 (70)	55/89 (62)
Physical Activity Intervention	68/96 (71)	53/87 (61)
No (%) Consistent condom use		
HIV/STI Intervention	26/100 (26)	29/84 (34)
Physical Activity Intervention	23/91 (25)	30/83 (36)
Mean (SE) Times had vaginal sex		
HIV/STI Intervention	11.70 (15.19)	11.07 (16.69)
Physical Activity Intervention	18.54 (27.70)	14.72 (19.91)
No (%) HIV testing		
HIV/STI Intervention	39/106 (37)	39/89 (44)
Physical Activity Intervention	37/96 (38)	41/86 (48)

Table 5: Self-reported attitudes toward homosexuality and HIV/AIDS by intervention condition and assessment period, African Americans, USA, 2016–2017

Self-reported attitudes	Baseline	Immediate-post	3-Month
Mean (SE) Homosexuality attitudes*			
HIV/STI Intervention	4.31 (0.79)	4.36 (0.74)	4.41 (0.76)
Physical Activity Intervention	4.16 (0.81)	3.99 (0.86)	4.11 (0.81)
Mean (SE) HIV/AIDS attitudes†			
HIV/STI Intervention	4.46 (0.63)	4.53 (0.57)	4.51 (0.64)
Physical Activity Intervention	4.24 (0.57)	4.26 (0.77)	4.36 (0.64)

*Higher scores on the homosexuality attitudes scale indicate more positive attitudes toward homosexuality

† Higher scores on the HIV/AIDS attitudes scale indicate more positive attitudes towards HIV/AIDS or less HIV/AIDS stigma

Table 6: GEE analysis, significance tests, estimated effects, 95% confidence intervals (CI) for the intervention effect unadjusted and adjusted for baseline prevalence and significant covariates, African Americans, USA, 2016–2017

Outcome	Unadjusted† Estimate		Adjusted† Estimate	
	β , RR or OR (95% CI)	p value	β , RR or OR (95% CI)	p value
Times had sex without condom in the past 3 months*	0.99 (0.88, 1.10)	.8237	0.73 (0.65, 0.82)	<.0001
Scaled frequency of condom use in the past 3 months*	1.12 (0.64, 1.95)	.6909	0.82 (0.45, 1.51)	.5297
Unprotected intercourse in the past 3 months*	1.01 (0.55, 1.86)	.9797	0.82 (0.39, 1.72)	.6034
Consistent condom-use in the past 3 months*	0.97 (0.51, 1.84)	.9229	0.91 (0.42, 1.93)	.7990
Times had vaginal sex in the past 3 months*	1.30 (1.19, 1.41)	<.0001	0.91 (0.83, 0.9992)	.0479
HIV testing in the past 3 months*	0.87 (0.48, 1.58)	.6502	0.83 (0.44, 1.56)	.5690
Attitudes toward homosexuality ^Δ	0.29 (0.09, 0.50)	.0043	0.15 (0.01, 0.28)	.0348
Attitudes toward HIV/AIDS ^Δ	0.18 (0.02, 0.34)	.0316	-0.01 (-0.11, 0.08)	.7702

† Unadjusted models controlled for education level of the participants while adjusted models controlled for baseline prevalence of the outcome and education level of the participants

* For outcomes measured as count or multinomial variables Risk Ratios were reported, whereas for binary outcomes, Odds Ratios were reported. RR and OR (Reality Check Intervention vs Physical Activity Control).

Δ For attitudes toward homosexuality and HIV/AIDS, measurements at two time points- immediate-post and 3-months after intervention, were included in the analysis while for other outcomes measurements were included only at 3-month follow-up. For continuous variables beta estimates were reported. Beta estimates represent the mean difference between conditions (Reality Check Intervention-Physical Activity Control).

Table 7: Mean (SE) for potential mediators of condom use by intervention condition and assessment period, African Americans, USA, 2016–2017

Potential mediators*	Baseline	Immediate-post	3-Month
Condom use attitudes			
HIV/STI Intervention	3.97 (0.74)	4.58 (0.46)	4.24 (0.68)
Physical Activity Intervention	3.95 (0.62)	4.41 (0.62)	4.23 (0.67)
Condom use subjective norms			
HIV/STI Intervention	4.61 (0.69)	4.38 (0.55)	4.66 (0.60)
Physical Activity Intervention	4.64 (0.59)	4.34 (0.52)	4.59 (0.71)
Condom use descriptive norms			
HIV/STI Intervention	2.84 (0.83)	3.01 (0.87)	2.97 (0.92)
Physical Activity Intervention	2.73 (0.74)	2.99 (0.83)	2.96 (0.84)
Condom use self-efficacy beliefs			
HIV/STI Intervention	4.25 (0.66)	4.46 (0.36)	4.39 (0.60)
Physical Activity Intervention	4.11 (0.69)	4.27 (0.55)	4.30 (0.67)
Condom use outcome expectancies			
HIV/STI Intervention	4.35 (0.53)	4.55 (0.48)	4.43 (0.61)
Physical Activity Intervention	4.2 (0.57)	4.28 (0.60)	4.31 (0.56)
Condom use prevention beliefs			
HIV/STI Intervention	4.66 (0.55)	4.77 (0.48)	4.72 (0.57)
Physical Activity Intervention	4.49 (0.67)	4.48 (0.67)	4.57 (0.57)
Condom use self-evaluative beliefs			
HIV/STI Intervention	3.87 (0.93)	4.22 (0.82)	4.01 (1.00)
Physical Activity Intervention	3.76 (0.87)	3.97 (0.87)	3.91 (0.98)
Condom use intentions			
HIV/STI Intervention	3.97 (1.15)	4.59 (0.65)	4.20 (1.04)
Physical Activity Intervention	3.93 (1.14)	4.37 (0.83)	4.17 (0.96)

* higher scores indicate greater support for using condoms

Table 8: GEE linear regression analyses, significance tests, beta estimates, 95% confidence intervals (CI) for the overall intervention effect on potential mediators of condom use unadjusted and adjusted for baseline prevalence and significant covariates, African Americans, USA, 2016–2017

Potential Mediator	Unadjusted†		Adjusted*	
	β (95 % CI)	p value	β (95 % CI)	p value
Condom use attitudes	0.10 (-0.05, 0.24)	.1955	0.08 (-0.04, 0.21)	.1984
Condom use subjective norm	0.06 (-0.08, 0.20)	.4265	0.03 (-0.09, 0.16)	.5974
Condom use descriptive norm	0.01 (-0.21, 0.24)	.8971	-0.04 (-0.22, 0.14)	.6321
Condom use self-efficacy beliefs	0.15 (0.01, 0.29)	.0371	0.07 (-0.03, 0.18)	.1674
Condom use outcome expectancies	0.20 (0.05, 0.34)	.0069	0.16 (0.02, 0.30)	.0219
Condom use prevention beliefs	0.21 (0.06, 0.36)	.0053	0.13 (0.01, 0.25)	.0326
Condom use self-evaluative beliefs	0.17 (-0.06, 0.41)	.1431	0.12 (-0.07, 0.30)	.2195
Condom use intentions	0.14 (-0.07, 0.35)	.1992	0.11 (-0.05, 0.27)	.1812

† Unadjusted models controlled for education level of the participants. The beta estimates represent the mean difference between intervention condition and control condition

*Adjusted models controlled for baseline of the potential mediator and education level of the participants.

The beta estimates represent the mean difference between conditions (Reality Check Intervention-Physical Activity Control).

Table 9: Mean (SE) for potential mediators of HIV testing by intervention condition and assessment period, African Americans, USA, 2016–2017

Potential mediator	Baseline	Immediate-post	3-Month
HIV testing attitudes			
HIV/STI Intervention	4.52 (0.55)	4.59 (0.48)	4.58 (0.53)
Physical Activity Intervention	4.38 (0.66)	4.46 (0.67)	4.41 (0.63)
HIV testing subjective norms			
HIV/STI Intervention	4.48 (0.74)	4.61 (0.62)	4.61 (0.61)
Physical Activity Intervention	4.32 (0.93)	4.45 (0.78)	4.45 (0.73)
HIV testing descriptive norms			
HIV/STI Intervention	2.58 (1.19)	2.59 (1.11)	2.80 (1.13)
Physical Activity Intervention	2.53 (1.11)	2.78 (1.13)	2.64 (1.06)
HIV testing self-efficacy beliefs			
HIV/STI Intervention	4.51 (0.74)	4.59 (0.55)	4.46 (0.68)
Physical Activity Intervention	4.36 (0.78)	4.42 (0.71)	4.55 (0.58)
HIV testing outcome expectancies			
HIV/STI Intervention	3.79 (1.07)	4.12 (0.84)	3.96 (0.93)
Physical Activity Intervention	3.75 (0.93)	3.85 (0.86)	3.84 (0.89)
Mean (SE) HIV testing anxiety			
HIV/STI Intervention	4.07 (1.09)	4.24 (0.93)	4.33 (0.96)
Physical Activity Intervention	3.83 (1.20)	4.21 (1.03)	4.23 (0.92)
HIV testing intentions			
HIV/STI Intervention	3.81 (1.24)	4.11 (1.11)	4.11 (1.06)
Physical Activity Intervention	3.67 (1.31)	3.92 (1.22)	3.83 (1.29)

Table 10: GEE linear regression analyses, significance tests, beta estimates, 95% confidence intervals (CI) for the overall intervention effect on mediators of HIV testing, unadjusted and adjusted for baseline prevalence and significant covariates, African Americans, USA, 2016–2017

Mediator of HIV testing	Unadjusted†		Adjusted*	
	β (95 % CI)	p value	β (95 % CI)	p value
HIV testing attitudes	0.15 (0.001, 0.30)	.0482	0.07 (-0.04, 0.18)	.2306
HIV testing subjective norm	0.15 (-0.02, 0.33)	.0835	0.09 (-0.06, 0.23)	.2408
HIV testing descriptive norm	-0.02 (-0.31, 0.27)	.9036	-0.05 (-0.25, 0.14)	.5896
HIV testing self-efficacy beliefs	0.04 (-0.12, 0.20)	.6269	-0.01 (-0.14, 0.11)	.8475
HIV testing outcome expectancies	0.20 (-0.02, 0.42)	.0702	0.19 (0.01, 0.37)	.0338
HIV testing anxiety	0.02 (-0.21, 0.26)	.8386	-0.04 (-0.23, 0.15)	.6700
HIV testing intentions	0.26 (-0.04, 0.55)	.0927	0.20 (-0.03, 0.44)	.0941

† Unadjusted models controlled for education level of the participants

*Adjusted models controlled for baseline prevalence of the mediator and education level of the participants.

The beta estimates represent the mean difference between conditions (Reality Check Intervention-Physical Activity Control).

Table 11: Mediation analysis of intervention effects (HIV/STI intervention vs physical activity intervention) fit to times had sex without condoms in the past three months, at 3 months post-intervention, African Americans, USA, 2016–2017

Potential mediator	Effect of the intervention on the potential mediator			Effect of the potential mediator on outcome			Overall Indirect Effect $\alpha*\beta$ product (95 % ACI)
	α path (SE)	(95 % CI)	p value	β path (SE)	(95 % CI)	p value	
Condom use outcome expectancy	0.24 (0.07)	(0.11, 0.37)	.0004	-1.90 (2.09)	(-6.02, 2.23)	.3655	-0.4523 (-2.0740, 0.4384)
Condom use subjective norm	0.03 (0.07)	(-0.01, 0.17)	.7215	0.91 (1.81)	(-2.66, 4.47)	.6157	0.0244 (-0.2324, 0.6664)
Condom use descriptive norm	-0.0004 (0.10)	(-0.20, 0.20)	.9970	-3.22 (1.35)	(-5.87, -0.56)	.0180	0.0012 (-0.6393, 0.7466)
Condom use self-efficacy	0.14 (0.06)	(0.03, 0.26)	.0165	-0.75 (2.33)	(-5.35, 3.84)	.7459	-0.1084 (-1.4475, 0.6569)
Condom use intentions	0.20 (0.10)	(0.01, 0.39)	.0414	0.82 (1.38)	(-1.91, 3.55)	.5535	0.1624 (-0.4689, 1.3304)

Potential mediators are from the immediate post-intervention assessment. Alpha path, the effect of the intervention on the construct, is adjusted for baseline times had sex without condom in the past three months and the theoretical construct. Beta path, the relation of the theoretical construct to times had sex without condom in the past three months measured at 3 months post-intervention, is adjusted for intervention condition and baseline of times had sex without condom in the past three months and mediator. CI is confidence interval. ACI is asymmetric confidence interval based on bootstrap quantile method with 5,000 replicates

Table 12: Mediation analysis of intervention effects (HIV/STI intervention vs physical activity intervention) fit to scaled frequency of condom use, at 3 months post-intervention, African Americans, USA, 2016–2017

Potential mediator	Effect of the intervention on the potential mediator			Effect of the potential mediator on outcome			Overall Indirect Effect $\alpha*\beta$ product (95 % ACI)
	α path (SE)	(95 % CI)	p value	β path (SE)	(95 % CI)	p value	
Condom use outcome expectancy	0.22 (0.07)	(0.08, 0.50)	.0017	0.24 (0.25)	(-0.25, 0.73)	.3409	0.0512 (-0.0323, 0.2083)
Condom use subjective norm	0.01 (0.08)	(-0.14, 0.17)	.8868	0.49 (0.21)	(0.07, 0.90)	.0219	0.0055 (-0.0782, 0.0987)
Condom use descriptive norm	-0.03 (0.10)	(-0.23, 0.18)	.7876	0.55 (0.15)	(0.25, 0.86)	.0004	-0.0156 (-0.1527, 0.0889)
Condom use self-efficacy	0.15 (0.06)	(0.02, 0.27)	.0217	0.18 (0.27)	(-0.35, 0.71)	.4990	0.0264 (-0.0355, 0.1492)
Condom use intentions	0.19 (0.10)	(-0.02, 0.39)	.0702	0.01 (0.16)	(-0.31, 0.33)	.9551	0.0017 (-0.0690, 0.0922)

Potential mediators are from the immediate post-intervention assessment. Alpha path, the effect of the intervention on the construct, is adjusted for baseline rated frequency of condom use and the theoretical construct. Beta path, the relation of the theoretical construct to rated frequency of condom use measured at 3 months post-intervention, is adjusted for intervention condition and baseline of rated frequency of condom use and mediator. CI is confidence interval. ACI is asymmetric confidence interval based on bootstrap quantile method with 5,000 replicates

Table 13: Mediation analysis of intervention effects (HIV/STI intervention vs physical activity intervention) fit to HIV testing, at 3 months post-intervention, African Americans, USA, 2016–2017

Potential mediator	Effect of the intervention on the potential mediator			Effect of the potential mediator on outcome			Overall Indirect Effect $\alpha*\beta$ product (95 % ACI)
	α path (SE)	(95 % CI)	p value	β path (SE) OR	(95 % CI)	p value	
HIV testing outcome expectancy	0.27 (0.11)	(0.05, 0.50)	.0184	1.34 (1.25)	(0.86, 2.07)	.2030	0.0785 (-0.0253, 0.2827)
HIV testing subjective norm	0.08 (0.09)	(-0.10, 0.27)	.3659	1.79 (1.32)	(1.03, 3.09)	.0389	0.0494 (-0.0319, 0.2780)
HIV testing descriptive norm	-0.21 (0.12)	(-0.44, 0.02)	.0745	1.38 (1.25)	(0.89, 2.14)	.1562	-0.0665 (-0.2593, 0.0164)
HIV testing self-efficacy	0.10 (0.08)	(-0.06, 0.26)	.2210	1.43 (1.36)	(0.79, 2.61)	.2438	0.0364 (-0.0221, 0.2061)
HIV testing intentions	0.12 (0.14)	(-0.16, 0.39)	.4149	1.38 (1.21)	(0.94, 1.99)	.0969	0.0367 (-0.0339, 0.2674)

Potential mediators are from the immediate post-intervention assessment. Alpha path, the effect of construct, is adjusted for baseline HIV testing and the theoretical construct. Beta path, the relation of the theoretical construct to HIV testing measured at 3 months post-intervention, is adjusted for intervention condition and baseline of HIV testing and mediator. CI is confidence interval. ACI is asymmetric confidence interval based on bootstrap quantile method with 5,000 replicates.

Reality Check Figures

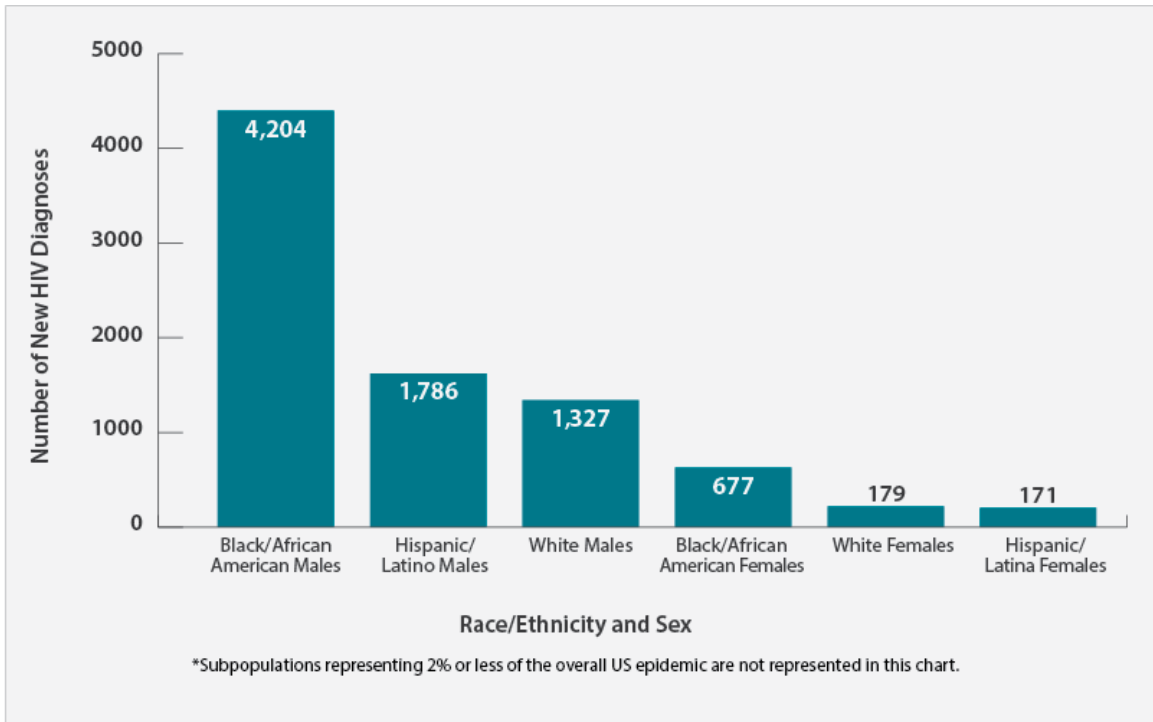


Figure 1: New HIV Diagnoses Among Youth Aged 13-24, 2015. Source: CDC. [Diagnoses of HIV infection in the United States and dependent areas](#), 2015. HIV Surveillance Report 2016;27.

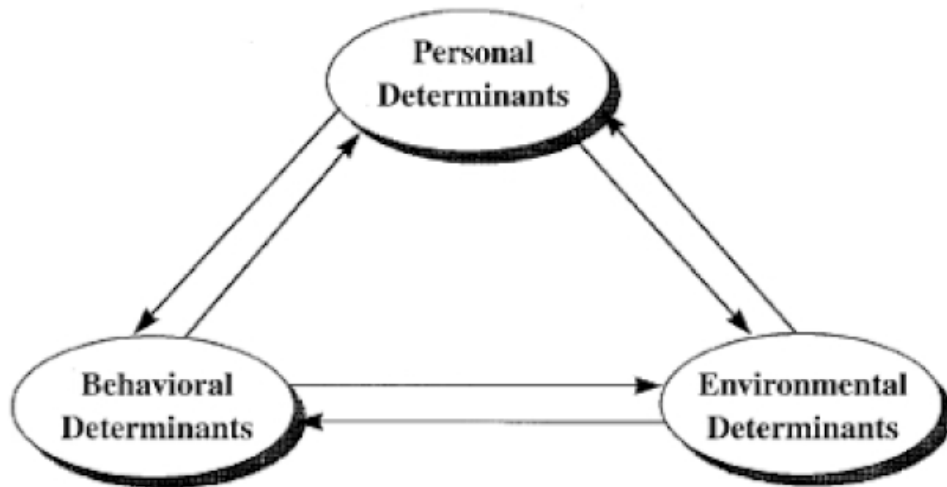


Figure 2: The triadic reciprocal causal model of behavioral, environmental and personal determinants proposed by SCT. Adapted from Bandura, A. (2002). *Social Cognitive Theory of Mass Communication*. In J. Bryant & D. Zillmann (Eds.), *Media Effects: Advances In Theory And Research* (2nd ed., pp. 121–153). Taylor & Francis.

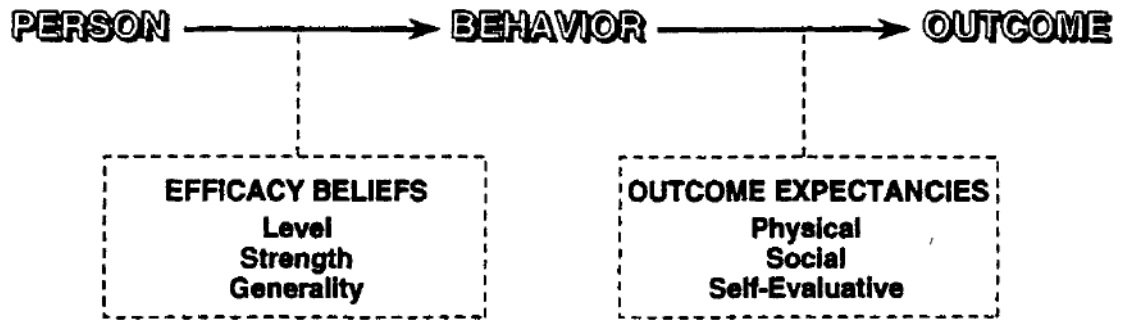


Figure 3: The conditional relations between efficacy beliefs and outcome expectancies. Adapted from Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. *Psychology & Health*, 13(4), 623–649. doi:10.1080/08870449808407422

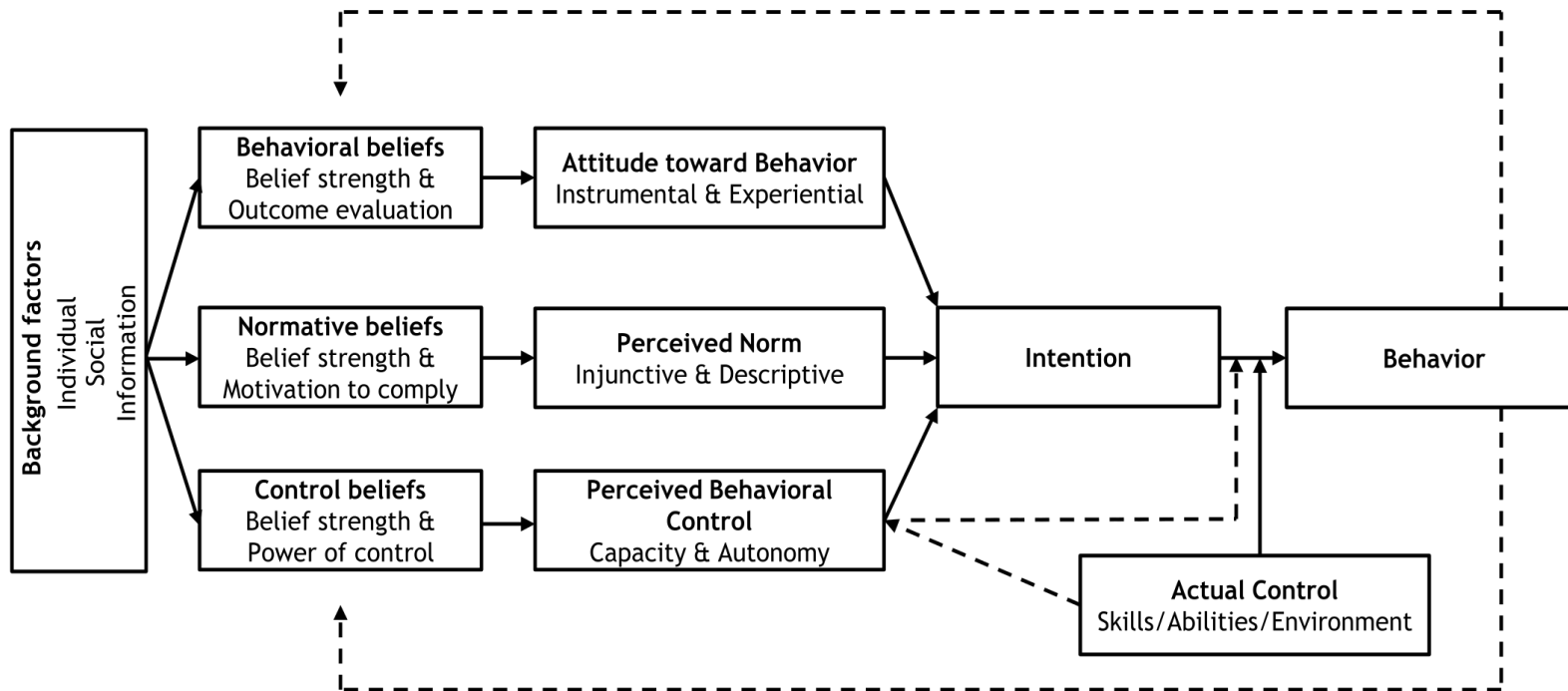


Figure 4: The reasoned action approach model. Adapted from Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior: The Reasoned Action Approach*. New York: Taylor & Francis

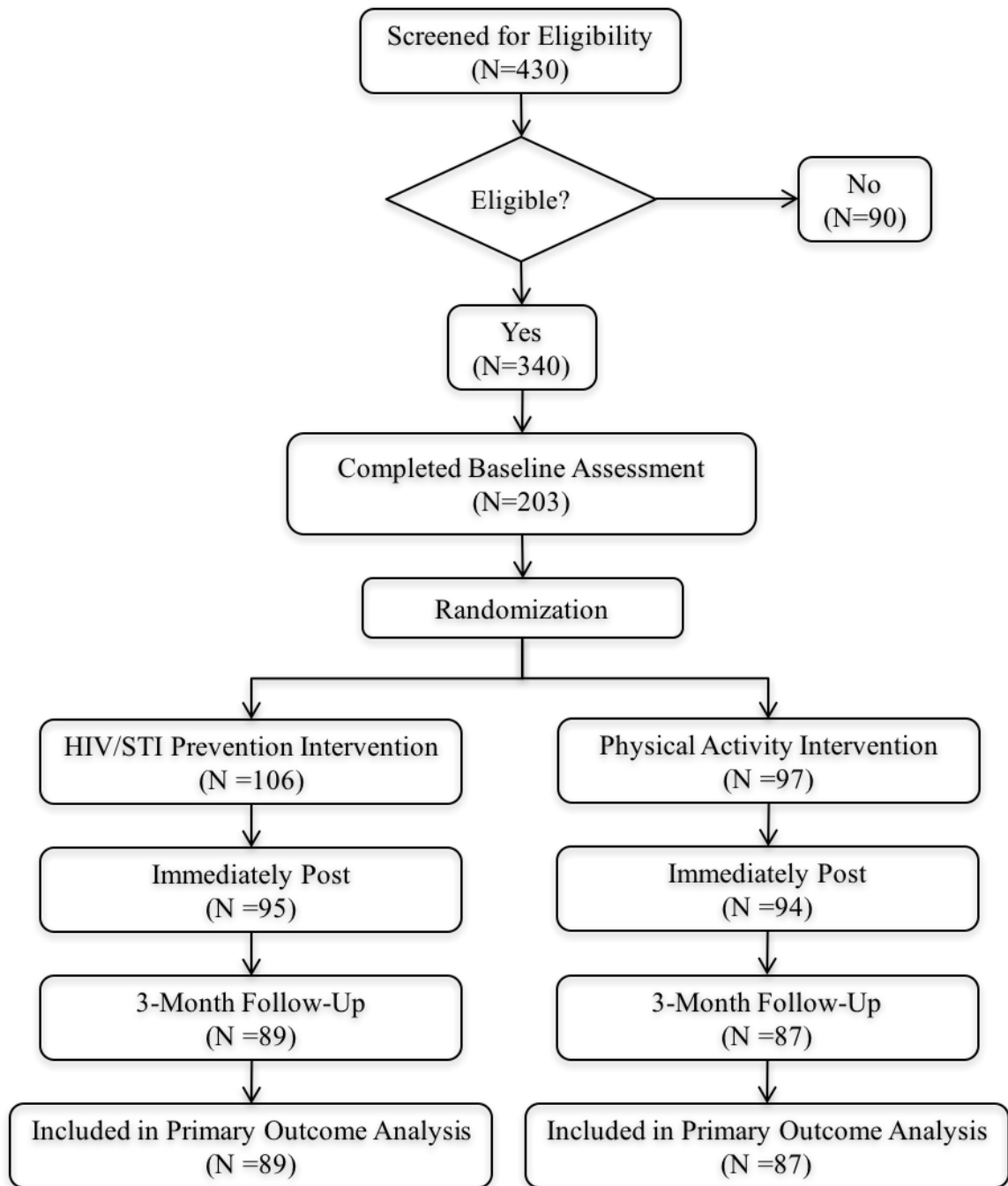


Figure 5: CONSORT map for enrollment into *Reality Check* randomized controlled trial

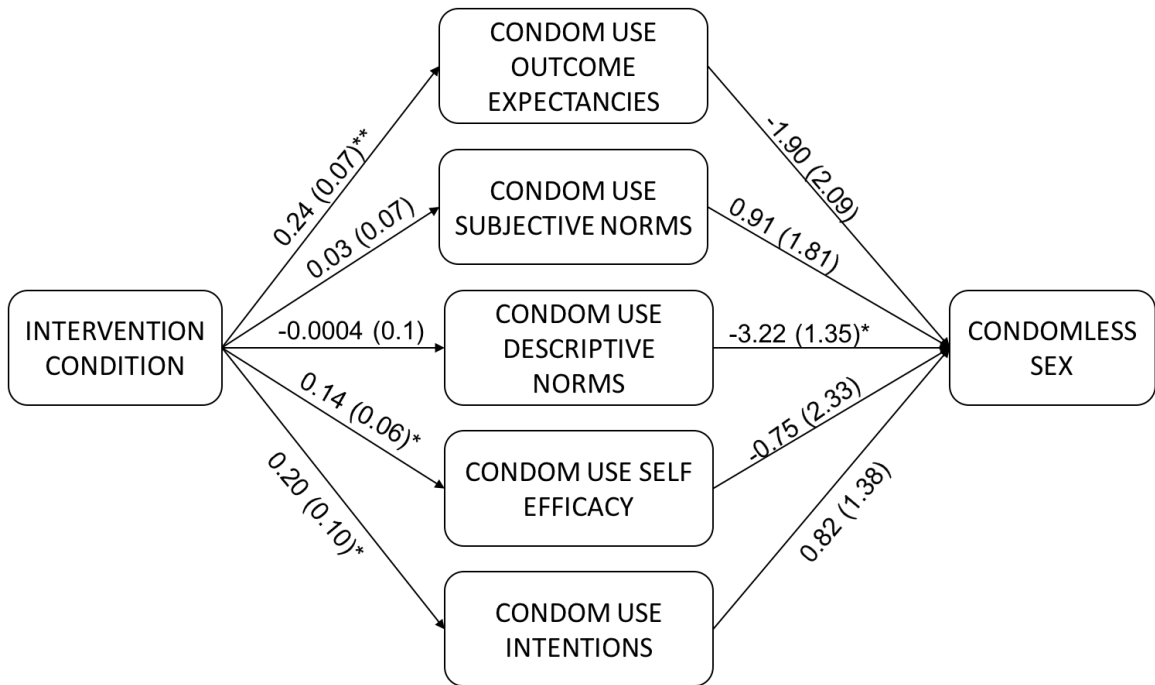


Figure 6: Visualization of the mediation model for the intervention's effects on condomless sex. The unstandardized coefficients (SE) are shown along each path and asterisks were used to reflect statistical significance, * $p < .05$, ** $p < .001$.

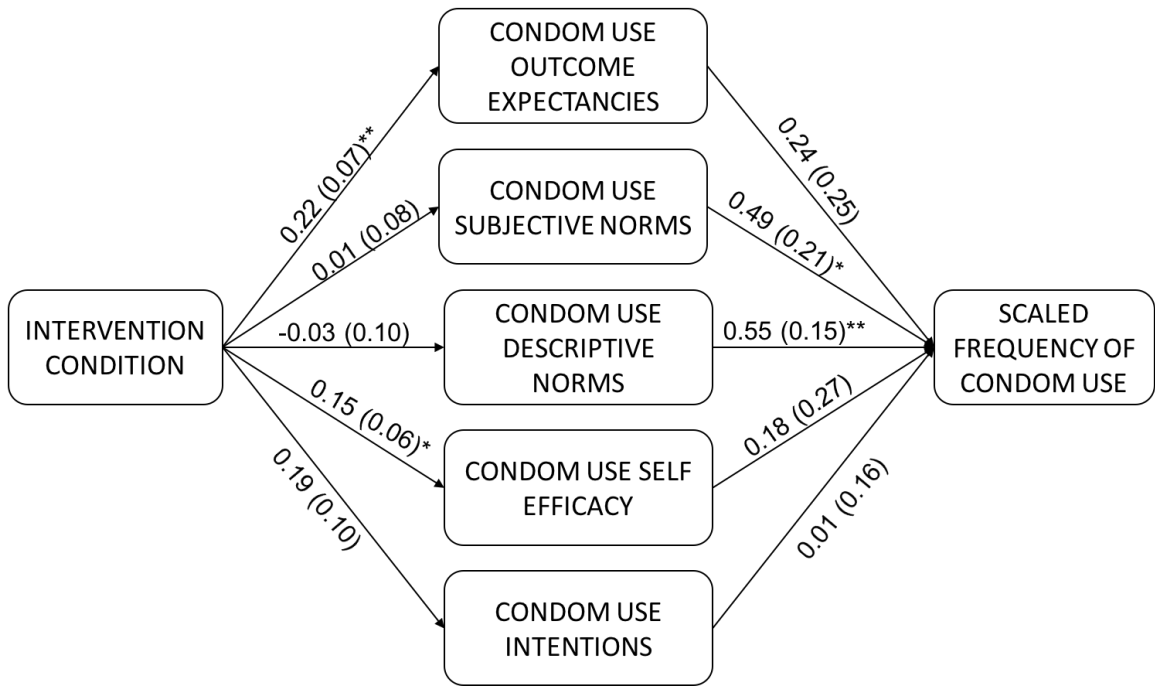


Figure 7: Visualization of the mediation model for the intervention's effects on scaled frequency of condom use. The unstandardized coefficients (SE) are shown along each path and asterisks were used to reflect statistical significance, * $p < .05$, ** $p < .001$.

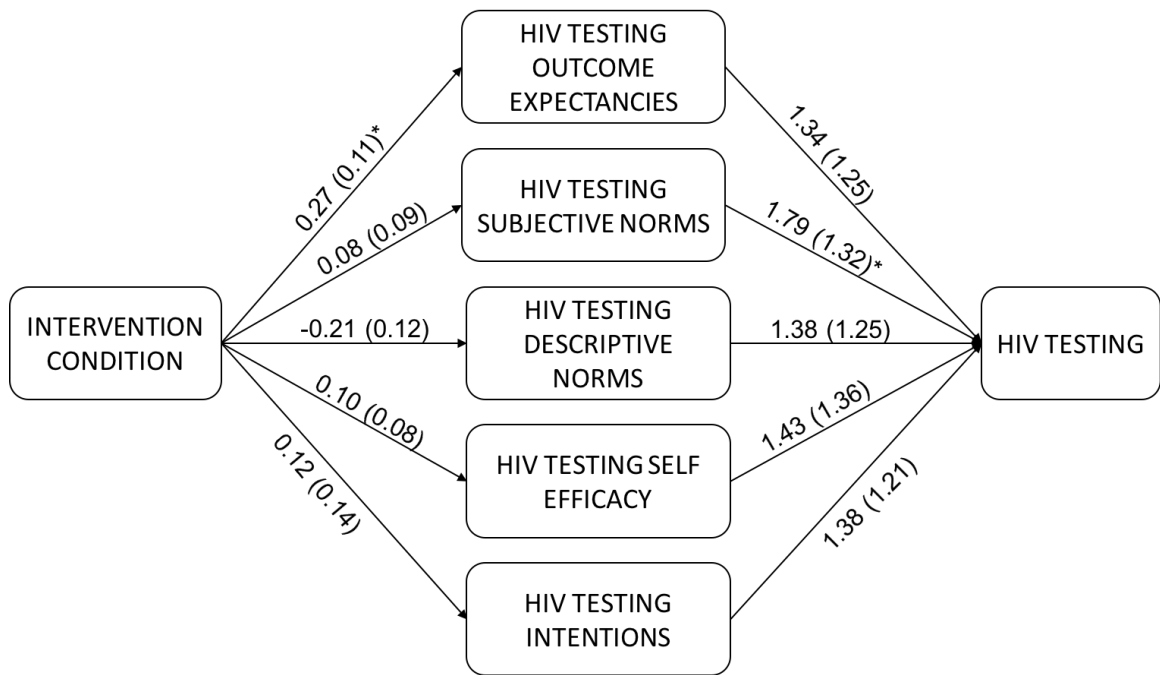


Figure 8: Visualization of the mediation model for the intervention's effects on HIV testing. The unstandardized coefficients (SE) are shown along each path an asterisks were used to reflect statistical significance, * $p < .05$, ** $p < .001$.

Appendix A: Screening Survey

1. How old are you?
₁ Less than 18 years old
₂ 18 years - 24 years old
₃ More than 24 years old

2. Do you consider yourself Black or African American?
₁ Yes ₂ No

3. Do you have a working cell phone with a data plan that can access the internet?
₁ Yes ₂ No

4. Will you agree to accept possible data charges associated with being in this study?
₁ Yes ₂ No

5. Do you have an email id where you can be contacted?
₁ Yes ₂ No

6. Do you have a Facebook id where you can be reached at?
₁ Yes ₂ No

7. Have you had sex in the past three months?
₁ Yes ₂ No

8. Do you want to participate in the study?
₁ Yes ₂ No

Appendix B: Reality Check Online Survey

A. Background Information

The questions in this survey are about things related to your health, as well as general questions about your background. Some questions ask about what you know; others ask your opinion on things; and others ask about things you may or may not have done. Some of the questions are very personal and ask about different sexual activities that some people do.

These particular questions are very blunt and to the point, questions you probably have never seen on a questionnaire before. Most of the questions are not like this, however. If a question bothers you so much that you do not want to answer it, you can skip that question and continue with the questionnaire. We warn you about the questions that are personal and blunt so that you will not be surprised when you see them. Please answer all of the questions honestly. This will help us design risk reduction programs that are truly helpful to people.

Your answers will be kept completely confidential—only authorized study personnel will ever see your answers. Please do not talk with others while you are answering the questions.

1. What is your date of birth? ____ ____ ____

2. What is your age? ____ ____

Please Enter City State and Zipcode Below

3. City _____

4. State _____

5. Zipcode _____

6. Do you own a smartphone? ₁ No ₂ Yes

7. What kind of a smartphone do you own?

₁ Android ₂ iPhone ₂ Other

For the questions that follow, you may select “Yes” to as many as apply.

8. Are you Black? ₁ No or ₂ Yes
9. Are you African American? ₁ No or ₂ Yes
10. Are you White? ₁ No or ₂ Yes
11. Are you Asian? ₁ No or ₂ Yes
12. Are you Hispanic/Latino? ₁ No or ₂ Yes
13. Are you American Indian/Alaska Native? ₁ No or ₂ Yes
14. Are you Native Hawaiian or other Pacific Islander? ₁ No or ₂ Yes
15. What is your marital status?
₁ Never married
₂ Married
₃ Separated
₄ Divorced
₅ Widowed
16. How long have you been married? ___ ___years
17. What is the highest grade of school you have completed?
₀ No formal schooling
₁ Less than a high school diploma
₂ A high school diploma (or GED)
₃ Some college or a 2-year degree
₄ 4-year college degree
₅ Post-graduate work
18. What is your employment status?
₀ Unemployed
₁ Part-time
₂ Full-time
19. Have you had vaginal sex in the past three months? ₁ No ₂ Yes
20. Have you had anal sex in the past three months? ₁ No ₂ Yes

B. Sexual Attitudes

The following questions ask how you feel about condom use. Please indicate how much you agree or disagree with the following statements, whether others would approve or disapprove of the behavior, and whether you plan to use condoms in the NEXT 3 MONTHS. Select the choice that best describes your feelings.

1. How bad or good would it be to use a condom every time you have sex in the next 3 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Bad | Bad | In the
Middle | Good | Very
Good |

2. How foolish or wise would it be to use a condom every time you have sex in the next 3 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Foolish | Foolish | In the
Middle | Wise | Very
Wise |

3. How unpleasant or pleasant would it be to use a condom every time you have sex in the next 3 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Unpleasant | Unpleasant | In the
Middle | Pleasant | Very
Pleasant |

4. How dangerous or safe would it be to use a condom every time you have sex in the next 3 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Dangerous | Dangerous | In the
Middle | Safe | Very
Safe |

5. How unenjoyable or enjoyable would it be to use a condom every time you have sex in the next 3 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Unenjoyable | Unenjoyable | In the
Middle | Enjoyable | Very
Enjoyable |

11. I can stop sex to get a condom, if I do not have one.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

Please indicate whether you agree or disagree with the statements by selecting the number that most closely represents your feelings about the statement.

12. I can put a condom on without turning my sexual partner off.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

13. I can get my sexual partner to use a condom, even if he or she doesn't want to.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

14. I can say to my sexual partner that we should use a condom.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

15. Before we are ready to have sex, I can talk to my sexual partner about using a condom.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

16. I will try to get my sexual partner to use condoms if we have sex in the next 3 months.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

17. I plan to use condoms if I have sex in the next 3 months.

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Disagree
Strongly | Disagree | In the
Middle | Agree | Agree
Strongly |

18. How likely is it that you will decide to use a condom if you have sex in the next 3 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Unlikely | Unlikely | In the
Middle | Likely | Very
Likely |

19. I intend to use a condom if I have sex in the next 3 months

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Disagree
Strongly | Disagree | In the
Middle | Agree | Agree
Strongly |

20. I am willing to use a condom if I have sex in the next 3 months

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Disagree
Strongly | Disagree | In the
Middle | Agree | Agree
Strongly |

How much do you agree or disagree with each of the following statements about condoms? (Try to answer the questions even if you have never used condoms.)

21. Condoms help prevent STDs.

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Disagree
Strongly | Disagree | In the
Middle | Agree | Agree
Strongly |

22. Condoms help prevent pregnancy.

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Disagree
Strongly | Disagree | In the
Middle | Agree | Agree
Strongly |

28. How many of your 5 closest friends use condoms when they have sexual intercourse with a main sexual partner?

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| None | 1 or 2 | 3 or 4 | All |
| Of Them | Of Them | Of Them | Of Them |

29. How many of your 5 closest friends use condoms when they have sexual intercourse with a casual partner? (A *casual partner* is a man or woman who is not a main sexual partner.)

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| None | 1 or 2 | 3 or 4 | All |
| Of Them | Of Them | Of Them | Of Them |

The following questions are about your sexual behavior in the recent past. Please answer them honestly. Honest answers will help us build better risk reduction programs. For the following questions on your sexual behavior, please choose answers for vaginal sex or anal sex or both as it applies to you.

30. In the past 3 months, how many times did you have vaginal intercourse?

___ ___ times

31. In the past 3 months, how many times did you have anal intercourse?

___ ___ times

32. In the past 3 months, on how many times did you have vaginal intercourse without using a condom?

___ ___ times

33. In the past 3 months, on how many times did you have anal intercourse without using a condom?

___ ___ times

==> ERROR CHECK: B33 CANNOT GREATER THAN B31

34. When you had vaginal intercourse in the past 3 months, how often did you use a condom?

- ₁ Never
- ₂ Sometimes
- ₃ Often
- ₄ Almost every time
- ₅ Every time

==> When combining this question with anal intercourse weight it by frequency

35. When you had anal intercourse in the past 3 months, how often did you use a condom?

- ₁ Never
- ₂ Sometimes
- ₃ Often
- ₄ Almost every time
- ₅ Every time

==> When combining this question with the vaginal intercourse one weight it by frequency

C. HIV Testing

The following questions ask about your plans to get tested for HIV. Please indicate how much you agree or disagree with the following statements, and whether you plan to get tested for HIV in the NEXT 3 MONTHS. Select the choice that best describes your feelings.

1. I plan to get tested for HIV in the next 3 months.

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Disagree
Strongly | Disagree | In the
Middle | Agree | Agree
Strongly |

2. I intend to get tested for HIV in the next 3 months

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Disagree
Strongly | Disagree | In the
Middle | Agree | Agree
Strongly |

3. I am willing to get tested for HIV in the next 3 months

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Disagree
Strongly | Disagree | In the
Middle | Agree | Agree
Strongly |

4. How likely are you to get tested for HIV in the next 3 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
UnLikely | Unlikely | In the
Middle | Likely | Very
Likely |

The following questions ask how you feel about HIV Testing. Please indicate how much you agree or disagree with the following statements, whether others would approve or disapprove of the behavior. Select the choice that best describes your feelings.

5. How bad or good would it be to get tested for HIV in the next 3 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Bad | Bad | In the
Middle | Good | Very
Good |

6. How foolish or wise would it be to get tested for HIV in the next 3 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Foolish | Foolish | In the
Middle | Wise | Very
Wise |

7. How unpleasant or pleasant would it be to get tested for HIV in the next 3 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Unpleasant | Unpleasant | In the
Middle | Pleasant | Very
Pleasant |

8. How dangerous or safe would it be to get tested for HIV in the next 6 months?

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Very Dangerous	Dangerous	In the Middle	Safe	Very Safe

9. How afraid or unafraid are you of getting tested for HIV in the next 3 months?

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Very Afraid	Somewhat Afraid	In the Middle	Somewhat Unafraid	Not At All Afraid

10. How afraid or unafraid are you of getting a positive result if you get tested for HIV in the next 3 months?

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Very Afraid	Somewhat Afraid	In the Middle	Somewhat Unafraid	Not At All Afraid

11. It's very easy for me to get tested for HIV in the next 3 months.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

12. I am sure I can get tested for HIV in the next 3 months.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

13. I am confident that I can overcome obstacles that might prevent me from getting tested for HIV in the next 3 months.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

19. Most of my friends get tested for HIV once every 6 months

₁
Disagree
Strongly

₂
Disagree

₃
In the
Middle

₄
Agree

₅
Agree
Strongly

How much do you agree or disagree with each of the following statements about HIV Testing? (Try to answer the questions even if you have never gotten tested for HIV.)

20. It's very important for me to get tested for HIV to protect myself and my sex partners.

₁
Disagree
Strongly

₂
Disagree

₃
In the
Middle

₄
Agree

₅
Agree
Strongly

21. I feel good about myself when I get tested for HIV.

₁
Disagree
Strongly

₂
Disagree

₃
In the
Middle

₄
Agree

₅
Agree
Strongly

22. I feel bad about myself when I do not get tested for HIV once in every 6 months.

₁
Disagree
Strongly

₂
Disagree

₃
In the
Middle

₄
Agree

₅
Agree
Strongly

23. Have you ever been tested for HIV?

₁ No or ₂ Yes

==> IF NO, SKIP TO D1; IF YES GO TO C23a

23a. Were you tested in the past 3 months?

₁ No or ₂ Yes

==> IF NO, SKIP TO C23c; IF YES GO TO C23b

5. I would feel disappointed if I heard that my child was homosexual.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

6. I would feel that I had failed as a parent if I learned that my child was gay.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

7. I would feel uncomfortable knowing that my son's male teacher was homosexual.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

8. It would disturb me to find out that my doctor was homosexual.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

9. I would feel uncomfortable being seen in a gay bar.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

10. It would not bother me to walk through a predominantly gay section of town.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

11. I would feel comfortable knowing that my clergyman was homosexual.

₁ ₂ ₃ ₄ ₅
Disagree Disagree In the Agree Agree
Strongly Middle Strongly

12. I would feel comfortable working closely with a female homosexual.

₁ ₂ ₃ ₄ ₅
Disagree Disagree In the Agree Agree
Strongly Middle Strongly

13. I would feel comfortable if I learned that my daughter's teacher was a lesbian.

₁ ₂ ₃ ₄ ₅
Disagree Disagree In the Agree Agree
Strongly Middle Strongly

14. I would feel comfortable if I learned that my best friend of my sex was homosexual.

₁ ₂ ₃ ₄ ₅
Disagree Disagree In the Agree Agree
Strongly Middle Strongly

E. HIV/AIDS Attitudes

Some people have different feelings and ideas. Please indicate whether you agree or disagree with the statements by selecting how you feel about the statement.

1. People who have AIDs are dirty.

₁ ₂ ₃ ₄ ₅
Disagree Disagree In the Agree Agree
Strongly Middle Strongly

2. People who have AIDs are cursed.

₁ ₂ ₃ ₄ ₅
Disagree Disagree In the Agree Agree
Strongly Middle Strongly

3. People who have AIDs should be ashamed.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

4. It is safe for people who have AIDS to work with children.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

5. People with AIDS must expect some restrictions on their freedom.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

6. A person with AIDS must have done something wrong and deserves to be punished.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

7. People who have HIV should be isolated.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

8. I do not want to be friends with someone who has AIDS.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Disagree Strongly	Disagree	In the Middle	Agree	Agree Strongly

9. People who have AIDS should not be allowed to work.

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Disagree
Strongly | Disagree | In the
Middle | Agree | Agree
Strongly |

F. EXERCISE ATTITUDES AND BEHAVIOR

Some people have different feelings and ideas. Please indicate whether you agree or disagree with the statements by selecting the CHOICE that best describes your feelings.

1. How bad or good would it be to exercise for 30 minutes at least 6 times a week in the next 6 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Bad | Bad | In the
Middle | Good | Very
Good |

2. How foolish or wise would it be to exercise for 30 minutes at least 6 times a week in the next 6 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Foolish | Foolish | In the
Middle | Wise | Very
Wise |

3. How unpleasant or pleasant would it be to exercise for 30 minutes at least 6 times a week in the next 6 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Unpleasant | Unpleasant | In the
Middle | Pleasant | Very
Pleasant |

4. How dangerous or safe would it be to exercise for 30 minutes at least 6 times a week in the next 6 months?

- | | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
| Very
Dangerous | Dangerous | In the
Middle | Safe | Very
Safe |

5. How harmful or beneficial would it be to exercise for 30 minutes at least 6 times a week in the next 6 months?

₁ ₂ ₃ ₄ ₅
Very Harmful Harmful In the Middle Beneficial Very Beneficial

6. Most people who are important to me would think it is okay for me to exercise for 30 minutes at least 6 times a week in the next 6 months.

₁ ₂ ₃ ₄ ₅
Disagree Strongly Disagree In the Middle Agree Agree Strongly

7. Most people who are important to me would think I should exercise for 30 minutes at least 6 times a week in the next 6 months.

₁ ₂ ₃ ₄ ₅
Disagree Strongly Disagree In the Middle Agree Agree Strongly

8. Most people who are important to me would want me to exercise for 30 minutes at least 6 times a week in the next 6 months.

₁ ₂ ₃ ₄ ₅
Disagree Strongly Disagree In the Middle Agree Agree Strongly

9. I am confident that I can overcome obstacles that might prevent me from exercising for 30 minutes at least 6 times a week in the next 6 months.

₁ ₂ ₃ ₄ ₅
Disagree Strongly Disagree In the Middle Agree Agree Strongly

10. I am sure that I can exercise for 30 minutes at least 6 times a week in the next 6 months.

- ₁ Disagree Strongly ₂ Disagree ₃ In the Middle ₄ Agree ₅ Agree Strongly

11. I plan to exercise for 30 minutes at least 6 times a week in the next 6 months.

- ₁ Disagree Strongly ₂ Disagree ₃ In the Middle ₄ Agree ₅ Agree Strongly

12. My goal is to exercise for 30 minutes at least 6 times a week in the next 6 months.

- ₁ Disagree Strongly ₂ Disagree ₃ In the Middle ₄ Agree ₅ Agree Strongly

13. I will try to exercise for 30 minutes at least 6 times a week in the next 6 months.

- ₁ Disagree Strongly ₂ Disagree ₃ In the Middle ₄ Agree ₅ Agree Strongly

Please select how often you did each of the following behaviors in the PAST 7 DAYS.

14. On how many of the past 7 days, did you exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard, such as basketball, hockey, soccer, running, swimming laps, fast bicycling, fast dancing, or similar vigorous physical activities?

- ₀ 0 days
₁ 1 day
₂ 2 days
₃ 3 days
₄ 4 days
₅ 5 days
₆ 6 days
₇ 7 days

2. On how many of the past 7 days, did you exercise or participate in physical activity for at least 30 minutes that did not make you sweat and breathe hard, such as walking, slow bicycling, skating, pushing a lawn mower or anything else that caused small increases in breathing or heart rate?

₀ 0 days

₁ 1 day

₂ 2 days

₃ 3 days

₄ 4 days

₅ 5 days

₆ 6 days

₇ 7 days

3. On how many of the past 7 days, did you exercise to strengthen or tone your muscles, such as push-ups, sit-ups, or weight lifting?

₀ 0 days

₁ 1 day

₂ 2 days

₃ 3 days

₄ 4 days

₅ 5 days

₆ 6 days

₇ 7 days

Thank you for your taking the time to answer our survey!

If you have any comments about the questions you answered today, please feel free to reach out to us through the Contact page

Bibliography

- Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. Action Control. P. D. D. J. Kuhl and D. J. Beckmann, Springer Berlin Heidelberg: 11-39.
- Ajzen, I. (1991). "The Theory of Planned Behavior." Organizational Behavior and Human Decision Processes **50**(2): 179-211.
- Ajzen, I. and T. J. Madden (1986). "Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control." Journal of Experimental Social Psychology **22**(5): 453-474.
- Albarracín, D., B. T. Johnson, M. Fishbein and P. A. Muellerleile (2001). "Theories of reasoned action and planned behavior as models of condom use: A meta-analysis." Psychological Bulletin **127**(1): 142-161.
- Arrington-Sanders, R. and J. Ellen (2008). "Prevalence of self-reported human immunodeficiency virus testing among a population-based sample of urban African-American adolescents." Journal of Adolescent Health **43**(3): 306-308.
- Bandura, A. (1977). Social learning theory, Prentice Hall.
- Bandura, A. (1982). "Self-efficacy mechanism in human agency." American Psychologist **37**(2): 122-147.
- Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ, US, Prentice-Hall, Inc.
- Bandura, A. (1998). "Health promotion from the perspective of social cognitive theory." Psychology & Health **13**(4): 623-649.
- Bandura, A. (2001). "SOCIAL COGNITIVE THEORY: An Agentive Perspective." Annual Review of Psychology **52**(1): 1-26.
- Bandura, A. (2002). Social Cognitive Theory of Mass Communication. Media Effects: Advances In Theory And Research. J. Bryant and D. Zillmann, Taylor & Francis: 121-153.
- Bandura, A. (2004). Social Cognitive Theory for Personal and Social Change by Enabling Media. Entertainment-Education and Social Change: History, Research, and Practice. A. Singhal, M. J. Cody, E. M. Rogers and M. Sabido. Mahwah, N.J., Lawrence Erlbaum Associates: 3-20.

- Beadnell, B. (2007). "Testing mediating mechanisms in theory-based interventions: contributions to efficacy research." The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine **41**(4): 317-318.
- Blankenship, K. M., S. R. Friedman, S. Dworkin and J. E. Mantell (2006). "Structural interventions: concepts, challenges and opportunities for research." J Urban Health **83**(1): 59-72.
- Blas, M. M., I. E. Alva, C. P. Carcamo, R. Cabello, S. M. Goodreau, A. M. Kimball and A. E. Kurth (2010). "Effect of an Online Video-Based Intervention to Increase HIV Testing in Men Who Have Sex with Men in Peru." PLOS ONE **5**(5): e10448.
- Bleakley, A., M. Fishbein, M. Hennessy, A. Jordan, A. Chernin and R. Stevens (2008). "Developing Respondent Based Multi-Media Measures of Exposure to Sexual Content." Communication methods and measures **2**(1-2): 43-64.
- Bleakley, A., M. Hennessy, M. Fishbein and A. Jordan (2008). "It Works Both Ways: The Relationship between Exposure to Sexual Content in the Media and Adolescent Sexual Behavior." Media psychology **11**(4): 443-461.
- Brown, J. D., K. L. L'Engle, C. J. Pardun, G. Guo, K. Kenneavy and C. Jackson (2006). "Sexy Media Matter: Exposure to Sexual Content in Music, Movies, Television, and Magazines Predicts Black and White Adolescents' Sexual Behavior." Pediatrics **117**(4): 1018-1027.
- Brown, L., K. Macintyre and L. Trujillo (2003). "Interventions to Reduce HIV/AIDS Stigma: What Have We Learned?" AIDS Education and Prevention **15**(1): 49-69.
- Brown, W. J. and M. D. Basil (1995). "Media Celebrities and Public Health: Responses to 'Magic' Johnson's HIV Disclosure and Its Impact on AIDS Risk and High-Risk Behaviors." Health Communication **7**(4): 345-370.
- Bull, S., K. Pratte, N. Whitesell, C. Rietmeijer and M. McFarlane (2009). "Effects of an Internet-based intervention for HIV prevention: the Youthnet trials." AIDS and behavior **13**(3): 474-487.
- CDC (2010). Early Release of Selected Estimates Based on Data From the 2009 National Health Interview Survey. 10. Human immunodeficiency virus (HIV) testing. National Health Interview Survey, Centers For Disease Control and Prevention.

- CDC (2012). Vital Signs: HIV Infection, Testing, and Risk Behaviors Among Youths — United States. Morbidity And Mortality Weekly Report MMWR, Centers for Disease Control and Prevention. **61** (47): 971-976.
- CDC (2015). Diagnoses of HIV Infection in the United States and Dependent Areas, 2014. HIV Surveillance Report. Atlanta, Centers For Disease Control and Prevention. **26**.
- CDC (2016). Diagnoses of HIV Infection in the United States and Dependent Areas, 2015. HIV Surveillance Report, Centers for Disease Control and Prevention. **27**.
- CDC (2016). Youth Risk Behavior Surveillance —United States, 2015. Morbidity and Mortality Weekly Report, Centers for Disease Control and Prevention. **65 / No. 6**.
- Coates, T. J. (2008). "What is to be done?" AIDS **22**(9): 1079-1080.
- Coleman, C. L. and K. Ball (2007). "Determinants of perceived barriers to condom use among HIV-infected middle-aged and older African-American men." Journal of Advanced Nursing **60**(4): 368-376.
- Coleman, C. L., L. Jemmott, J. B. Jemmott, N. Strumpf and S. Ratcliffe (2009). "Development of an HIV risk reduction intervention for older seropositive African American men." AIDS patient care and STDs **23**(8): 647-655.
- Crosby, R. A., R. J. Charnigo, L. F. Salazar, R. Pasternak, I. W. Terrell, J. Ricks, R. V. Smith and S. N. Taylor (2014). "Enhancing Condom Use Among Black Male Youths: A Randomized Controlled Trial." American Journal of Public Health **104**(11): 2219-2225.
- Darbes, L., N. Crepaz, C. Lyles, G. Kennedy and G. Rutherford (2008). "The Efficacy of Behavioral Interventions in Reducing HIV Risk Behaviors and Incident Sexually Transmitted Diseases in Heterosexual African Americans." AIDS (London, England) **22**(10): 1177-1194.
- Davis, K. R. and S. C. Weller (1999). "The effectiveness of condoms in reducing heterosexual transmission of HIV." Fam Plann Perspect **31**(6): 272-279.
- de Vincenzi, I. (1994). "A longitudinal study of human immunodeficiency virus transmission by heterosexual partners. European Study Group on Heterosexual Transmission of HIV." N Engl J Med **331**(6): 341-346.

- Downs, J. S., P. J. Murray, W. Bruine de Bruin, J. Penrose, C. Palmgren and B. Fischhoff (2004). "Interactive video behavioral intervention to reduce adolescent females' STD risk: a randomized controlled trial." Social Science & Medicine **59**(8): 1561-1572.
- El-Bassel, N., J. B. Jemmott, J. R. Landis, W. Pequegnat, G. M. Wingood, G. E. Wyatt and S. L. Bellamy (2010). "National Institute of Mental Health Multisite Eban HIV/STD Prevention Intervention for African American HIV Serodiscordant Couples." Archives of internal medicine **170**(17): 1594-1601.
- El-Bassel, N., S. S. Witte, L. Gilbert, E. Wu, M. Chang, J. Hill and P. Steinglass (2003). "The efficacy of a relationship-based HIV/STD prevention program for heterosexual couples." American journal of public health **93**(6): 963-969.
- Elford, J. and G. Hart (2003). "If HIV Prevention Works, Why Are Rates of High-Risk Sexual Behavior Increasing among MSM?" AIDS Education and Prevention **15**(4): 294-308.
- Fishbein, M. and I. Ajzen (1975). Belief, attitude, intention, and behavior : an introduction to theory and research. Reading, Mass., Addison-Wesley Pub. Co.
- Fishbein, M. and I. Ajzen (2010). Predicting and changing behavior : the reasoned action approach. New York, NY u.a., Psychology Press.
- Fonner, V. A., C. E. Kennedy, K. R. O'Reilly and M. D. Sweat (2014). "Systematic assessment of condom use measurement in evaluation of HIV prevention interventions: need for standardization of measures." AIDS Behav **18**(12): 2374-2386.
- Fullilove, M. T. and R. E. Fullilove (1999). "Stigma as an Obstacle to AIDS Action The Case of the African American Community." American Behavioral Scientist **42**(7): 1117-1129.
- Gruber, E. and J. W. Grube (2000). "Adolescent sexuality and the media." Western Journal of Medicine **172**(3): 210-214.
- Guse, K., D. Levine, S. Martins, A. Lira, J. Gaarde, W. Westmorland and M. Gilliam (2012). "Interventions Using New Digital Media to Improve Adolescent Sexual Health: A Systematic Review." Journal of Adolescent Health **51**(6): 535-543.

- Halpern, C. T., E. M. H. Mitchell, T. Farhat and P. Bardsley (2008). "Effectiveness of web-based education on Kenyan and Brazilian adolescents' knowledge about HIV/AIDS, abortion law, and emergency contraception: findings from TeenWeb." Social Science & Medicine (1982) **67**(4): 628-637.
- Hamblen, M. (2010). "Pew study finds rapid increase in mobile Internet use by low-income Americans." Computer World <http://www.computerworld.com/article/2518965/mobile-wireless/pew-study-finds-rapid-increase-in-mobile-internet-use-by-low-income-americans.html>
 files/1599/pew-study-finds-rapid-increase-in-mobile-internet-use-by-low-income-americans.html.
- Hayes, A. (2016). PROCESS macro for SPSS and SAS. **2.16**.
- Healthy Living Project, T. (2007). "Effects of a behavioral intervention to reduce risk of transmission among people living with HIV: the healthy living project randomized controlled study." Journal of Acquired Immune Deficiency Syndromes (1999) **44**(2): 213-221.
- Heath, J. and K. Goggin (2009). "Attitudes Towards Male Homosexuality, Bisexuality, and the Down Low Lifestyle: Demographic Differences and HIV Implications." Journal of Bisexuality **9**(1): 17-31.
- Herbst, J. H., R. T. Sherba, N. Crepaz, J. B. Deluca, L. Zohrabyan, R. D. Stall, C. M. Lyles and H. A. P. R. S. Team (2005). "A meta-analytic review of HIV behavioral interventions for reducing sexual risk behavior of men who have sex with men." Journal of Acquired Immune Deficiency Syndromes (1999) **39**(2): 228-241.
- Herek, G. M., J. P. Capitanio and K. F. Widaman (2002). "HIV-Related Stigma and Knowledge in the United States: Prevalence and Trends, 1991-1999." American Journal of Public Health **92**(3): 371-377.
- Hintze, J. (2014). PASS 13. NCSS, LLC. Kaysville, Utah USA, NCSS, LLC.
- Hinyard, L. J. and M. W. Kreuter (2007). "Using Narrative Communication as a Tool for Health Behavior Change: A Conceptual, Theoretical, and Empirical Overview." Health Education & Behavior **34**(5): 777-792.
- Hirshfield, S., M. A. Chiasson, H. Joseph, R. Scheinmann, W. D. Johnson, R. H. Remien, F. S. Shaw, R. Emmons, G. Yu and A. D. Margolis (2012). "An Online Randomized Controlled Trial Evaluating HIV Prevention Digital Media Interventions for Men Who Have Sex with Men." PLOS ONE **7**(10): e46252.

- Horrigan, J. (2009). "Wireless Internet Use." Pew Research Center's Internet & American Life Project
[http://www.pewinternet.org/2009/07/22/wireless-internet-use/
files/885/wireless-internet-use.html](http://www.pewinternet.org/2009/07/22/wireless-internet-use/files/885/wireless-internet-use.html).
- Hoyle, R. H. and D. A. Kenny (1999). Sample size, reliability, and tests of statistical mediation. Statistical strategies for small sample research. H. R. H. Thousand Oaks, CA, Sage: 195–222.
- Jemmott, J. B. and L. S. Jemmott (1990). "Sexual Knowledge, Attitudes, and Risky Sexual Behavior among Inner-City Black Male Adolescents." Journal of Adolescent Research **5**(3): 346-369.
- Jemmott, J. B., L. S. Jemmott, P. K. Braverman and G. T. Fong (2005). "HIV/STD risk reduction interventions for African American and Latino adolescent girls at an adolescent medicine clinic: a randomized controlled trial." Arch Pediatr Adolesc Med **159**(5): 440-449.
- Jemmott, J. B., L. S. Jemmott and G. T. Fong (1998). "Abstinence and safer sex HIV risk-reduction interventions for African American adolescents: a randomized controlled trial." JAMA **279**(19): 1529-1536.
- Jemmott, J. B., L. S. Jemmott and G. T. Fong (2010). "Efficacy of a theory-based abstinence-only intervention over 24 months: a randomized controlled trial with young adolescents." Archives of Pediatrics & Adolescent Medicine **164**(2): 152-159.
- Jemmott, J. B., L. S. Jemmott, G. T. Fong and K. McCaffree (1999). "Reducing HIV risk-associated sexual behavior among African American adolescents: testing the generality of intervention effects." Am J Community Psychol **27**(2): 161-187.
- Jemmott, J. B., L. S. Jemmott, G. T. Fong and K. H. Morales (2010). "Effectiveness of an HIV/STD Risk-Reduction Intervention for Adolescents When Implemented by Community-Based Organizations: A Cluster-Randomized Controlled Trial." American Journal of Public Health **100**(4): 720-726.
- Jemmott, J. B., L. S. Jemmott and C. I. Hacker (1992). "Predicting intentions to use condoms among African-American adolescents: the theory of planned behavior as a model of HIV risk-associated behavior." Ethn Dis **2**(4): 371-380.
- Jemmott, J. B., L. S. Jemmott, A. O'Leary, L. D. Icard, S. E. Rutledge, R. Stevens, J. Hsu and A. J. Stephens (2015). "On the Efficacy and Mediation of a One-on-One HIV Risk-Reduction

- Intervention for African American Men Who Have Sex with Men: A Randomized Controlled Trial." AIDS and Behavior **19**(7): 1247-1262.
- Jemmott, J. B., L. S. Jemmott, A. O'Leary, Z. Ngwane, L. D. Icard, S. L. Bellamy, S. F. Jones, J. R. Landis, G. A. Heeren, J. C. Tyler and M. B. Makiwane (2010). "School-based randomized controlled trial of an hiv/std risk-reduction intervention for south african adolescents." Archives of Pediatrics & Adolescent Medicine **164**(10): 923-929.
- Jemmott, J. B., L. S. Jemmott, H. Spears, N. Hewitt and M. Cruz-Collins (1992). "Self-efficacy, hedonistic expectancies, and condom-use intentions among inner-city black adolescent women: a social cognitive approach to AIDS risk behavior." J Adolesc Health **13**(6): 512-519.
- Jemmott, L. S. and J. B. Jemmott (1991). "Applying the theory of reasoned action to AIDS risk behavior: condom use among black women." Nurs Res **40**(4): 228-234.
- Jemmott, L. S. and J. B. Jemmott (1992). "Increasing condom-use intentions among sexually active black adolescent women." Nurs Res **41**(5): 273-279.
- Jemmott, L. S., J. B. Jemmott and A. O'Leary (2007). "Effects on Sexual Risk Behavior and STD Rate of Brief HIV/STD Prevention Interventions for African American Women in Primary Care Settings." American Journal of Public Health **97**(6): 1034-1040.
- Johnson, B. T., L. A. J. Scott-Sheldon, N. D. Smoak, J. M. LaCroix, J. R. Anderson and M. P. Carey (2009). "Behavioral Interventions for African-Americans to Reduce Sexual Risk of HIV: A Meta-Analysis of Randomized Controlled Trials." Journal of acquired immune deficiency syndromes (1999) **51**(4): 492-501.
- Kalichman, S. C., M. P. Carey and B. T. Johnson (1996). "Prevention of sexually transmitted HIV infection: A meta-analytic review of teh behavioral outcome literature." Ann Behav Med **18**(1): 6-15.
- Kalichman, S. C., L. C. Simbayi, S. Jooste, Y. Toefy, D. Cain, C. Cherry and A. Kagee (2005). "Development of a brief scale to measure AIDS-related stigma in South Africa." AIDS Behav **9**(2): 135-143.

- Kamb, M. L., M. Fishbein, Douglas, J. M. Jr and et al. (1998). "Efficacy of risk-reduction counseling to prevent human immunodeficiency virus and sexually transmitted diseases: A randomized controlled trial." JAMA **280**(13): 1161-1167.
- Kelly, J. A., D. A. Murphy, K. J. Sikkema, T. L. McAuliffe, R. A. Roffman, L. J. Solomon, R. A. Winett and S. C. Kalichman (1997). "Randomised, controlled, community-level HIV-prevention intervention for sexual-risk behaviour among homosexual men in US cities." The Lancet **350**(9090): 1500-1505.
- Kennedy, M. G., A. O'Leary, V. Beck, P. Simpson and K. Pollard (2004). "Increases in Calls to the CDC National STD and AIDS Hotline Following AIDS-Related Episodes in a Soap Opera." Journal of Communication **54**(2): 287-301.
- Kerr, J. C., R. F. Valois, R. J. DiClemente, M. P. Carey, B. Stanton, D. Romer, F. Fletcher, N. Farber, L. K. Brown, P. A. Vanable, L. F. Salazar, I. Juzang and T. Fortune (2015). "The Effects of a Mass Media HIV-Risk Reduction Strategy on HIV-Related Stigma and Knowledge Among African American Adolescents." AIDS Patient Care and STDs **29**(3): 150-156.
- Koblin, B., M. Chesney, T. Coates and E. S. Team (2004). "Effects of a behavioural intervention to reduce acquisition of HIV infection among men who have sex with men: the EXPLORE randomised controlled study." Lancet **364**(9428): 41-50.
- Koblin, B. A., S. Bonner, B. Powell, P. Metralaxis, J. E. Egan, J. Patterson, G. Xu, D. R. Hoover, K. Goodman, J. Chin, H. V. Tieu and P. Spikes (2012). "A randomized trial of a behavioral intervention for black MSM: the DiSH study." AIDS (London, England) **26**(4): 483-488.
- Lewis, G. B. (2003). "Black-White Differences in Attitudes toward Homosexuality and Gay Rights." Public Opinion Quarterly **67**(1): 59-78.
- Lightfoot, M., W. S. Comulada and G. Stover (2007). "Computerized HIV Preventive Intervention for Adolescents: Indications of Efficacy." American Journal of Public Health **97**(6): 1027-1030.
- Lou, C.-h., Q. Zhao, E.-S. Gao and I. H. Shah (2006). "Can the Internet be used effectively to provide sex education to young people in China?" The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine **39**(5): 720-728.
- MacKinnon, D. P. (2008). Introduction to Statistical Mediation Analysis. New York, Routledge.

- MacKinnon, D. P., C. M. Lockwood, J. M. Hoffman, S. G. West and V. Sheets (2002). "A comparison of methods to test mediation and other intervening variable effects." Psychol Methods **7**(1): 83-104.
- Mackinnon, D. P., C. M. Lockwood and J. Williams (2004). "Confidence Limits for the Indirect Effect: Distribution of the Product and Resampling Methods." Multivariate Behav Res **39**(1): 99.
- Markham, C. M., R. Shegog, A. D. Leonard, T. C. Bui and M. E. Paul (2009). "+CLICK: harnessing web-based training to reduce secondary transmission among HIV-positive youth." AIDS care **21**(5): 622-631.
- Marks, G., N. Crepaz and R. S. Janssen (2006). "Estimating sexual transmission of HIV from persons aware and unaware that they are infected with the virus in the USA." AIDS (London, England) **20**(10): 1447-1450.
- Marks, G., N. Crepaz, J. W. Senterfitt and R. S. Janssen (2005). "Meta-analysis of high-risk sexual behavior in persons aware and unaware they are infected with HIV in the United States: implications for HIV prevention programs." Journal of Acquired Immune Deficiency Syndromes (1999) **39**(4): 446-453.
- Marsch, L. A., M. J. Grabinski, W. K. Bickel, A. Desrosiers, H. Guarino, B. Muehlbach, R. Solhkhah, S. Taufique and M. Acosta (2011). "Computer-Assisted HIV Prevention for Youth With Substance Use Disorders." Substance use & misuse **46**(1): 46-56.
- McAlister, A., W. Johnson, C. Guenther-Grey, M. Fishbein, D. Higgins and K. O'Reilly (2000). "Behavioral Journalism for HIV Prevention: Community Newsletters Influence Risk-Related Attitudes and Behavior." Journalism & Mass Communication Quarterly **77**(1): 143-159.
- McAlister, A. L., C. L. Perry and G. S. Parcel (2008). How Individuals, Environments, And Health Behaviors Interact: Social Cognitive Theory. K. Glanz, B. K. Rimer and K. Viswanath. San Francisco, CA, Jossey-Bass: 169-188.
- McGuire, W. J. (2001). Input and output variables currently promising for constructing persuasive communications. Public communication campaigns. R. E. Rice and C. K. Atkin. Thousand Oaks, Calif., Sage Publications: 22-48.
- Miller, R. L. (2007). "Legacy Denied: African American Gay Men, AIDS, and the Black Church." Social Work **52**(1): 51-61.

- Mustanski, B., R. Garofalo, C. Monahan, B. Gratzler and R. Andrews (2013). "Feasibility, Acceptability, and Preliminary Efficacy of an Online HIV Prevention Program for Diverse Young Men who have Sex with Men: The Keep It Up! Intervention." AIDS and behavior **17**(9).
- National Expert Panel on Social Determinants of Health, E. (2009). Recommendations for Advancing efforts to Achieve Health Equity. Atlanta, GA.
- NIMH, N. M. H. P. T. G. (1998). "The NIMH Multisite HIV Prevention Trial: reducing HIV sexual risk behavior. The National Institute of Mental Health (NIMH) Multisite HIV Prevention Trial Group." Science **280**(5371): 1889-1894.
- NIMH, N. M. H. P. T. G. (2001). "Social-cognitive theory mediators of behavior change in the National Institute of Mental Health Multisite HIV Prevention Trial." Health Psychol **20**(5): 369-376.
- Noar, S. M., H. G. Black and L. B. Pierce (2009). "Efficacy of computer technology-based HIV prevention interventions: a meta-analysis." AIDS **23**(1): 107-115.
- O'Leary, A. (2005). Guessing Games: Sex Partner Serostatus Assumptions Among HIV-Positive Gay and Bisexual Men. HIV+ Sex: The Psychological and Interpersonal Dynamics of HIV-Seropositive Gay and Bisexual Men's Relationships. P. N. Halkitis, C. A. Gomez and R. J. Wolitski. Washington, D.C., American Psychological Association.
- O'Leary, A., C. C. Hoff, D. W. Purcell, C. A. Gomez, J. T. Parsons, F. Hardnett and C. M. Lyles (2005). "What happened in the SUMIT trial? Mediation and behavior change." AIDS **19 Suppl 1**: S111-121.
- O'Leary, A., L. S. Jemmott and J. B. Jemmott (2008). "Mediation analysis of an effective sexual risk-reduction intervention for women: the importance of self-efficacy." Health Psychol **27**(2S): S180-184.
- O'Leary, A., M. Kennedy, K. A. Pappas-DeLuca, M. Nkete, V. Beck and C. Galavotti (2007). "Association between exposure to an HIV story line in The Bold and the Beautiful and HIV-related stigma in Botswana." AIDS education and prevention: official publication of the International Society for AIDS Education **19**(3): 209-217.

- O'Leary, A., R. J. Wolitski, R. H. Remien, W. J. Woods, J. T. Parsons, S. Moss and C. M. Lyles (2005). "Psychosocial correlates of transmission risk behavior among HIV-seropositive gay and bisexual men." AIDS **19 Suppl 1**: S67-75.
- Painter, T. M., P. M. Ngalame, B. Lucas, J. L. Lauby and J. H. Herbst (2010). "Strategies Used by Community-Based Organizations to Evaluate Their Locally Developed HIV Prevention Interventions: Lessons Learned from the CDC's Innovative Interventions Project." AIDS Education and Prevention **22(5)**: 387-401.
- Petraglia, J., C. Galavotti, N. Harford, K. A. Pappas-DeLuca and M. Mooki (2007). "Applying behavioral science to behavior change communication: the pathways to change tools." Health Promot Pract **8(4)**: 384-393.
- Roberto, A. J., R. S. Zimmerman, K. E. Carlyle and E. L. Abner (2007). "A computer-based approach to preventing pregnancy, STD, and HIV in rural adolescents." Journal of Health Communication **12(1)**: 53-76.
- Rogers, E. M., P. W. Vaughan, R. M. A. Swalehe, N. Rao, P. Svenkerud and S. Sood (1999). "Effects of an Entertainment-education Radio Soap Opera on Family Planning Behavior in Tanzania." Studies in Family Planning **30(3)**: 193-211.
- Romer, D., S. Sznitman, R. DiClemente, L. F. Salazar, P. A. Vanable, M. P. Carey, M. Hennessy, L. K. Brown, R. F. Valois, B. F. Stanton, T. Fortune and I. Juzang (2009). "Mass Media as an HIV-Prevention Strategy: Using Culturally Sensitive Messages to Reduce HIV-Associated Sexual Behavior of At-Risk African American Youth." American Journal of Public Health **99(12)**: 2150-2159.
- Rosenstock, I. M., V. J. Strecher and M. H. Becker (1988). "Social Learning Theory and the Health Belief Model." Health Education & Behavior **15(2)**: 175-183.
- Rosser, S. B. R., M. J. Wilkerson, D. J. Smolenski, M. J. Oakes, J. Konstan, K. J. Horvath, G. R. Kilian, D. S. Novak, G. P. Danilenko and R. Morgan (2011). "The Future of Internet-based HIV Prevention: A Report on Key Findings from the Men's INternet (MINTS-I, II) Sex Studies." AIDS and Behavior **15(Suppl 1)**: S91-100.

- Sanderson, C. A. and J. B. Jemmott (1996). "Moderation and mediation of HIV-prevention interventions: Relationship status, intentions, and condom use among college students." Journal of Applied Social Psychology **26**(23): 2076-2099.
- Saracco, A., M. Musicco, A. Nicolosi, G. Angarano, C. Arici, G. Gavazzeni, P. Costigliola, S. Gafa, C. Gervasoni, R. Luzzati and et al. (1993). "Man-to-woman sexual transmission of HIV: longitudinal study of 343 steady partners of infected men." J Acquir Immune Defic Syndr **6**(5): 497-502.
- Schnall, R., J. Travers, M. Rojas and A. Carballo-Diéguez (2014). "eHealth Interventions for HIV Prevention in High-Risk Men Who Have Sex With Men: A Systematic Review." Journal of Medical Internet Research **16**(5).
- Sheeran, P., P. Norman and S. Orbell (1999). "Evidence that intentions based on attitudes better predict behaviour than intentions based on subjective norms." European Journal of Social Psychology **29**(23): 403-406.
- Siebert, D. C., J. Chonody, S. E. Rutledge and M. Killian (2009). "The Index of Attitudes Toward Homosexuals 30 Years Later: A Psychometric Study." Research on Social Work Practice **19**(2): 214-220.
- Sikkema, K. J., J. A. Kelly, R. A. Winett, L. J. Solomon, V. A. Cargill, R. A. Roffman, T. L. McAuliffe, T. G. Heckman, E. A. Anderson, D. A. Wagstaff, A. D. Norman, M. J. Perry, D. A. Crumble and M. B. Mercer (2000). "Outcomes of a randomized community-level HIV prevention intervention for women living in 18 low-income housing developments." American Journal of Public Health **90**(1): 57-63.
- Singhal, A. and E. Rogers (1999). Entertainment-Education: A Communication Strategy for Social Change. London; New York, Routledge.
- Singhal, A. and E. M. Rogers (2004). The status of entertainment-education worldwide. Entertainment-Education and Social Change: History, Research, and Practice. A. Singhal, M. J. Cody, E. M. Rogers and M. Sabido. Mahwah, N.J., Lawrence Erlbaum Associates: 3-20.
- Smith, A. (2013). "Smartphone Ownership 2013." Pew Research Center's Internet & American Life Project <http://www.pewinternet.org/2013/06/05/smartphone-ownership-2013/files/1596/smartphone-ownership-2013.html>.

- Smith, A. (2014). African Americans and technology use: a demographic potrait, Pew Research Center.
- Stevens, R. (2010). AIDS in black and white: the influence of news coverage of HIV/AIDS on HIV testing among African Americans and white Americans, 1993- 2007. AIDS 2010 - XVIII International AIDS Conference.
- Stevens, R., S. J. Hull and A. Ho (2007). T.V. to testing: Linking the KNOW HIV/AIDS media campaign to HIV prevention behavior among adolescents. Annual Conference of the National Communication Association.
- Stokes, J. P., D. J. McKirnan, L. Doll and R. G. Burzette (1996). "Female partners of bisexual men: What they don't know might hurt them." Psychology of Women Quarterly **20**(2): 267-284.
- Strecher, V. J., B. M. DeVellis, M. H. Becker and I. M. Rosenstock (1986). "The role of self-efficacy in achieving health behavior change." Health education quarterly **13**(1): 73-92.
- Suarez-Al-Adam, M., M. Raffaelli and A. O'Leary (2000). "Influence of abuse and partner hypermasculinity on the sexual behavior of Latinas." AIDS education and prevention: official publication of the International Society for AIDS Education **12**(3): 263-274.
- Sumartojo, E. (2000). "Structural factors in HIV prevention: concepts, examples, and implications for research." AIDS (London, England) **14 Suppl 1**: S3-10.
- Swenson, R. R., C. J. Rizzo, L. K. Brown, N. Payne, R. J. DiClemente, L. F. Salazar, P. A. Venable, M. P. Carey, R. F. Valois, D. Romer and M. Hennessy (2009). "Prevalence and Correlates of HIV Testing among Sexually Active African American Adolescents in Four U.S. Cities." Sexually transmitted diseases **36**(9): 584-591.
- Underhill, K., D. Operario and P. Montgomery (2007). "Systematic Review of Abstinence-Plus HIV Prevention Programs in High-Income Countries." PLOS Medicine **4**(9): e275.
- Vaughan, P. W., E. M. Rogers, A. Singhal and R. M. A. Swalehe (2000). "Entertainment-Education and HIV/AIDS Prevention: A Field Experiment in Tanzania." Journal of Health Communication **5**(sup1): 81-100.
- Warner, L., J. D. Klausner, C. A. Rietmeijer, C. K. Malotte, L. O'Donnell, A. D. Margolis, G. L. Greenwood, D. Richardson, S. Vrungos, C. R. O'Donnell and C. B. Borkowf (2008). "Effect of a

- Brief Video Intervention on Incident Infection among Patients Attending Sexually Transmitted Disease Clinics." PLoS Medicine **5**(6).
- Warner, L., D. R. Newman, H. D. Austin, M. L. Kamb, J. M. Douglas, Jr., C. K. Malotte, J. M. Zenilman, J. Rogers, G. Bolan, M. Fishbein, D. G. Kleinbaum, M. Macaluso, T. A. Peterman and R. S. G. Project (2004). "Condom effectiveness for reducing transmission of gonorrhea and chlamydia: the importance of assessing partner infection status." Am J Epidemiol **159**(3): 242-251.
- Weller, S. C. (1993). "A meta-analysis of condom effectiveness in reducing sexually transmitted HIV." Soc Sci Med **36**(12): 1635-1644.
- Wilton, L., J. H. Herbst, P. Coury-Doniger, T. M. Painter, G. English, M. E. Alvarez, M. Scahill, M. A. Roberson, B. Lucas, W. D. Johnson and J. W. Carey (2009). "Efficacy of an HIV/STI prevention intervention for black men who have sex with men: findings from the Many Men, Many Voices (3MV) project." AIDS Behav **13**(3): 532-544.
- Wohlfeiler, D. and J. M. Ellen (2010). The Limits of Behavioral Interventions for HIV Prevention. Prevention Is Primary: Strategies for Community Well Being. L. Cohen, V. Chavez and S. Chehimi. San Francisco, CA, Jossey-Bass.
- Zhang, J., J. B. Jemmott and L. S. Jemmott (2015). "Mediation and moderation of an efficacious theory-based abstinence-only intervention for African American adolescents." Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association **34**(12): 1175-1184.