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The differential effects of risk avoidance and remedy messages on intentions
and willingness to engage in risky sexual behavior

A dissertation submitted in partial satisfaction of the requirements
for the degree of Doctor of Philosophy

in

Psychological Sciences

by

Sydney Michelle Loewen

Committee in charge:

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The Dissertation of Sydney Michelle Loewen is approved, and it is acceptable
in quality and form for publication on microfilm and electronically:

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University of California, Merced

2017

This is dedicated to my mom, Janet Loewen, who was my biggest cheerleader and taught me to never give up

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Sydney Michelle Loewen

Curriculum Vitae

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Education

PhD Candidate in Psychological Sciences, University of California Merced, Merced, CA; studying Health Psychology; GPA 3.83

B.S., 2009, University of California Merced, Merced, CA; major in Biological Sciences, minor in Psychology; GPA 3.376

Research Interests

My research interests revolve around investigating socio-cognitive factors in risk behaviors. My research has mainly focused on perceptions of risk and social norms and I have applied this interest to the study of sexual health. My dissertation is focused on how individuals differently respond to risk avoidance and remedy messages and if those differences are related to their intentions and willingness to engage in risky sexual behavior. The methods I have used range from large scale surveys to behavioral experiments.

Statistical Programs Used

- SPSS
- Mplus
- R
- SAS

Statistical Analysis Skills

- Basic descriptive statistics
- Multivariate analysis (ANOVA, ANCOVA, multiple regression, logistic regression)
- Path Analysis
- Structural Equation Modeling

Honors and Awards

- Psychological Sciences Summer and Research /Travel Support Fellowship, University of California, Merced, Summer 2015, Reward amount: \$4,570
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Manuscripts in Preparation

1. Loewen, S. M. (in prep.). Differential effects of risk avoidance and remedy messages on intentions and willingness to engage in risky sexual behavior.
2. Loewen, S. M. & Song, A. V. (in prep.). Perceptions of sexually transmitted diseases (STDs) and unintended pregnancy: Changes in prevalence estimates across anchored reference points.
3. Loewen, S. M. & Song, A. V. (in prep.). Perceptions of contracting sexually transmitted infections (STIs) among low and high risk sexual behavior individuals are related to testing intentions.

Conference Presentations

1. **Loewen, S. M.**, & Song, A. V. (2015, February). *What about my friends? Individuals' perceptions of prevalence of sexually transmitted infections across social groups and their relation to condom use intentions*. Poster to be presented at the 16th annual meeting of the Society for Personality and Social Psychology, Long Beach, CA.
2. Mendiola, J., **Loewen, S. M.**, Alexander, C. B., McClure, S., & Song, A. V. (2014, February). *Condom use in romantic and casual relationships: Adolescent's perception of risk and worry over sexually transmitted infections*. Poster presented at the 15th annual meeting of the Society for Personality and Social Psychology, Austin, TX.
3. **Loewen, S. M.**, Butler, M., & Song, A. V. (2013, March). *Perceptions of contracting sexually transmitted infections (STIs) among low and high risk sexual behavior individuals are related to testing intentions*. Poster to be presented at the 34th Annual meeting and scientific sessions of the Society of Behavioral Medicine, San Francisco, CA.
4. Clifton, J. P., **Loewen, S. M.**, Depaoli, S., & Song, A. V. (2013, March). *Characterizing smoking cessation maintenance among former smokers: A latent class analysis*. Poster to be presented at the 34th Annual meeting and scientific sessions of the Society of Behavioral Medicine, San Francisco, CA.
5. **Loewen, S. M.**, Huang, J., Butler, M., & Song, A. V. (2012, April). *Perceptions of sex-related consequences: Prevalence estimates across reference points*. Poster

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Experience

Teaching Assistant, Psychological Sciences, University of California, Merced

Under Dr. Anna Song, Fall 2010 – Present

To assist in the delivery of instruction under the active tutelage and supervision of a faculty member. Responsibilities include:

- >To assist the supervising faculty member by conducting discussion, laboratory, or quiz sections that supplement faculty lectures
- >Provide input into the development of assignments or exams
- >Grade assignments or examinations
- >Hold office hours for one-on-one and group tutoring sessions

Substitute Teacher, Merced County, Los Banos, California

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To substitute for any district in Merced County, for any grade level, and any subject area.

Centers of Excellence on Health Disparities Trainee, University of California and National Institutes of Health, Merced CA

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Conducted mentored research relevant to health disparities and developed community partnerships for health promotion, disease prevention, and health sciences research

Research Assistant, Alliance for Community Research and Development, Merced CA

Under Dr. Stergios Roussos, June 2009-August 2010

Collected, organized, and analyzed community data, prepared grants and performed program evaluation support

Research Assistant, Natural Sciences, University of California Merced

Under Dr. Monica Medina, Fall 2006—Fall 2007

Performed genetic analysis on coral symbionts to study the effects of coral bleaching

Instrumentation Experience

- DNA extraction
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- Gel electrophoresis
- Hemacytometry
- RFLP analysis

- Nanodrop
- Polymerase Chain Reaction (PCR)
- Microscopy

Memberships

- Fresno Adolescent Sexual Health Community Stakeholders Think Tank Member, 2016
- Society of Behavioral Medicine (SBM), 2013
- Western Psychological Association (WPA), 2012
- Society for Personality and Social Psychology (SPSP), 2011-2012; 2014-2015
- Graduate Student Representative, Junior Health Psychology Hiring Committee, University of California, Merced, 2012
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- Tutor, Natural Sciences, University of California Merced, Spring 2009; assisted students in Anatomy
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Research Projects

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2012-2015	Perceptions of contracting sexually transmitted infections (STIs) among low and high risk sexual behavior individuals are related to testing intentions
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Abstract of the Dissertation

Objective: There are two common health communication approaches to promote health behavior and reduce risky behavior. The first approach has been through risk avoidance messages and the second through the promotion of remedy messages. While the goals of risk avoidance and remedy messages are similar, research suggests that they produce contrasting outcomes. To date, remedy messages have not been experimentally examined for influence on sexual behavior. This dissertation seeks to answer the question: does exposure to a risk avoidance message versus a remedy message differentially influence intentions and willingness to engage in risky sexual behavior?

Methods: Two studies were conducted. For study I, 396 University of California, Merced undergraduates participated in the study. Participants evaluated variations on risk avoidance messages and remedy messages for various outcomes (e.g. believability and favorability) with the goal that the most favorable messages will be used in study II. For study II, 895 Mechanical Turk users were randomly assigned to a risk avoidance message condition, a remedy message condition, or a control message condition. Participants were asked about their intentions and willingness to engage in sexual behavior without a condom. Their perceived risk, prototype perceptions, subjective norms, and STI or HIV contraction worry were also evaluated.

Results: The overall model for both analyses were significant with worry over contracting an STI or HIV being the only significant predictor to add to the model predicting willingness to engage in risky sexual behavior. Thus, as STI or HIV contraction worry increased, willingness to engage in sex without a condom decreased. Additionally, an interaction effect between the remedy message and STI or HIV contraction worry were found to predict participants' risk perceptions.

Conclusions: Determining if remedy messages induce individuals to participate in risky sexual behavior practices, as results from other remedy studies have shown this effect to be true, remain important. Findings showing that remedy messages may induce the opposite effect on individuals and increase their intentions and willingness to engage in risky sexual behavior would have important implications on the way we communicate remedy products.

The differential effects of risk avoidance and remedy messages on intentions and willingness to engage in risky sexual behavior

Introduction

It is estimated that 20 million new cases of sexually transmitted infections (STIs) are diagnosed in the United States each year costing the healthcare system an estimated \$16 billion yearly (CDC NPIN, 2014). Additionally, one of every two sexually active youth under the age of 25 has a sexually transmitted infection (Brown et al., 2006). This number is of particular concern because individuals aged 15-24 years represent only 25% of the sexually experienced population, but contract nearly half of all new STI cases (CDC, 2013). Despite widespread prevention efforts, the effectiveness of these efforts has been low, leaving STIs a widespread public health concern (CDC NPIN, 2014).

In general, there are two common health communication approaches to promote health behavior and reduce risky behavior. The first, and more traditional approach, has been through risk avoidance messages that focus on the risk behavior itself. The main goal of this approach is to persuade individuals to avoid the behavior or risk in question, and typically involves social marketing campaigns, health communication, interventions, and educational efforts (Bolton, Cohen, & Bloom, 2006). This approach is grounded in the idea that increasing perceptions of risk is an effective way to motivate individuals to avoid risky behavior or to begin protective behavior (Ellen, Adler, Gurvey, Millstein, & Tschann, 2002; Kilmer, Hunt, Lee, & Neighbors, 2007; Maddux & Rogers, 1983; McCaul Branstetter, Schroeder, & Glasgow, 1996; Poppen & Reisen, 1997; Rosenstock, 1974; Weinstein, 1988; Witte, 1992).

The second approach to promote health behavior and reduce risk behaviors is by promoting remedies, defined as “products or services that offer solutions to, or ways of mitigating risk by decreasing either its likelihood or severity” (Bolton, Cohen, & Bloom, 2006, p. 71). Remedy messages are categorized as either being curative or preventive in nature. A curative message reduces the severity of the consequences of the risk after the risk has already occurred (Bolton, Cohen, & Bloom, 2006). For example, a curative remedy message may be one about the morning after pill, also known as “Plan B”. A remedy message regarding Plan B would offer a “cure” to the problem of engaging in unprotected sexual intercourse by offering a pill that would prevent an unintended pregnancy. In contrast, a remedy message that is preventative, aims to offset the risk before it happens (Bolton, Cohen, & Bloom, 2006). An example of a preventive remedy message is pre-exposure prophylaxis, or PrEP, which is a pill that protects individuals from contracting the HIV virus before they engage in risky behaviors. A preventive remedy message about PrEP would target individuals who believe they will engage in unprotected sexual intercourse in the future but hope to avoid contracting HIV.

While the goals of risk avoidance and remedy messages are similar—to curtail risky behavior—research suggests that they produce contrasting outcomes. While risk avoidance messages typically induce health promoting behavior, remedy messages induce risky behavior. It is thought that individuals feel safer with the remedy and therefore compensate for that increased security by engaging in riskier behavior (Bolton, Cohen, & Bloom, 2006). Research has shown that exposure to a remedy message reduces an individuals’ perceived risk of the behavior. For example, car accidents increased after the introduction of seat belt laws because individuals believed seat belts to be safe and

engaged in riskier driving to compensate for that added safety they felt (Calkins & Zlatoper, 2001).

Currently, many remedies to negative sex-related consequences are available that may be promoting individuals to engage in riskier forms of sexual behavior had the remedy not been available. Some of these remedies include: condoms, the human papillomavirus (HPV) vaccine, Plan B or morning after pill, and PrEP. Furthermore, despite the presence of more remedies linked to negative sex-related consequences, STI rates and unintended pregnancies—both markers of sexual risk taking—have increased over the years.

To date, remedy messages have not been experimentally examined for sexual behavior. Additionally, there is limited research on how remedies are advertised for consequences of sexual behavior and if this influences emotions, such as worry, that may in turn promote safe sexual behavior. Emotions like worry play an important role in the way we make decisions about health and the protective behaviors we engage in (Loewenstein, Weber, Hsee, & Welch, 2001). Evaluating emotions like worry, may lead to solutions to curb the potential negative effects of remedy messaging.

The following research question is proposed to guide the current studies: does exposure to a risk avoidance message versus a remedy message differentially influence intentions and willingness to engage in risky sexual behavior? To answer this question, a randomized between subjects' design was used to assess the effects of risk avoidance and remedy messages against a control on individuals' intentions and willingness to engage in risky sexual behavior. Data was collected from a national sample of individuals via Mechanical Turk. Three aims guide this research:

Aim 1: To determine whether risk avoidance messages will lead to higher intentions and willingness to engage in protective behavior.

Aim 2: To determine whether remedy messages will lead to higher intentions and willingness to engage in risky behavior.

Aim 3: To determine whether worry moderates the relationship between intentions and willingness to engage in risk behaviors and type of message received.

Theoretical Background: The Prototype Willingness (P/W) Model

Many health belief theories and models such as protection motivation theory (Maddux & Rogers, 1983), theory of planned behavior (Ajzen, 1985) and the health belief model (Rosenstock, 1974) are reasoned decision making models and assume that individuals make planned, deliberate decisions that involve contemplating the risks and benefits of engaging (or not engaging) in various behaviors. Additionally, in most of these models, behavioral intentions are the antecedent to behavior. Therefore, attitudes and beliefs towards the behavior, perceived risks of the behavior, perceived subjective norms (individuals' perception of social pressures put on them by important others to perform a behavior or not), and so on, are mediated by behavioral intentions. Research has generally shown that these theories and models are effective in predicting health behavior (e.g. Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008). Yet, despite their success with predicting protective behaviors like cancer screening (McCaul, Sandgren, O'Neill, & Hinsz, 1993), sun-safe behaviors to prevent skin cancer (McClendon & Prentice-Dunn, 2001) and dental hygiene (McCaul, Sandgren, O'Neill, & Hinsz, 1993) to name a few, these theories and models do not always do well when trying to predict risky

behavior or behaviors that are socially reactive, such as smoking and risky sexual behavior (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008; Webb & Sheeran, 2006).

For example, work by Gerrard, Gibbons, and Gano (2003) showed that adolescents aged 11-15 may state they have no intentions to drink within the next year, but when asked again a year later about their behaviors, a number of the non-intenders did in fact drink. Similar results have been found with engaging in unprotected sex, smoking, and drinking and driving (Gerrard, Gibbons, & Gano, 2003). One conclusion drawn from this study is that adolescents were not lying about their intentions and genuinely believed they would abstain from these behaviors. Instead of being reasoned and planned, their behavior is believed to be in response to the social situation that prompted them to engage in the risky behavior (Gerrard, Gibbons, & Gano, 2003). The engagement in risky behavior in response to the social situation is a central assumption of the social reaction path of the Prototype Willingness (P/W) model.

The P/W model is a dual process model, that is based on the assumption that there are different types of decision making involved in health behavior. There are two paths to risk behavior accounted for in the model: the reasoned path and the social reaction path (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008). The reasoned path is the more analytic, planned path similar to other reasoned action models, such as the theory of planned behavior; it incorporates constructs like perceived risk and vulnerability, subjective norms, and behavioral intentions. The social reaction path involves more image-based processing, and attempts to capture behavior that is less reasoned and rational (Gibbons, Gerrard, Ouellette, & Burzette, 1998) and was hypothesized to try to explain unintended behavior, specifically behaviors that are risky to an individuals' health. The social reaction path includes two constructs: risk prototypes (perceived images of individuals who engage in risk behaviors) and behavioral willingness (a measure of openness to engage in risky behavior). The model assumes that not all behavior is intended, and may in fact be in response to specific social situations. Individuals with high willingness to engage in risky behavior, coupled with a social situation where the risky behavior is taking place, may produce the tipping point for an individual to engage in the risky behavior despite not intending to do so to begin with (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008).

Unlike reasoned action models like the protection motivation theory (Maddux & Rogers, 1983), the theory of planned behavior (Ajzen, 1985), and the health belief model (Rosenstock, 1974), which have shown success with predicting preventive behavior (McCaul, Sandgren, O'Neil, & Hinsz, 1993; McClendon & Prentice-Dunn, 2001), the P/W model has shown success in predicting risky behavior (Webb & Sheeran, 2006). Such risky behaviors predicted by the P/W model include: use of tanning beds (Gibbons, Gerrard, Lane, Mahler, & Kulik, 2005), smoking (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008), engaging in risky sexual behavior (Gibbons & Gerrard, 1995), and reckless driving (Gibbons & Gerrard, 1995). Because of its continued success with predicting risky behavior, the P/W model is a popular model among health behavior researchers.

Assumptions of the Prototype Willingness Model. The model has two basic assumptions. The first is that health risk behavior is believed to be volitional, but is often not planned, premeditated, or intentional (Gerrard, Gibbons, Houlihan, Stock, & Pomery,

2008). Instead, risk behaviors are believed to be a reaction to a risk-conducive situation (Gibbons & Gerrard, 1997). A risk-conducive situation is one that makes it easier, but does not demand experimentation with the risk behavior in question and is typically a situation that an individual is not commonly in (Gibbons & Gerrard, 1997). An example of a risk-conducive situation may be a party where marijuana is being smoked. For an individual with high willingness to smoke marijuana (despite having no explicit intention to smoke), being at the party may lead the individual to smoke, possibly because of the behavior being available to engage in and because of peers engaging in the behavior. As a result, risk behavior may be less about intentions to engage in a behavior (planning) and more about willingness to engage in a behavior (recognition that engaging in a behavior may be possible under certain circumstances and in certain situations; Gibbons & Gerrard, 1997).

There are important distinctions between intentions and willingness. When a person intends to behave, that individual is fully responsible for engaging in that behavior. Intentions are plans to achieve a particular goal and involve contemplation of the behavior and of its consequences (Gibbons, Gerrard, Ouellette, & Burzette, 1998). The construct of willingness does not lay the responsibility solely on the individual. Behavioral willingness does not involve plans to achieve a particular goal; instead behavioral willingness is an acknowledgement that there is a possibility to engage in a behavior under certain circumstances. Willingness involves little, if any, contemplation of the behavior beforehand (Gibbons, Gerrard, Ouellette, & Burzette, 1998).

The second assumption is that individuals have cognitive prototypes of the type of individuals their age who engage in risky behavior (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008). For example, these prototypes are representations of the type of people who smoke or engage in risky sexual behavior. The prototype images focus on the underlying characteristics of the individual (e.g. smart, cool, etc.; Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008). Prototype perceptions and their ability to influence behavior are predicated on the fact that adolescent risk behavior is typically a social event (e.g. smoke with friends, speed in a car with friends, have sex at a party; Gibbons & Gerrard, 1997). Mental images of risk behavior may be more salient to an individual; therefore, making the images more able to influence behavior through social comparison (Gibbons & Gerrard, 1997). The more similar to the self the image is, the more likely the individual is to engage in the behavior (Gibbons & Gerrard, 1997). For example, if a person believes someone who engages in sexual behavior without a condom to be cool, independent, and self-confident and the person believes they have these same traits, or want these same traits, they will be more likely to engage in sex without a condom as well.

Role of Risk Avoidance Messages

One way to curtail risk behaviors, like engaging in risky sexual behavior, is to implement risk avoidance messages which emphasize the problems or costs associated with a certain risk behavior and urge individuals to avoid that risk (Bolton, Cohen, & Bloom, 2006). In most theories and models of health behavior it is assumed that risk reduction is an important motivator for action (Weinstein & Nicolich, 1993). Therefore, the construct of perceived risk, or how an individual estimates their personal vulnerability for a negative outcome, plays an integral role in health behavior change theories and

models, such as the health belief model (Rosenstock, 1974), extended parallel process model (Witte, 1992), precaution adoption process model (Weinstein, 1988), and protection motivation theory (Maddux & Rogers, 1983). According to these theories and models, a high perceived risk should motivate individuals to take action to reduce their risk, thereby decreasing behaviors associated with those risks (Brewer, Weinstein, Cuite, & Herrington, 2004).

Individuals who have high perceptions of risk for a given health outcome are more likely to engage in behaviors to prevent the illness than are individuals who hold low perceptions of risk for the same outcome (e.g. Song, Glantz, & Halpern-Felsher, 2009; Song et al., 2009). For example, research has shown that individuals with high perceptions of risk for osteoporosis were more likely to begin taking vitamins to prevent it, than were individuals with low perceptions of risk (Wurtele, 1988). This same relationship, of high risk perceptions and engagement in protective behavior against the risk, holds true for many behaviors, including, engagement in sun-safe behavior to prevent skin cancer (McClendon & Prentice-Dunn, 2001; McClendon, Prentice-Dunn, Blake, & McMath, 2002), and increases in healthy diet and exercise to prevent heart disease risk (Lee, Cameron, Wunsche, & Stevens, 2010). All of the studies mentioned presented individuals with a risk avoidance message, either written or visual, and were successful in increasing risk perceptions towards a negative health outcome and associated behavior. Risk avoidance messages are the norm for how health communications are presented to individuals and have been analyzed by many empirical studies.

Role of Remedy Messages

The other approach to reduce risk behavior is through the use of remedy messages, which offer solutions to engaging in the risk behavior by either decreasing the likelihood or severity of negative consequences associated with behaving (Bolton, Cohen, & Bloom, 2006). According to Bolton and colleagues, remedy messages offer a way to “take the risk out of” engaging in risk behavior (2006, p. 71). By definition, remedy messages can either be curative or preventive.

Curative remedy messages reduce the severity of negative outcomes after engaging in risky behavior. For example, a curative remedy message may be one about the morning after pill, or Plan B. A remedy message regarding to Plan B would offer a “cure” to the problem of engaging in unprotected sexual intercourse by offering a pill that would prevent an unintended pregnancy.

Preventive remedy messages reduce the severity of the risk before engaging in risky behavior. For example, a preventive remedy message may be one about PrEP. A preventive remedy message in reference to PrEP would offer the pill, PrEP, to an individual who believes they will engage in risky sexual behavior (sex without a condom), as a way to prevent contracting HIV because of engaging in that risky sexual behavior.

Similar to risk avoidance messages, remedy messages can be thought of as another type of persuasive message to appeal to individuals to engage in less risky behavior. Remedy messages utilize similar constructs as risk avoidance messages, such as risk perception. However, they differ from risk avoidance messages in the sense that remedy messages try to provide a solution to engaging in the risky behavior (e.g. PrEP)

while the risk avoidance message tries to persuade individuals to avoid the risky behavior altogether (e.g. do not engage in sexual behavior without a condom).

Despite these differences, remedy and risk avoidance messages have similar goals—to reduce an individuals' overall risk (Bolton, Cohen, & Bloom, 2006). For example, traditional risk avoidance messages for sexual behavior without a condom emphasize the risks associated with engaging in the behavior, such as the contraction of HIV or other STI's. Individuals who perceive their risk to be higher than the perceived benefits will be more likely to start engaging in safer sexual behavior (e.g. use of a condom). Similarly, a remedy message may promote the use of PrEP as a way to prevent the contraction of HIV, a possible negative consequence of engaging in sexual behavior without a condom. Therefore, an individual who perceives their risk to be high will be more likely to perceive the effectiveness of the remedy and begin to use it to curtail the possible negative effects of engaging in the behavior. As can be seen in this example, remedy and risk avoidance messages have the same underlying goal, to reduce engagement in risky behavior.

Pre-Exposure Prophylaxis (PrEP) as a Remedy. PrEP is a United States Food and Drug Administration approved oral medication that reduces the risk of contracting HIV via sexual behavior for those high at risk (Baeten, Haberer, Liu, & Sista, 2013). PrEP is being touted as an effective addition to traditional preventative measures—such as condom usage. Results from the Pre-Exposure Prophylaxis Trial Initiative on men-who-have-sex-with-men (MSM) receiving PrEP versus a control, showed that HIV incidence was 44% lower (Leibowitz, Parker, & Rotheram-Borus, 2011). However, intrinsic to the effectiveness of the intervention of PrEP lies two main points a) the effectiveness of the drug, and b) the behaviors of users (Underhill & Mayer, 2013).

There is concern that the benefits of PrEP may decrease when considering accompanying displacement effects, namely increases in risk behaviors, such as a decrease in condom usage and engaging in sexual behavior with multiple partners (Eaton & Kalichman, 2007). Research has shown that individuals may rely too heavily on the medication and forego condom use (Golub, Kowalczyk, Weinberger, & Parsons, 2010; Brooks et al., 2012; Holt et al., 2012).

In a study aimed to characterize the patterns of PrEP usage among members of the Kaiser Permanente Medical Center in San Francisco, it was found that 657 individuals were actively using PrEP (653 MSM and 3 heterosexual women; Volk et al., 2015). After 12 months of PrEP use, 50% of the users were diagnosed with an STI. A sample of 188 participants were asked about their behavioral changes while using PrEP, and 11% stated they increased the number of sexual partners, and 41% stated they decreased condom usage (Volk et al., 2015). This study demonstrates the possible displacement effects of the remedy. The individuals in the study felt safe with PrEP as a remedy that they began to engage in riskier sexual behaviors which lead to other negative sex-related consequences.

Additional risk displacement evidence comes from the Partners PrEP Team which analyzed the open-label extension of the Partners PrEP Trial among serodiscordant heterosexual couples (Underhill & Mayer, 2013). Results showed a significantly increased frequency of unprotected sex and total sex with outside partners over time with those using PrEP (Underhill & Mayer, 2013). Again, results of this study indicate that

individuals felt safe with the remedy of PrEP to engage in risky sexual behavior which may lead to other negative sex-related consequences. Research has shown that if individuals continue to compensate for their risk behaviors with PrEP usage, it may significantly increase the transmission of mutated HIV strains resistant to PrEP, rendering the drug ineffective (Supervie, Garcia-Lerma, Heneine, & Blower, 2010). As presented, research is showing that PrEP may have opposite effects than intended. While meaning to help curb negative sex-related consequences, displacement effects, namely increases in risky sexual behavior, may increase negative sex-related consequences.

The Unintended Consequences of Remedy Messages. Despite the similar goals of risk avoidance messages and remedy messages—to reduce risky behavior and increase protective behavior—remedy messages may have unintended consequences that may potentially harm an individuals' welfare (Bolton, Cohen, & Bloom, 2006). Risk compensation research has analyzed various behavior patterns and has found that exposure to the remedy message reduces the perceived risk of the behavior (Bolton, Cohen, & Bloom, 2006; Brooks et al., 2012; Calkins & Zlatoper, 2001; Richens, Imrie, & Copas, 2000; Rodgers, 1996). In other words, individuals feel safe with the remedy to curtail the negative consequences that may arise from engaging in risky behaviors—they are trading away some of the increases in safety to engage in riskier behavior (Bolton, Cohen, & Bloom, 2006).

In a series of five experiments considering diverse topics as smoking cessation aids, debt consolidation loans, diet pills, and online security software/insurance, Bolton and colleagues (2006) found that remedy messages specific to a risk behavior, lowered risk perceptions and increased behavioral intentions to engage in the risky behavior. For example, for people who smoked, being exposed to a remedy message such as the nicotine patch lowered risk perceptions for negative health consequences due to smoking and increased intentions to continue smoking.

Bolton and colleagues' findings support research on risk compensation. Work on risk compensation suggests that individuals are willing to accept some risks and want to balance the rewards of risks with the negative consequences of those risks (Wilde, 1994). Therefore, when a safety device (remedy) is introduced, levels of perceived risk of engaging in a particular behavior decrease and the perceived rewards of risk taking increase (risk compensation). With risk compensation, negative effects of the behavior will either go back to original levels (risk homeostasis) or they may be transferred to other negative effects (risk displacement; Wilde, 1994).

To date, remedy messages have not been experimentally examined for sexual behavior; studies typically link condom use to riskier sexual behavior through correlational techniques (e.g. Richens, Imrie, & Copas, 2000). Additionally, there is limited research on how remedies are advertised for consequences of sexual behavior and if this influences safe sexual behavior or not. However, it is believed that the findings in other fields of remedy messages undermining perceptions of risk will extend to remedies such as PrEP.

Worry as a Moderator between Message Type and Intentions and Willingness to Use Condoms

Unlike perceptions of risk which are part of a reasoned response, worry is part of an emotional system which when individuals are presented with health information

arouses affect (emotional experiences and imagery) along with motivations to reduce the arousal (Cameron & Diefenbach, 2001; Cameron & Reeve, 2006). Risk perceptions have been identified as the primary motivators of health behaviors (Brewer, Weinstein, Cuite, & Herrington, 2004); however, worry also plays a significant role in the way we make decisions about health and the protective behaviors we engage in (Loewenstein, Weber, Hsee, & Welch, 2001).

While risk perceptions and worry are related, the experience of risk may be different than the experience of worry (Shiloh, Wade, Roberts, Alford, & Biesecker, 2013). Evaluations of risk, cognitive evaluations, are sensitive to probabilities and the prevalence of the outcome (Loewenstein, Weber, Hsee, & Welch, 2001). Worry is not only sensitive to probabilities and the prevalence of the outcome, but is also sensitive to the vividness of the imagery brought up in the mind associated with the outcome, the proximity in time of the outcome happening, and a variety of other variables that are not considered when evaluating a risk cognitively (Loewenstein, Weber, Hsee, & Welch, 2001). As a result, people may experience a discrepancy in the worry they experience for a threat and their evaluation of that threat occurring (Loewenstein, Weber, Hsee, & Welch, 2001); or in other words, people may be worried about a risk without believing that the risk will even happen to them.

Research has shown that worry about a disease plays a role in promoting health behaviors. For example, if someone is worried about their chances of getting breast cancer, they are more likely to receive a mammogram (Diefenbach, Miller, & Daly, 1999) or get a genetic test to check for breast cancer susceptibility (Cameron & Reeve, 2006). Additionally, in terms of sexual behavior, worry has been associated with greater levels of condom use to prevent HIV/AIDS (Sheeran, Abraham, & Orbell, 1999).

Because worry has been associated with motivating protective behaviors it is important to assess if it will differentially affect willingness and intentions to engage in risky sexual behavior depending upon exposure to a risk avoidance or remedy message. It is possible that exposure to a risk avoidance message will increase condom use if people are worried, but not for people who are not worried. People who are more worried about an outcome will be more likely to protect themselves when faced with a health threat regarding that outcome. However, the role of worry may be different in response to a remedy message. According to the risk compensation hypothesis, individuals presented with a remedy will feel more at ease with taking more risks, therefore, it is possible that exposure to a remedy message will decrease condom use for people who are worried but not for people who are not worried. In other words, individuals most worried for contracting HIV may be the most likely to accept the PrEP remedy and engage in risky sexual behavior.

Current Study

The current research was guided by the P/W model and research conducted on risk avoidance and remedy messages to examine the variables of the P/W model with special interest in intentions and willingness to engage in risky sexual behavior. Risky sexual behavior, specifically not using condoms while engaging in sexual behaviors, was chosen as the focus due to the fact that the negative consequences of the behavior (e.g. STIs) pose a serious public health threat.

The study is a randomized between-subjects design which allowed us to test the effects of the two message types against a control group. The purpose of the study is to analyze the main effects of the two message types on the variables incorporated in the P/W model. The risk avoidance message presented statistics on HIV infection and described why it was important to avoid the risks of sexual behavior to prevent STI's. The remedy message also presented statistics on HIV but then described pre-exposure prophylaxis (PrEP) as a remedy to engaging in risky sexual behavior.

This dissertation used PrEP as the remedy in the experimental manipulation. PrEP was chosen as the remedy for two reasons: a) novelty of the drug, and b) the public health implications of the drug causing risk compensation. PrEP is a relatively new drug and has currently been made most recognizable among the MSM population; however, uptake within this community has also been slow. Because of this slow uptake among heterosexual communities, PrEP was chosen as the remedy message in this study as the majority of the population will be heterosexual. By presenting a novel drug or information to an individual it was hoped that they will pay more attention to the message. The second reason for PrEP being chosen as the remedy in the experimental manipulation was the fact that risk compensation, as explained above, may become an issue leading to higher numbers of STIs and unintended pregnancy. The intentions and willingness of individuals to engage in sexual behavior without a condom after being exposed to a PrEP remedy message is an interesting measure, as well as one that has not been measured before.

Based on the reviewed literature above, this dissertation tested the following hypotheses:

- H1. Exposure to a risk avoidance message would lead to higher intentions and willingness to engage in protective behaviors (use condoms)
- H2. When exposed to a risk avoidance message, risk perceptions and protective behavioral intentions would be higher following exposure to a risk avoidance message relative to exposure to a control message, and favorable subjective norms would be lower (reasoned path)
- H3. When exposed to a risk avoidance message, unfavorable prototype perceptions of individuals who engage in risky sexual behavior would be higher than the control condition, and willingness to engage in risky sexual behavior would be lower than the control condition (social reaction path)
- H4. Exposure to a remedy message, PrEP, would lead to higher intentions and willingness to engage in risky behavior (not use condoms)
- H5. When exposed to PrEP message, risk perceptions would be lower than the control condition, favorable subjective norms would be higher, and behavioral intentions to engage in risky sexual behavior would be higher (reasoned path)
- H6. When exposed to a PrEP message, prototype perceptions would become more favorable than the control condition, and willingness to engage in risky sexual behavior would be higher (social reactance path)
- H7. Worry would moderate the relationship between intentions and willingness to engage in risky sexual behavior and message type

Significance of Current Study. The significance of the current study is twofold. The first significant contribution of this study is that currently, only a single study on the

effects of remedy and risk avoidance messages on behavior has been conducted. This study, conducted by Bolton, Cohen, and Bloom (2006) examined various risk avoidant and remedy messages on various behaviors to determine the effects of the message types. Results indicated that the remedy messages did in fact create a boomerang effect making individuals feel safer with the risk and therefore engage in more risk to compensate for the added safety (Bolton, Cohen, & Bloom, 2006). The current study will be the first examination of how message type has an influence on decisions to engage in risky sexual behavior.

The second significant contribution of this study is the focus on PrEP messages. PrEP has not been examined in a way to understand how an individual's decisions to engage in a particular behavior change based upon various psychological measures. Current research has looked into accessibility, uptake, worry, and risk taking of initiating PrEP use (Brooks et al., 2012; Golub, Kowalczyk, Weinberger, & Parsons, 2010; Volk et al., 2015) but little other variables, which are typically included in behavior change models and theories, have been examined. This study will examine multiple psychological variables, including risk perceptions, subjective norms, worry, and willingness and intentions to engage in risky sexual behavior, in both the absence and presence of PrEP exposure to determine the influence of PrEP messages.

Because little research is currently available on the examination of risk avoidance and remedy messages on sexual behavior and the use of PrEP as a remedy, this study will provide valuable information on how people think about engaging in risky sexual behavior based upon a message type they are exposed to. By examining how various message types influence behavior, it is hoped that we can develop more effective interventions to curtail the spread of STIs and unintended pregnancies via engagement in risky sexual behavior.

Study I—Analysis of Remedy and Risk Avoidance Messages

Overview

The goal of Study I was to evaluate variations on risk avoidance messages and variations on remedy messages for ease in understanding, believability, and favorability. Two gender-matched message variations were created to portray risk avoidance messages and two gender-matched message variations were created to portray remedy messages (Appendix A). The risk avoidance message presented statistics on HIV infection and described why it is important to avoid the risks of risky sexual behavior, including STI contraction. The remedy message also presented statistics on HIV but also described pre-exposure prophylaxis (PrEP) as a remedy to engaging in risky sexual behavior.

This study assessed the risk avoidance message and remedy message that participants were most engaged with and favored. As a result of this study, one risk avoidance message and one remedy message (including gender-matched messages) were selected to be used in Study II.

Method

Participants and Procedure. Participants were undergraduate students of the University of California, Merced who were enrolled in a psychology research participation pool—SONA experiment management system. The SONA system is available to students on campus to participate in research studies in return for extra credit in qualifying courses. This sample was chosen as it represents a young adult population, who are the most at risk for contracting a STI.

Participants could log into the SONA system and choose to participate in the study among a list of other study titles and approximate completion times. If a participant chose our study they were directed to a page that explained the focus of the study as well as the credit they would receive for participation.

Procedure and measures. Participants who chose to participate were given a link to an online survey, which included the Bill of Rights for Human Subjects and an Informed Consent form. In these documents, participants were told that they were participating in a study to assess new advertisement campaigns. Upon providing informed consent, participants were randomized to either receive the risk avoidance messages or the remedy messages (messages were gender-matched). Participants assessed two messages and after each message they answered a set of seven questions. Once the questionnaire was complete, and participants rated each message, the participants were debriefed. For their participation, participants received course credit which was distributed through the SONA system. All material was approved by the University of California, Merced's Institutional Review Board.

Participants assessed how engaged they were with the message, whether they believed the message, if the message was easy to read and understand, if the message made them think about their own behavior, and if they liked the message overall. Questions also assessed if participants believed the message portrayed a remedy to contracting HIV, and if the message showed that the risks of contracting HIV could be avoided. Sample questions include: "I believed the information that was presented in this message", "This message was easy to read and understand", and "This message provides a remedy to the risks of HIV". The full set of items asked to participants can be found in Appendix B. Responses were recorded using a 7-point (0 = *Strongly Disagree* to 6 =

Strongly Agree) continuous Likert type scale. The questions were made into a composite score with 7 being high favorability to the message and 1 being no favorability to the message.

Statistical Analysis. To determine which messages will be used in Study II, average favorability scores and independent samples t-tests were implemented. T-tests were used to determine if a difference existed between message A and message B on message favorability as determined by the composite score for each participant. The message which had the highest overall approval was used as the experimental manipulation in study II.

A power analysis was conducted, and it was determined a sample a $N = 330$ (165 per condition) was sufficient at proving a 95% chance of detecting a small to medium effect size ($d = 0.4$), with a two-tailed test at $p < .05$. This effect size was determined to be appropriate for remedy message studies as derived from previous research on exposing individuals to remedy messages (Bolton, Cohen, & Bloom, 2006; Thalheimer & Cook, 2002). Studies by Bolton and colleagues (2006) indicated a range of effect sizes for remedy-based messages of d : 0.29-0.62. An average of the four effect sizes was taken, and a small to medium effect size of $d = 0.4$ was found to be appropriate for this type of research.

Results

Participant Characteristics. A total of 396 individuals participated in the first study. Participants average age was 19.53 (SD = 2.749) with an age range from 17-55, with 275 (70.2%) female. The sample was racially diverse with 158 (46.2%) Caucasian or White, 35 (10.2%) African American or Black, 63 (18.4%) American Indian or Native American, and 86 (25.1%) Asian or Pacific Islander. The sample was randomized to receive either the risk avoidance message condition, which consisted of 188 (47.5%) participants, or the remedy message condition, which consisted of 205 (51.8%) participants. Messages were gender specific; females viewed messages with female images and males viewed messages with male images. Therefore, 145 females and 59 males viewed both remedy messages and 130 females and 58 males viewed both risk avoidance messages. The participant flow throughout the study design can be found in Figure I.

Average Favorability Scores. Figures II – V show the average favorability scores for both males and females and Figure VI shows the average favorability of risk avoidance message versus the remedy message. Message favorability scores were highest for message B for both the risk avoidance and remedy message on most items. Exceptions among females include: average message believability values ($M_A=5.42$ vs. $M_B=5.33$) higher in message A and average ease in understanding values ($M_A=5.06$ vs. $M_B=5.02$) essentially equal for messages A and B. Exceptions among males include: average avoid the risk values ($M_A=5.36$ vs. $M_B=5.33$) and message engagement values ($M_A=4.64$ vs. $M_B=4.62$) essentially equal for messages A and B.

T-Test Results. Four independent samples t-tests, male response to remedy messages, female response to remedy messages, male response to risk avoidance messages, and female response to risk avoidance messages, were run to determine message preference by gender and message type—message A or message B. The tests were conducted using Bonferroni adjusted alpha levels of .0125 per test (.05/4). To

conduct an independent samples t-test, six assumptions must be met. These six assumptions include: a) a dependent variable measured at the continuous level, b) an independent variable which consists of two categorical and independent groups, c) independence of observations, d) no significant outliers in the independent variable in terms of the dependent variable, e) the dependent variable should be approximately normally distributed across the independent variable, and f) there should be homogeneity of variances. All assumptions to implement an independent samples t-test were met for each analysis.

Male response to remedy messages. There were 56 males who viewed remedy message A and 56 males who viewed remedy message B. There was no statistical difference in message favorability scores between remedy message A and B, $t(110) = -1.551, p = .124, ns$ (Figure II).

Female response to remedy messages. There were 143 females who viewed remedy message A and 142 females who viewed remedy message B. The message favorability scores were higher in the message B condition ($M = 4.27; SD = 1.20$) than the message A condition ($M = 3.75; SD = 1.10$). There was a statistically significant difference in message favorability scores between the two remedy conditions, $t(283) = -3.812, p < .01$ (Figure III).

Male response to risk avoidance messages. There were 55 males who viewed risk avoidance message A and 55 males who viewed risk avoidance message B. There was no statistical difference in message favorability scores between risk avoidance message A and B, $t(108) = -.695, p = .489, ns$ (Figure IV).

Female response to risk avoidance messages. There were 125 females who viewed risk avoidance message A and 124 females who viewed risk avoidance message B. There was no statistical difference in message favorability scores between risk avoidance message A and B, $t(247) = -.784, p = .434, ns$ (Figure V).

Discussion

The purpose of conducting study I was to determine one gender-matched risk avoidance message and one gender-matched remedy message to use in the study II. Study I evaluated the messages on various aspects including ease in understanding, believability, and favorability. Four main messages were created for this study (Appendix A); two risk avoidance message variations and two remedy message variations. Additionally, the risk avoidance and remedy message variations were gender matched, therefore eight messages in total were created.

Although evidence was mixed, there seemed to be more support for message B. Results indicated that average favorability scores generally favored message B for both risk avoidance and remedy messages, and independent sample's t-tests revealed that males had no preference for message A or B for either risk avoidance and remedy message, females had no preference for message A or B for risk avoidance messages, but rated the remedy message B more favorable than remedy message A. Because message B appeared to have the clearest message, per the participants, it was chosen for both the risk avoidance and remedy message to be presented in Study II

Study II—Differential Effects of Risk Avoidance and Remedy Messages on Intentions and Willingness to Engage in Risky Sexual Behavior

Overview

The goal of Study II is to answer the main research question of the dissertation: Does exposure to a risk avoidance message versus a remedy message differentially influence intentions and willingness to engage in risky sexual behavior? While both risk avoidance and remedy messages have the same goal, their approach to reducing risk behavior is significantly different. Moreover, research has shown that the result of their use may be in opposite directions. While risk avoidance messages typically induce health promoting behavior, remedy messages are being found to induce risky behavior, because individuals feel safer with the remedy and therefore compensate for that increased security by engaging in riskier behavior (Bolton, Cohen, & Bloom, 2006).

From an applied perspective, the current study poses a more specific question: Are PrEP messages associated with risk displacement in the form of increased intentions and willingness to engage in risky forms of sexual behavior (e.g., such as sex without a condom)? To guide this work on effects of message type on intentions and willingness to engage in risky sexual behavior, seven hypotheses were tested.

H1. Exposure to a risk avoidance message would lead to higher intentions and willingness to engage in protective behaviors (use condoms)

H2. When exposed to a risk avoidance message, risk perceptions and protective behavioral intentions would be higher following exposure to a risk avoidance message relative to exposure to a control message, and favorable subjective norms would be lower (reasoned path)

H3. When exposed to a risk avoidance message, unfavorable prototype perceptions of individuals who engage in risky sexual behavior would be higher than the control condition, and willingness to engage in risky sexual behavior would be lower than the control condition (social reaction path)

H4. Exposure to a remedy message, PrEP, would lead to higher intentions and willingness to engage in risky behavior (not use condoms)

H5. When exposed to PrEP message, risk perceptions would be lower than the control condition, favorable subjective norms would be higher, and behavioral intentions to engage in risky sexual behavior would be higher (reasoned path)

H6. When exposed to a PrEP message, prototype perceptions would become more favorable than the control condition, and willingness to engage in risky sexual behavior would be higher (social reactance path)

H7. Worry would moderate the relationship between intentions and willingness to engage in risky sexual behavior and message type

Method

A randomized between-subjects experimental design was implemented for this study. Participants were randomly assigned to one of three groups: 1) exposure to risk avoidance message, 2) exposure to remedy message, and 3) a control group (see Appendix A). All messages were presented in the format of a health communication narrative. The risk avoidance message conveyed the negative consequences of engaging in risky sexual behavior. The remedy message also conveyed the negative consequences of engaging in risky sexual behavior, with the addition of discussing pre-exposure

prophylaxis (PrEP) as a way to prevent those negative consequences. The control message discussed oatmeal and the different types of oatmeal a person can purchase. The main outcome of interest was participants' intentions and willingness to engage in risky sexual behavior (sex without a condom). This study was conducted to determine how message type, risk avoidance and remedy, differentially influence intentions and willingness to use condoms.

Participants and Procedure. Participants were individuals with an active account with Amazon's Mechanical Turk (Mturk). Participants were required to be 18 years of age, speak/read English, reside in the United States, and be single (not currently married). Participants who were married were asked to not participate because of the reduced likelihood of engaging in risky sexual behaviors. Past research utilizing the same recruitment platform showed that participants of Mturk to be more demographically diverse than typical internet and American college samples and participation rates to be affected by compensation rate and duration of the task (Buhrmester, Kwang, & Gosling, 2011). Overall, Mturk was found to be successful in obtaining high-quality data quickly and inexpensively (Buhrmester, Kwang, & Gosling, 2011).

Participants could log into the Mturk system and choose to participate in the study among a list of other study titles and approximate completion times. If a participant chose the study, they were directed to a page that explained the focus of the study as well as the compensation that they received for participation. From this description, participants chose to continue with the study or go back to the list of other potential studies.

Procedure. Participants who chose to participate were given a link to the study hosted by Qualtrics. After giving informed consent, participants were randomly assigned to one of three groups. The groups consisted of: 1) exposure to risk avoidance message, 2) exposure to remedy message, and 3) a control group. Once assigned to a condition, participants were first asked demographic information. They were then presented a message (see Appendix A). After the messages were shown, they were given a questionnaire assessing the variables of interest. Once the questionnaire was complete, the participants were debriefed and their participation complete. For their participation, participants received monetary compensation, \$0.50 on average, distributed through the Mturk system. All material was approved under the University of California, Merced's Institutional Review Board.

Experimental Manipulation. The experimental manipulation in this study was the messages the participants were exposed to. The exposure was to one of three conditions: 1) a risk avoidance message, 2) a remedy message, or 3) a control message.

The risk avoidance message promoted the idea that individuals should avoid the risk of risky sexual behavior while the remedy message promoted the same idea but presents PrEP as a remedy to contracting HIV as a consequence of engaging in risky sexual behavior. The control condition was a message about different varieties of oatmeal that are available for consumers. The messages can be seen in Appendix A.

Measures

Demographics. Demographic information was collected for each participant including: age, gender, race/ethnicity, highest education level of self, mother and father, annual income, relationship status, and sexuality.

Age was measured as an open-ended continuous variable. Gender was coded dichotomously as: 0 = *male* and 1 = *female*. Race was measured categorically and coded as follows: 1 = *white/Caucasian*, 2 = *black or African American*, 3 = *American Indian or Native American*, and 4 = *Asian or Pacific Islander*. Being Hispanic/Latino was measured as a dichotomous variable with 0 = *no* and 1 = *yes*. Participants' highest level of education was measured ordinally and coded as the following: 1 = *6th grade*, 2 = *7th grade*, 3 = *8th grade*, 4 = *9th grade*, 5 = *10th grade*, 6 = *11th grade*, 7 = *12th grade*, 8 = *1 year of college*, 9 = *2 years of college*, 10 = *3 years of college*, 11 = *4 years of college*, 12 = *5 or more years of college*, 13 = *1 year of graduate school*, 14 = *2 years of graduate school*, 15 = *3 years of graduate school*, 16 = *4 years of graduate school*, and 17 = *5 or more years of graduate school*. Parents highest level of education was asked with two questions, one for the mothers' highest education level and the other for the fathers. The variables were measured ordinally and coded as the following: 1 = *8th grade or less*, 2 = *some high school*, 3 = *high school degree or GED*, 4 = *some college or 2-year degree*, 5 = *4-year college degree*, and 6 = *post college degree (MA, MD, PhD, etc.)*. Average annual income of the participant was measured at the ordinal level and had the following categories: 1 = *under \$10,000*, 2 = *\$10,000 - \$19,999*, 3 = *\$20,000 - \$29,999*, 4 = *\$30,000 - \$39,999*, 5 = *\$40,000 - \$49,999*, 6 = *\$50,000 - \$59,999*, 7 = *\$60,000 - \$69,999*, 8 = *\$70,000 - \$79,999*, 9 = *\$80,000 - \$89,999*, 10 = *\$90,000 - \$99,999*, 11 = *\$100,000 - \$109,999*, 12 = *\$110,000 - \$119,999*, 13 = *\$120,000 - \$129,999*, 14 = *\$130,000 - \$139,999*, 15 = *\$140,000 - \$149,999*, and 16 = *\$150,000 and over*. The participants' current relationship status was measured categorically and coded as follows: 1 = *single—not currently in a relationship*, 2 = *have boyfriend/girlfriend*, and 3 = *married*. Lastly, the participants' sexuality was measured as a categorical variable and coded as the following: 1 = *100% heterosexual (straight)*, 2 = *mostly heterosexual (straight), but somewhat attracted to people of your own sex*, 3 = *Bisexual, that is, attracted to men and women equally*, 4 = *Mostly homosexual (gay), but somewhat attracted to people of the opposite sex*, 5 = *100% homosexual*, and 6 = *not sexually attracted to either males or females*.

Past Sexual Behavior. Sexual behavior was assessed through four items. Three items asked if participants had ever had vaginal sex, anal sex, and oral sex. These questions were coded dichotomously as: 0 = *No* and 1 = *Yes*. The last item asked participants what form of contraceptive and/or STI preventive method they used in the past 12 months, followed by a list of 22 response choices. Choices were coded as: 1 = *condoms*, 2 = *female condom*, 3 = *birth control pills*, 4 = *shot (Depo-Provera)*, 5 = *emergency contraception or 'morning after' pill*, 6 = *Norplant*, 7 = *diaphragm, cap or shield*, 8 = *IUD (intrauterine device)*, 9 = *natural family planning (safe periods by temperature, cervical mucus test)*, 10 = *withdrawal (pulling out)*, 11 = *rhythm or safe period by calendar*, 12 = *vaginal sponge*, 13 = *spermicide foam, jelly, cream, suppositories*, 14 = *ring (NuvaRing)*, 15 = *patch (Ortho Evra)*, 16 = *contraceptive film*, 17 = *emergency IUD insertion*, 18 = *vasectomy*, 19 = *tubal ligation/sterilization*, 20 =

anti-retroviral or HIV/AIDS drugs (PrEP), 21 = *some other method* and 22 = *no method used*. See Appendix B for item wording.

Prototype Perception. Prototype perceptions of others were assessed with 12 items using a 7-point (0 = *not at all* to 6 = *very much*) continuous scale, which measured participants' idea of the typical same-sex individuals who engages in risky sexual behavior through their ratings of 12 adjectives. The 12 adjectives include: intelligent, confused, dull (boring), popular, immature, considerate, self-confident, independent, self-centered, careless, unattractive, and cool (sophisticated). These adjectives were drawn from previous work which have shown to be effective in predicting the typical person who engages in risk behaviors (Gibbons, Gerrard, & Boney-McCoy, 1995; Thornton, Gibbons, & Gerrard, 2002; Gibbons, Gerrard, Blanton, & Russell, 1998; Gibbons & Gerrard, 1995). Participants responded to the typical same-sex individual who engages in unprotected sex. After telling participants to imagine this person, questions took the following form: "On a scale from 0 (not at all) to 6 (very much) how intelligent/confused/dull/etc. is the typical person who engages in this behavior?" Image favorability was based off the average ratings of the 12 adjectives, with higher scores reflecting greater favorability. The measure of prototype perceptions individuals had of others had an internal consistency score of 0.660, as determined by a Cronbach's alpha. See Appendix B for item wording. The 12 items were averaged to make a composite prototype perception score.

Risk Perception. Risk perception was assessed with 6 items using a 7-point (0 = *not at all likely* to 6 = *extremely likely*) continuous Likert type scale, and with accordance to the prototype/willingness model, was a conditional risk assessment measured in the subjunctive. Questions sought to determine participants' risk perceptions for various sex-related consequences. Sample questions took the following form: "If you were to have sex without a condom, how likely is it that you will contract an STI?" The scale had a high level of internal consistency, as determined by a Cronbach's alpha of 0.829. See Appendix B for item wording. The 6 items were averaged to make a composite risk perception score.

Subjective Norms. Subjective norms were assessed with 6 items using a 7-point continuous Likert type scale. Participants were asked to assess their friends' sexual behavior and assess how they felt their friends would think about their own behavior. Questions took the following form: "How many of your friends have unprotected vaginal/oral/anal sex (no condom)?" followed by a 7-point response scale (0 = *None* to 6 = *Almost All*). Additional questions included: "How would your friends react if they thought you were having vaginal/oral/anal sex without a condom?" followed by a 7-point response scale (0 = *Extreme Disapproval* to 6 = *Extreme Approval*). The scale had a high level of internal consistency, as determined by a Cronbach's alpha of 0.862. See Appendix B for item wording. The 6 items were averaged to make a composite subjective norms score.

Behavioral Intentions. Intentional behavior was assessed with 3 items using a 7-point (0 = *Not at all likely* to 6 = *Very likely*) continuous Likert type scale. Participants were asked to assess their chance of engaging in various risky behaviors within the next 6 months. Questions took the form as the following: "How likely is it that you will engage in vaginal/anal/oral sex without a way to prevent pregnancy/STIs in the next 6 months?"

The scale had a high level of internal consistency, as determined by a Cronbach's alpha of 0.857. See Appendix B for item wording. As determined by a factor analysis, described in results, the 3 items were averaged together to make a composite behavioral intentions score.

Behavioral Willingness. Behavioral willingness was measured with 10 items on a 7-point continuous Likert type scale that sought to measure participants' willingness to engage in risky sexual behavior, sex without a condom. The construct of willingness is a measure of acknowledgement that under specific circumstances an individual may engage in risk behaviors that are not previously intended or planned (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008). Because willingness is a response to a risk-conducive situation, participants were given a hypothetical scenario where they had to assess their willingness to engage in risky behavior within each different scenario. Questions took the following form (as drawn from Gibbons, Gerrard, Blanton, & Russell, 1998): "Imagine that you have met a person that you find highly sexually attractive. Over the course of an evening, the two of you have an enjoyable conversation and you come to realize that this person wants to have sex with you. However, neither of you has a condom. Using the scale below, please tell us how willing you would under these circumstances to a) go ahead and have sex with this person, b) go ahead but use a method like withdrawal of the penis before ejaculation, and c) not have sex." This question was followed by a 7-point response scale with anchors 0 (*Not at all willing*) and 6 (*Very much willing*). The scale had a reliability score of 0.745, as determined by Cronbach's alpha. See Appendix B for item wording. As determined by a factor analysis, described in results, the 10 items were averaged together to make a composite behavioral willingness score.

Worry. Worry was measured by 8 items using a continuous scale and attempted to assess how worried participants were in terms of having a negative sex-related consequence. The negative sex-related consequences included in the study were contracting an STI. Questions took the following form: "How worried are you about contracting an STI after having unprotected sex?" followed by a 7-point Likert type scale (0 = *Not at all worried* to 6 = *Extremely worried*). The scale had a high level of internal consistency, as determined by a Cronbach's alpha of 0.980. See Appendix B for item wording. The 8 items were averaged together to create a composite worry score. This score was then mean centered.

Statistical Analysis. All analyses were done using Statistical Package for the Social Sciences (SPSS; version 23 and 24). Demographics and past sexual behavior were summarized using descriptive statistics. Statistical summaries include means and standard deviations for continuous variables and frequencies in percentages for categorical variables. Three main analyses were conducted for this study, a factor analysis, two multiple regressions, and three one-way ANOVAs.

Before assessing the main aims of the study, a factor analysis was performed on the behavioral intention and behavioral willingness variables (see measures section or Appendix B for items) to determine how to best analyze the results. The 13 items (3 intention and 10 behavioral willingness) items were analyzed with a principal components analysis with a varimax rotation. Then, to assess the main aim of the study, two multiple regressions were conducted. One regressed intentions to engage in sex without a condom on message type and worry over

acquiring an STI or HIV, and the associated interaction of message type and worry, and the second regressed willingness to engage in sex without a condom on message type, STI or HIV contraction worry, and the associated interaction of message type and worry. The main outcome variables, or dependent variables, were intentions to engage in sex without a condom and willingness to engage in sex without a condom. Additionally, the independent variables for both regression analyses included message type (control, risk avoidance, and remedy), STI or HIV contraction worry, and the cross product of message type and worry which allowed for testing of an interaction.

A regression analysis was chosen because of its ability to analyze variables at the continuous level; and, its capability to determine whether an interaction, or moderation occurs. Moderation occurs when the relationship between two variables depend upon a third variable. Specifically, in this example, the influence of STI or HIV contraction worry was examined on the relationship of message type and intentions and willingness to engage in sex without a condom. The main effect of message type on intentions and willingness to engage in risky behavior analyzed the experimental manipulation.

Three additional multiple regressions were carried out to determine how the remaining variables included in the P/W model, subjective norms, perceived risk, and prototype perceptions, were influenced based upon message condition. Each of the analyses regressed one of the P/W variables on message type, STI or HIV contraction worry, and the associated interaction of message type and worry. The three dependent variables for these analyses were subjective norms, risk perceptions, and prototype perceptions. The independent variables for each analysis was message type, STI or HIV contraction worry, and the cross product of message type and worry which allowed for testing of an interaction.

All analyses were conducted on the portion of the sample that was sexually active (as determined by a “yes” response on any of the three questions asking if they had ever engaged in vaginal, anal, or oral sex) and single (as determined by the participant not being married or in a current relationship). A single and sexually active sample was chosen as these individuals would be the most likely to be engaging in risky sexual behavior.

An *a priori* power analysis was conducted, and it was determined a sample size of $N = 119$ was sufficient at proving a 95% chance of detecting a small to medium effect size ($f^2 = 0.15$), at $p < .05$. The effect size statistic, f , is being used as this was a power analysis for multiple regression, but this effect size statistic is roughly half of d therefore translates into a small to medium effect size of $d = 0.4$. This effect size was determined to be appropriate for remedy message studies as derived from previous research on exposing individuals to remedy messages (Bolton, Cohen, & Bloom, 2006; Thalheimer & Cook, 2002). Studies by Bolton and colleagues (2006) indicated a range of effect sizes for remedy-based messages of d : 0.29-0.62. An average of the four effect sizes was taken, and a small to medium effect size of $d = 0.4$ was found to be appropriate for this type of research.

Results

Participant Characteristics. A total of 895 Mechanical Turk users participated in the study. Participants’ average age was 33.62 (SD = 11.07) with an age range from 18-74, with 448 (49.9%) female. The racial breakdown of the sample was: 699 (77.8%)

Caucasian or White; 67 (7.5%) Hispanic; 88 (9.8%) African American or Black; 11 (1.2%) American Indian or Native American; and 63 (7.0%) Asian or Pacific Islander (responses not mutually exclusive). The highest education level of the participant was four years of college (276; 30.7%), while the highest education level of the participants' mother (273; 30.4%) and father (256; 28.5%) was a high school diploma or GED. Annual income for the participant was \$30,000 – \$39,999 (132; 14.7%). The majority of the sample was heterosexual (551; 61.4%), single (502; 55.9%), or in a relationship but not married (352; 39.2%). Most of the sample was sexually experienced with 668 (74.4%) having engaged in vaginal sex, 660 (73.5%) having had oral sex, and 395 (44%) having had anal sex. When engaging in sexual behavior, participants responded that in the past 12 months the most commonly used form of contraceptive or STI protection was from: the male condom (394; 43.9%), a contraceptive pill (216; 24.1%), withdrawal method (155; 17.3%), and no protection (215; 23.9%).

To effectively answer the question if exposure to different message types influence intentions and willingness to engage in risk behavior, a sample of those individuals most likely to be influenced by the messages was used. Therefore, individuals who were in a relationship or married and were not sexually active (responded “no” to ever having vaginal, anal, and oral sex) were excluded from analyses as they were the least likely to be engaging in risky sexual behavior. Analyses on the full sample were also conducted and are available upon request. A total of 449 participants were single and sexually active. The average age of the sample was 34.82 (SD = 11.99) with an age range from 19 – 74. 47% of the sample was female. The racial breakdown of the sample was: 362 (81.0%) Caucasian or White; 29 (6.5%) Hispanic; 51 (11.4%) African American or Black; 5 (1.1%) American Indian or Native American; and 29 (6.5%) Asian or Pacific Islander (responses not mutually exclusive). The highest education level of the participant was 4 years of college (147; 32.7%), while the highest education level of the participants' mother (152; 34.4%) and father (134; 29.9%) was high school or GED degree. Annual income for the participant was \$30,000 - \$39,999 (70; 15.6%). Most of the sample was heterosexual (287; 76.5%). When engaging in sexual behavior, participants responded that in the past 12 months the most commonly used form of contraceptive or STI protection was from: condoms (203; 61.5%), birth control pills (109; 34%), and the withdrawal method (65; 20.4%).

139 (31%) of the participants received the risk avoidance message condition, 162 (36.1%) of the participants received the remedy message condition, and 148 (33%) of the participants received the control message condition. Within each message condition, participants were then split by gender where females viewed messaged with female images and males viewed messaged with male images. Therefore, 67 males and 72 females viewed the risk avoidance message, 90 males and 72 females viewed the remedy message, and 81 males and 67 females viewed the control message. Participant flow into the study can be found in Figure VII and demographic characteristics by message type individuals received can be found in Table I.

Principal Components Analysis of Intention and Willingness Variables. A principal components analysis of intentions and willingness to engage in risky sexual behavior was performed to determine the factors underlying the variables, as they were

the main variables of interest in the study. Thirteen items were analyzed; 3 for intentions and 10 for willingness behavior (see measures section or Appendix B).

Principal components analysis with a varimax rotation was used for the analysis. Results indicated a two-factor solution. The first factor explained 45.7% of the variance and the second explained 19.7%. Willingness variables loaded together forming a factor called “behavioral willingness” and intention variables loaded together forming a factor that will be called “behavioral intention.” This two-factor solution is supported by the literature which identifies intentions and willingness as independent predictors of risk behavior (Gibbons, Gerrard, Blanton, & Russell, 1998). Items analyzed, along with their factor loadings, can be found in Table II.

Behavioral intention variables and behavioral willingness variables were made into a composite score. These two composite variables were used as the dependent variables of the study—the participants’ willingness and intent to engage in risky sexual behavior (sex without a condom).

The Effects of Message Type on Intentions and Willingness to Engage in Risky Sexual Behavior. To determine the effects of message type on intentions and willingness to engage in risky sexual behavior, or sex without a condom, two multiple regressions were conducted. Multiple regression analyses were conducted to include the cross product (interaction) of participants’ STI or HIV contraction worry and message type. For these analyses, message type, a categorical variable, was dummy coded to account for the three message types. Because of this, the referent, or control condition, is represented by the intercept in the multiple regression model. Additionally, worry was mean centered. These analyses tested hypotheses H1, H4, and H7.

A multiple regression was conducted to predict intentions to engage in sex without a condom from message type, STI or HIV contraction worry, and the interaction of these two variables. All assumptions to run such an analysis were met. The overall model was statistically significant, $F(5, 378) = 2.536, p < .05, \text{adj. } R^2 = .020$. Results indicated that none of the predictive variables within the model were significant. Regression coefficients and standard errors can be found in Table III and the plot of the interaction can be found in Figure VIII.

A second multiple regression was conducted to predict willingness to engage in sex without a condom from message type, STI or HIV contraction worry, and the interaction of these two variables. All assumptions to run such an analysis were met. The overall model was statistically significant, $F(5, 389) = 2.281, p < .05, \text{adj. } R^2 = .016$. Results indicated worry was the only variable that significantly predicted ($p < .001$) willingness to engage in sex without a condom. Worry was negatively associated with willingness. That indicates that as worry increased, willingness to engage in sex without a condom decreased. Regression coefficients and standard errors can be found in Table III and the plot of the interaction can be found in Figure IX.

Effects of Message Type on Prototype Willingness Model Variables. To determine the effects of message type on the remaining variables of the P/W, subjective norms, risk perceptions, and prototype perceptions, three additional multiple regressions were conducted. Multiple regression analyses were conducted to include the cross product (interaction) of participants’ STI or HIV contraction worry and message type. For these analyses, message type, a categorical variable, was dummy coded to account

for the three message types. Because of this, the referent, or control condition, is represented by the intercept in the multiple regression model. Additionally, worry was mean centered. These analyses tested hypotheses H2, H3, H5, and H6.

First, a multiple regression was conducted to predict participants' subjective norms towards engaging in risky sexual behavior, or sex without a condom, from message type, STI or HIV contraction worry, and the interaction of these two variables. All assumptions to run such an analysis were met. The overall model was statistically significant, $F(5, 382) = 3.112, p < .05, \text{adj. } R^2 = .027$. None of the predictive variables included in the model were found to be statistically significant. Regression coefficients and standard errors can be found in Table III and the plot of the interaction can be found in Figure X.

Next, a multiple regression was conducted to predict a participants' perceived risk towards contracting an STI or HIV from engaging in risky sexual behavior, or sex without a condom, from message type, STI or HIV contraction worry, and the interaction of these two variables. All assumptions to run such an analysis were met. The overall model was statistically significant, $F(5, 377) = 24.827, p < .05, \text{adj. } R^2 = .238$, and two variables, worry and the interaction term between the remedy message and worry, added statistically significant ($p < .05$) to the prediction of participants' perceptions of risk (Table III). These results indicate that as STI or HIV contraction worry increased so did participants' perceived risk for contracting an STI or HIV ($\beta = .616, p < .001$). Additionally, the interaction effect shows that worry has different magnitudes of impact on participants' risk perceptions when exposed to the remedy message versus the other two message conditions, ($\beta = -.184, p < .001$). By inspection of the interaction plot (Figure XI), worry appears to have less of an impact in the remedy group on participants' risk perceptions versus the other two message conditions.

Lastly, a multiple regression was conducted to predict participants' prototype perceptions regarding individuals who engage in risky sexual behavior, or sex without a condom, from message type, STI or HIV contraction worry, and the interaction of these two variables. All assumptions to run such an analysis were met. The overall model was not statistically significant, $F(5, 375) = 2.074, p = .06, ns$. Regression coefficients and standard errors can be found in Table III and the plot of the interaction can be found in Figure XII.

Discussion

The main goal of study II was to assess whether exposure to a risk avoidance message versus a remedy message differentially influences intentions and willingness to engage in risky sexual behavior—sex without a condom. The main hypotheses to assess this goal were as follows: a) risk avoidance messages would increase intentions and willingness to engage in protective behavior, b) exposure to remedy messages would increase intentions and willingness to engage in risky behavior, and c) STI or HIV contraction worry would moderate the relationship between message type and intentions and willingness to engage in risky behavior. Results revealed that the overall models for both intentions and willingness to engage in sex without a condom were significant with worry being the only variable adding statistical significance to the prediction of willingness to engage in risky sexual behavior. This implied that as worry increased, willingness to engage in sex without a condom decreased. This pattern is consistent with

the literature on how worry influences behavior change (Cameron & Reeve, 2006; Diefenbach, Miller, & Daly, 1999; Sheeran, Abraham, & Orbell, 1999). However, the main experimental effect of message type differentially influencing intentions and willingness to engage in sex without a condom was found to be non-significant.

While the interaction effects within the willingness and intentions analyses did not emerge, a statistically significant interaction effect was found for participants exposed to the remedy message. The magnitude of STI or HIV contraction worry was different in relation to the message types. By inspection of the interaction plot, worry appears to have less of an impact in the remedy group on participants' risk perceptions versus the other two message conditions. The negative regression coefficient found for the interaction effect suggests that remedy messages may dull the impact of worry on increasing risk perceptions. This signifies that people may be aware of the risk of STIs and HIV, but when exposed to a remedy are less worried about personally contracting them. Interventions and health communication efforts should keep in mind that remedy messages may negate the role of worry on deterring risk behaviors (e.g. Magnan & Cameron, 2015).

Past research has shown that risk avoidance messages increase intentions and willingness to engage in protective behavior. This finding has been found in many studies and with various behavioral outcomes (e.g. Markham et al., 2012; Lee, Cameron, Wunsche, & Stevens, 2010; McClendon, Prentice-Dunn, Blake, & McMath, 2002; McClendon & Prentice-Dunn, 2001; and Wurtele, 1988). This effect, however, was not found in the current study. Possible explanations may lie in the experimental manipulation. It is possible that the experimental manipulation of the study, or the messages presenting the risk avoidance or remedy message, did not correctly convey the information to promote perception changes. An ineffective message would impact each arm of the study, therefore explaining the non-significant findings throughout.

A potential explanation for the message failure may have been the content of the message itself. Witte (1992; 2000) proposed a model, the extended parallel process model (EPPM) to explain an individuals' ability to process a health message and relates both emotional and cognitive factors into the success or failure of the message (Gore & Campanella Bracken, 2005). According to the model, when an individual is exposed to a fear-appeal, health communication, two cognitive appraisals can occur, the first is the appraisal of the threat and the second is the appraisal of the efficacy of the message's recommended response (Gore & Campanella Bracken, 2005). If the appraisal of the threat is adequate (they believed themselves to be susceptible and believed the issue to be a threat), fear is elicited which motivates individuals to begin the message efficacy appraisal (Witte, 1992). From this appraisal one of two processes will occur, danger control processes which allows the individuals to cognitively deal with the threat and evaluate possible solutions, or fear control processes which lead individuals to maladaptive coping mechanisms such as denial or avoidance of the threat (Witte, 2000). In summary, strong fear appeals with a high efficacy message lead to the most effective behavior change, while strong fear appeals with a low efficacy message produces the greatest levels of defensive responses. The EPPM may explain why non-significant results occurred in this study. The fear appeal (e.g., AIDS is a threat to your health) may have adequately made participants feel vulnerable to the threat, but the lack of an efficacy

message may have left them in denial that they could be susceptible to contracting the disease. This may explain why the messages failed; the combination of high threat to low efficacy would leave the reader to reject the message as they felt they had no control over the outcome.

Another explanation may be the choice of PrEP as the remedy manipulation. Pre-exposure prophylaxis is a new medication that lowers the chances of contracting HIV before engaging in sexual behavior that could put an individual at risk. Because the findings were non-significant, it is possible that the message was not believable. PrEP believability, usage, and previous knowledge were not assessed in the study; therefore, it is possible that this type of message may not be effective on the sample.

Other possible explanations may lie in the message wording. The messages were not tested via pre-test. It may be that the amount of content within the messages was lengthy, and instead participants opted out of reading it in its entirety in order to proceed to other parts of the study. While Mechanical Turk has been found to be a fast, cheap, and reliable way to gather quality data (Buhrmester, Kwang, & Gosling, 2011; Peer, Vosgerau, & Acquisti, 2014), it is limited by the reputation of the participants. Within the system, participants can be sorted into high reputation workers—above a 95% approval rating—and non-high reputation workers. Research has shown that data quality decreased among non-high reputation workers (Peer, Vosgerau, & Acquisti, 2014). As a way to collect as much of a random national sample as possible, this study did not limit the type of worker, therefore leading to data that may not have been as high quality. In other words, some participants may have sped through the questionnaire or the message manipulation to receive their compensation for participating.

Future Directions. The future direction of this research is best described through the current study's limitations which include both design and sample constraints.

Design Limitations. Despite the study being a randomized experiment, the strength of the experimental manipulation may be the biggest limitation. Participants were exposed to a single message type and were told to read it carefully as they were going to be answering questions about it. They were not timed to determine if this was actually done, and they were not exposed to the message again. Past research has shown that health campaigns have small effects in the short run, with an average effect size of $\bar{r} = .04$ for sexual health campaigns (Snyder et al., 2004). Because sexual health campaigns have small effect sizes, a larger experimental manipulation, or more robust, would be needed to produce significant measurable effects. Past research has also shown that campaigns that promote commencement of a behavior (versus prevention or cessation; Snyder et al., 2009), use gain-framed messages (Garcia-Retamero & Cokely, 2011), use visual aids (e.g. bar graphs; Garcia-Retamero & Cokely, 2011), introduce a novel idea which alerts higher level cognitive processing to take place (Donohew, Lorch, & Palmgreen, 1998), and matches a strong fear appeal with a high efficacy response message (Witte, 1992), are more successful at producing observable behavior change.

Due to these limitations, future research looking into differential effects of risk avoidance and remedy messages need to focus on ways to strengthen the experimental manipulation. The remedy message shown to participants presented a commencement of a behavior (using PrEP to prevent HIV infection) and a novel idea (PrEP), but the risk avoidance and control message did not incorporate these elements. Despite the remedy

message incorporating some of the elements which have shown success at behavior change, future messages should be re-worked to incorporate the other elements such as the use of visual aids versus verbally presenting statistics about HIV infection rates and incorporating gain-framed messages throughout the health communication. Additionally, future research should present participants with multiple messages (versus a single message) and also force a time limit on the screen making the participants view the message for an appropriate amount of time before moving on. It is possible that by incorporating elements past research has shown to be successful on various other behaviors to induce change, increasing the amount of exposure to the message, and increasing the amount of time the participant has to view the message, the message will produce significant measurable results that effect behavior.

Future work could also incorporate a longitudinal design. The current study is cross-sectional, capturing only a single point in time for each participant, and may not provide adequate time for the messages to be effective as intentions and willingness were measured immediately following message exposure. Use of a longitudinal design would assess how much individuals remember and think about the message they were exposed to, and their actual behavioral outcomes after message exposure. While intentions and willingness are important predictors to actual behavior, they are not always a strong predictor as individuals may report one thing and then do another. A meta-analysis, conducted by Webb and Sheeran (2006), on the impact of changing intentions on the subsequent behavior change showed that a medium-to-large size change in intentions only made a small-to-medium change in subsequent behavior. The research also showed that the intention to behavior effect was weakened when people perceived a lack of control over the behavior and when there is a potential for social reaction (Webb & Sheeran, 2006), both present in sexual situations. Additionally, because sexual behavior is a private behavior, it may invoke participants to respond to items using social desirability bias. A stronger experimental manipulation may be needed when studying risky and protective sexual behaviors to overcome the tendency of participants to overestimate protective behaviors and underestimate risky behaviors.

Sample Limitations. The last limitation to the study is in regards to the sample itself. Despite the sample being randomized to conditions, the sample is homogenous in terms of racial and ethnic backgrounds as well as sexuality. White/Caucasian individuals made up 77.8% of the sample and the majority, 61.4% were heterosexual. While this may be an artifact of the individuals who participate on Mechanical Turk, future research should consider other methods to collect a more heterogeneous population that will allow for more generalizability.

The second sample limitation is that the ideal sample would be individuals who are not married and actively dating (preferably not in long-term relationships). The reason why this sample is the most important is because they are the ones most likely to be engaging in risky sexual behavior (e.g. having multiple sexual partners, not using condoms). Individuals who are married and in long-term relationships view condom use differently. Many times, condoms are not used in these relationships as individuals are actively trying to become pregnant, know the other persons' STD status and feels they are safe, or as a signal of trust that they are monogamous. While the majority of the sample was single (not married and not in a relationship), 55.9%, a larger proportion of

the sample being single would have been nice to obtain as the results may have been significant. The responses of those individuals who were currently in a relationship mixed with those who were single may have skewed the results to be more non-significant. Further research is needed on a sample of single and actively dating individuals to determine if responses differ.

The last sample limitation is age. The average age of the sample obtained was 33.62 years old. Age is important to consider when conducting this type of work because research suggests that the older a person gets the more likely they are to rely upon behavioral intentions and less so on behavioral willingness, which is backed by research findings that show a shift from reactive to reasoned decision making as age increases (Pomery, Gibbons, Reis-Bergan, & Gerrard, 2009). The reliance on behavioral willingness at a younger age is believed to be linked to experience level. People with less experience dealing with risk behaviors and risk-conducive situations are less likely to anticipate problems that may arise from engaging in the behavior at hand (Pomery, Gibbons, Reis-Bergan, & Gerrard, 2009). As individuals gain experience, they become more aware of the potential outcomes of their decisions and behaviors. Additionally, adolescents and college age individuals take more risks than children or adults do, which is evidenced by the statistics on car crashes, excessive drinking, contraceptive use, and crime (Steinberg, 2007). This increase in risk behavior during this time period is thought to be contributed to by brain structure and maturation. Psychosocial capacities that improve an individuals' decision making and moderate their risk taking behaviors, such as impulse control, emotion regulation, delayed gratification, and resistance to peer influence continue to mature into adulthood (Steinberg, 2007). Therefore, in this instance, a significant result may not have been obtained for behavioral willingness measures in this sample as individuals may be more aware of the consequences of engaging in risky sexual behavior and/or not engaging in risky behavior at all.

Implications and Conclusion

Using the prototype willingness model as a guide, the differential effects of message type, risk avoidance, remedy, and control, were analyzed to determine how they influence intentions and willingness to engage in risky sexual behavior. Results indicated that the overall models for both intentions and willingness to engage in sex without a condom were significant, with the only significant predictor being STI and HIV contraction worry adding statistical significance to the prediction of willingness to engage in risky sexual behavior. Overall, results indicated that the experimental manipulation was not effective as intentions and willingness to engage in sex without a condom was non-significant across the three message types. Because worry was the only significant predictor, the hypothesis that risk avoidance and remedy messages differentially influence intentions and willingness to engage in risky sexual behavior was rejected. Possible explanations for a lack of significant findings for both message types include both message design and sample constraints. Future research is needed to determine which aspects of messages induce individuals to engage in risky sexual behavior and if applying these messages to various samples produce similar findings.

Despite non-significant main effects, it remains important to determine if remedy messages induce individuals to participate in risky sexual behavior practices. Results from other remedy studies looking into various behaviors, have shown this effect to be true (Bolton, Cohen, & Bloom, 2006) and it is still believed that this result would hold true for sexual behavior. Findings that show that remedy messages may induce the opposite effect on individuals and actually increase their intentions and willingness to engage in risky sexual behavior would have important implications on the way we communicate remedy products. Remedy messages promote beneficial products that help individuals lead more healthy lives, including messages pertaining to PrEP which would lower HIV infection rates. Therefore, we need to look into how to produce effective remedy messaging without the potential effect of the message leading to increased risk behavior.

As this is the second study to look into the difference between risk avoidance and remedy messages, and the first looking into risky sexual behavior, further work on how remedies promote risk compensation among various behavioral outcomes, is needed. The research on this topic is still new and the research that has been done, including this study, is to determine if differences exist among the message type which, in turn, lead to risky behavior. Future research needs to determine ways to fix the remedy message problem that studies are consistently finding—promoting a remedy can lead to increased risk behavior instead of increased protective behavior. Meanwhile, as PrEP becomes more popular with individuals (especially the heterosexual community), the spread of STIs, anti-retroviral resistant HIV infections, and unintended pregnancies may become more of an issue as individuals will feel more safe with an available remedy to contracting HIV and discontinue their condom use.

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Tables

Table I. Demographics by message type

	Remedy	Risk Avoidance	Control
<i>Gender</i>			
Male	161	119	141
Female	144	172	132
<i>Race/Ethnicity</i>			
White/Caucasian	242	235	222
Black/African American	33	34	21
American Indian	7	1	3
Asian/Pacific Islander	20	18	25
Hispanic	26	19	22
<i>Socioeconomic Variables</i>			
Highest Education Level	4Yrs of College	4Yrs of College	4Yrs of College
Mother's Highest Education Level	HS/GED	HS/GED	HS/GED
Father's Highest Education Level	4Yrs of College	HS/GED	HS/GED
Annual Income	40,000-49,999	20,000-29,999	30,000-39,999
<i>Sexual Behavior</i>			
Vaginal Sex	225 (87.5%)	233 (89.6%)	210 (87.5%)
Oral Sex	224 (86.8%)	231 (89.8%)	205 (85.7%)
Anal Sex	146 (56.5%)	130 (50.1%)	119 (50.2%)

Note. Socioeconomic variables are presented as the response that was most prevalent for each message type. 4Yrs of College = Four years of a college education; HS/GED = A high school diploma or equivalent (GED). Annual income is given in US dollars.

Table II. Items and factor loadings for intentions and willingness to engage in risky sexual behavior

Items	Factor 1: Behavioral Willingness	Factor 2: Behavioral Intention
Scenario 1: Go ahead and sex with this person	.781	.239
Scenario 1: Go ahead but use a method like withdrawal of the penis before ejaculation	.752	.276
Scenario 1: Not have sex (reverse scored)	.602	.184
Scenario 2: Go ahead and have sex anyway	.772	.297
Scenario 2: Go ahead but use a method like withdrawal of the penis before ejaculation	.699	.276
Scenario 2: Not have sex (reverse scored)	.620	.281
Scenario 3: Your partner tells you that he or she has very rarely had other unprotected sex	.834	.225
Scenario 3: You, or your partner, is on the pill	.740	.157
Scenario 3: If your partner tells you they would rather have sex without a condom	.859	.174
Scenario 3: If both you and your partner did not have a condom	.868	.197
Intention: Vaginal Sex	.328	.833
Intention: Anal Sex	.155	.783
Intention: Oral Sex	.257	.838
	% of Total Variance	45.697
	Total Variance	19.728
		65.425%

Note. The prompt for each scenario 1 item reads as follows: “Imagine that you have met a person that you find highly sexually attractive. Over the course of an evening, the two of you have an enjoyable conversation and you come to realize that this person wants to have sex with you. However, neither of you has a condom. Using the scale, please tell us how willing you would be under these circumstances to...”. The prompt for each scenario 2 item reads as follows: “Imagine that you are with your boyfriend/girlfriend and the two of you want to have sex but neither one of you has a condom. Using the scale, please tell us how willing you would be under the circumstances to...”. The prompt for each scenario 3 item reads as follows: “How willing would you be to have unprotected sex (sex without a condom) in each of the following scenarios?” The prompt for each intention item reads as follows: “How likely is it that you will engage in each of the following behavior, without a way to prevent (without protection) from an STI—including AIDS—in the next 6 months?”

Table III. Summary of multiple regression analyses of Prototype Willingness Model variables

Variable	B	SE _B	Beta
Intentions			
Intercept (Control)	2.791	.165	
Risk Avoidance	.076	.233	.019
Remedy	.104	.231	.027
Worry _{centered}	-.137	.081	-.144
Risk Avoidance X Worry _{centered}	-.078	.117	-.047
Remedy X Worry _{centered}	-.011	.117	-.006
Willingness			
Intercept (Control)	3.780	.102	
Risk Avoidance	.058	.145	.023
Remedy	.104	.144	.042
Worry _{centered}	-.143	.050	-.237**
Risk Avoidance X Worry _{centered}	.113	.073	.106
Remedy X Worry _{centered}	.063	.073	.058
Subjective Norms			
Intercept (Control)	4.377	.120	
Risk Avoidance	-.186	.171	-.063
Remedy	-.093	.169	-.032
Worry _{centered}	-.058	.059	-.082
Risk Avoidance X Worry _{centered}	-.006	.086	-.005
Remedy X Worry _{centered}	-.163	.086	-.130
Risk Perceptions			
Intercept (Control)	4.403	.088	
Risk Avoidance	-.092	.125	-.038
Remedy	-.014	.124	-.006
Worry _{centered}	.358	.044	.616**
Risk Avoidance X Worry _{centered}	-.061	.063	-.060
Remedy X Worry _{centered}	-.190	.064	-.184**
Prototype Perceptions			
Intercept (Control)	3.998	.064	
Risk Avoidance	-.041	.090	-.027
Remedy	-.077	.090	-.051
Worry _{centered}	.081	.031	.220
Risk Avoidance X Worry _{centered}	-.033	.045	-.052
Remedy X Worry _{centered}	-.054	.046	-.081

Note. * $p < .05$; ** $p < .001$; B = unstandardized regression coefficient; SE_B = standard error of the coefficient; Beta = standardized coefficient

Figures

Figure I. Flow of Participants into Study I

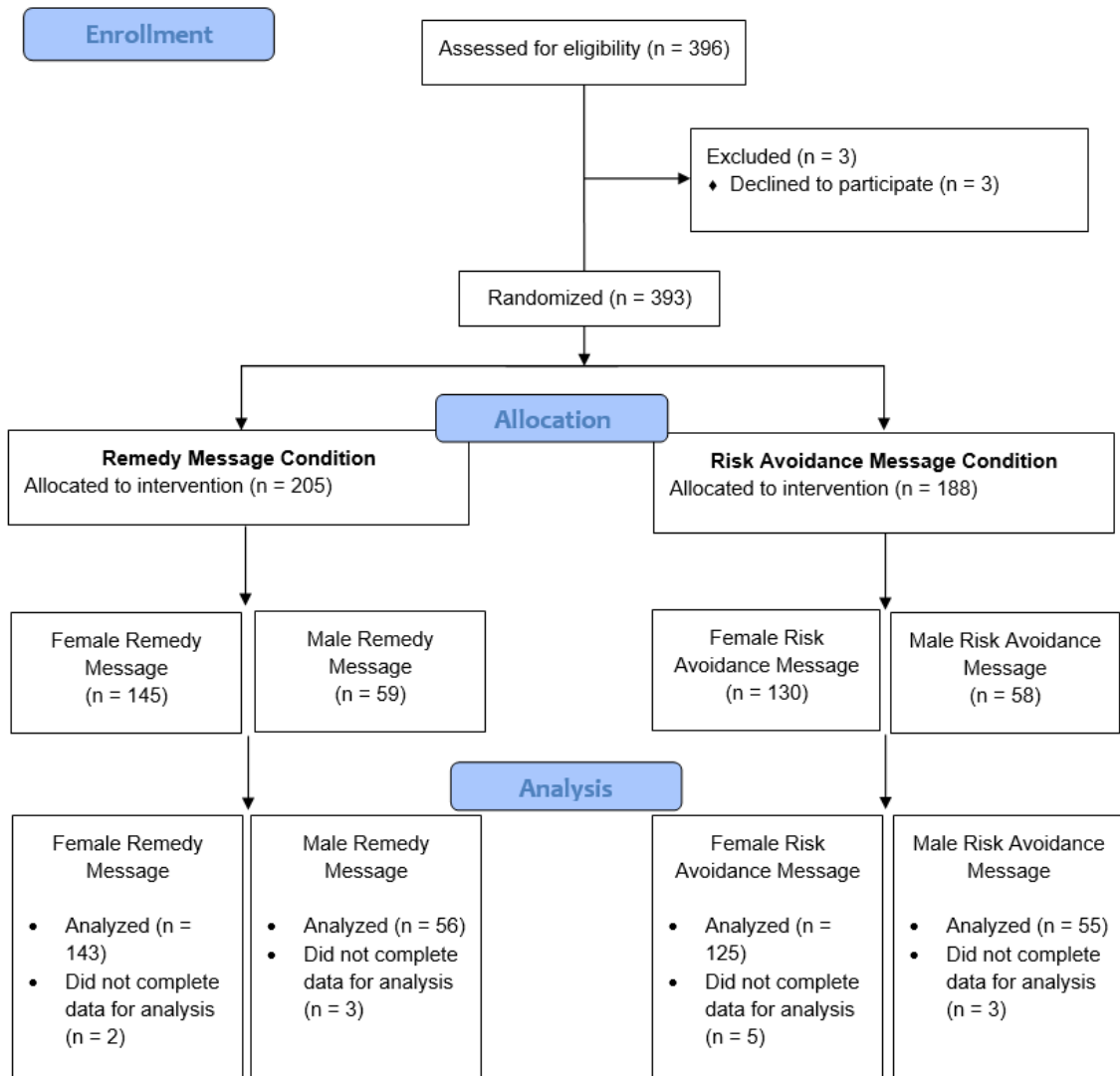


Figure I. CONSORT flowchart for recruitment and study enrollment

Figure II. Male Average Favorability Scores for Remedy Messages

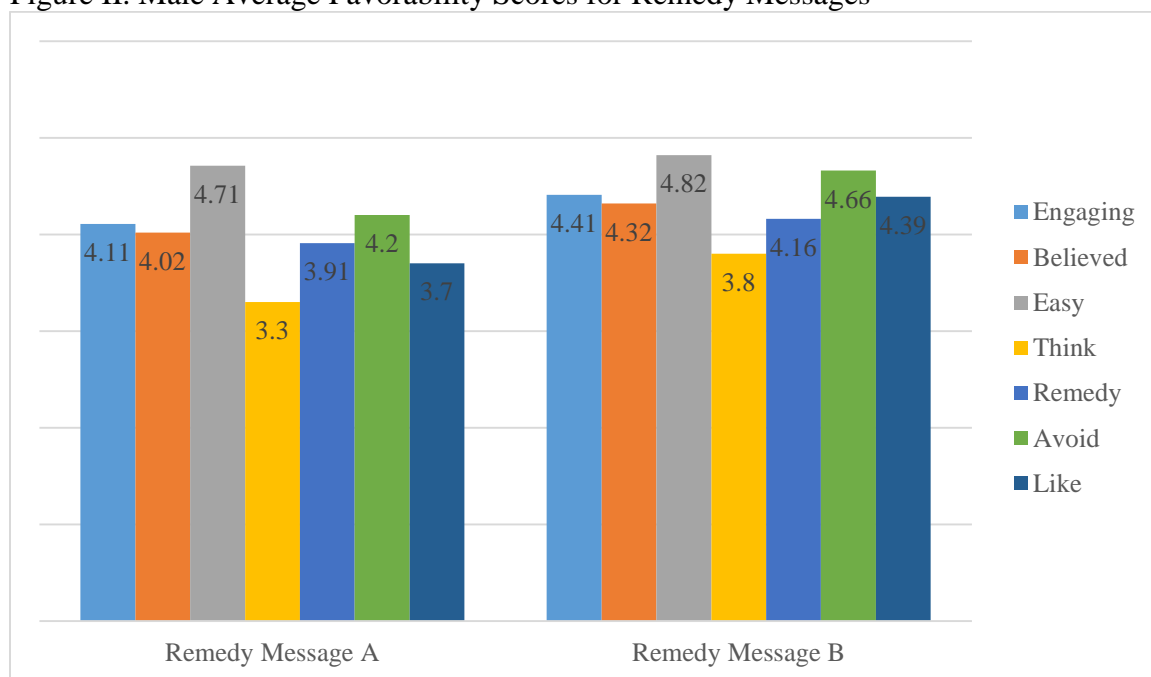


Figure II. Average scores for male favorability scales by remedy message. Scales were on a 7-point continuous scale from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). The questions were worded as follows. Engaging = “This advertisement was engaging (caught my attention)”; Believed = “I believed the information presented in this advertisement”; Easy = “This advertisement was easy to read and understand”; Think = “This advertisement made me think about my own behavior”; Remedy = “This advertisement provides a remedy to the risks of HIV”; Avoid = “This advertisement made it clear that I should avoid the risks of HIV”; Like = “Overall, I liked this advertisement”.

Figure III. Female Average Favorability Scores for Remedy Messages

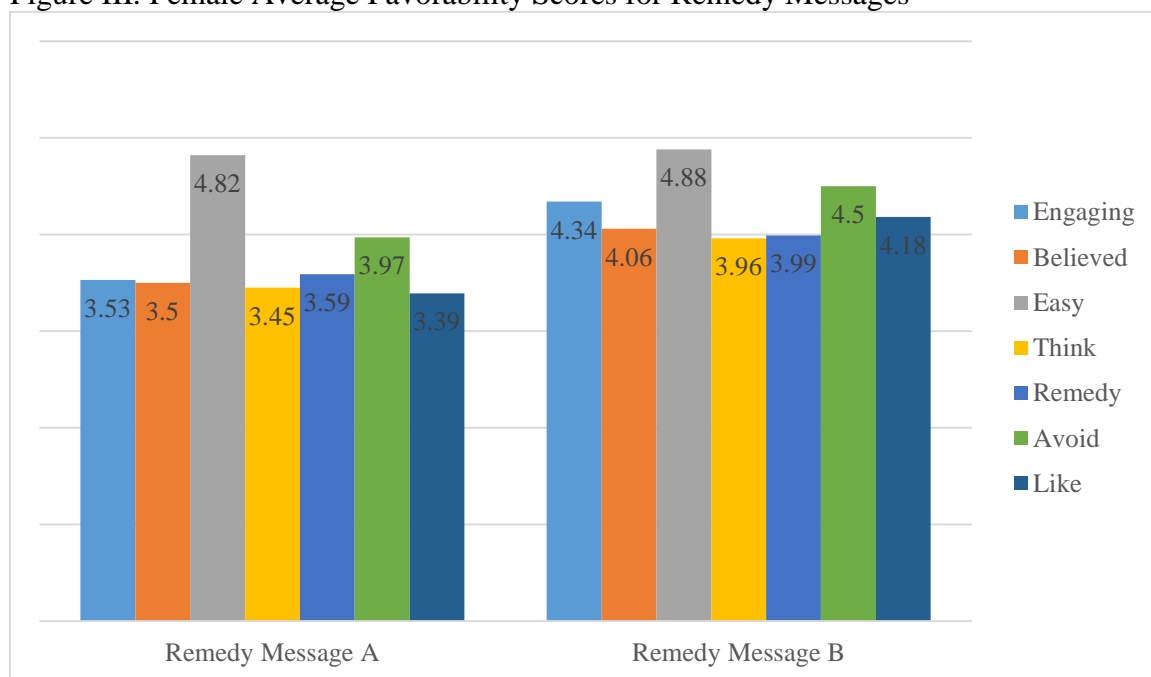


Figure III. Average scores for female favorability scales by remedy message. Scales were on a 7-point continuous scale from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). The questions were worded as follows. Engaging = “This advertisement was engaging (caught my attention)”; Believed = “I believed the information presented in this advertisement”; Easy = “This advertisement was easy to read and understand”; Think = “This advertisement made me think about my own behavior”; Remedy = “This advertisement provides a remedy to the risks of HIV”; Avoid = “This advertisement made it clear that I should avoid the risks of HIV”; Like = “Overall, I liked this advertisement”.

Figure IV. Male Average Favorability Scores for Risk Avoidance Messages

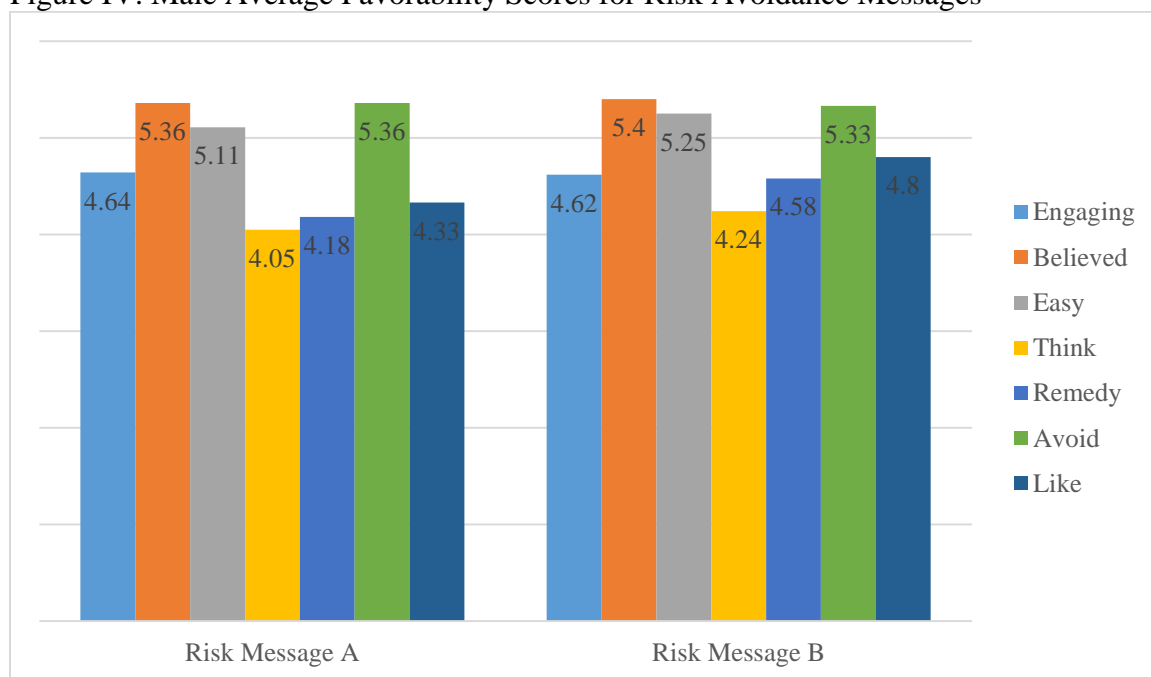


Figure IV. Average scores for male favorability scales by risk avoidance message. Scales were on a 7-point continuous scale from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). The questions were worded as follows. Engaging = “This advertisement was engaging (caught my attention)”; Believed = “I believed the information presented in this advertisement”; Easy = “This advertisement was easy to read and understand”; Think = “This advertisement made me think about my own behavior”; Remedy = “This advertisement provides a remedy to the risks of HIV”; Avoid = “This advertisement made it clear that I should avoid the risks of HIV”; Like = “Overall, I liked this advertisement”.

Figure V. Female Average Favorability Scores for Risk Avoidance Messages

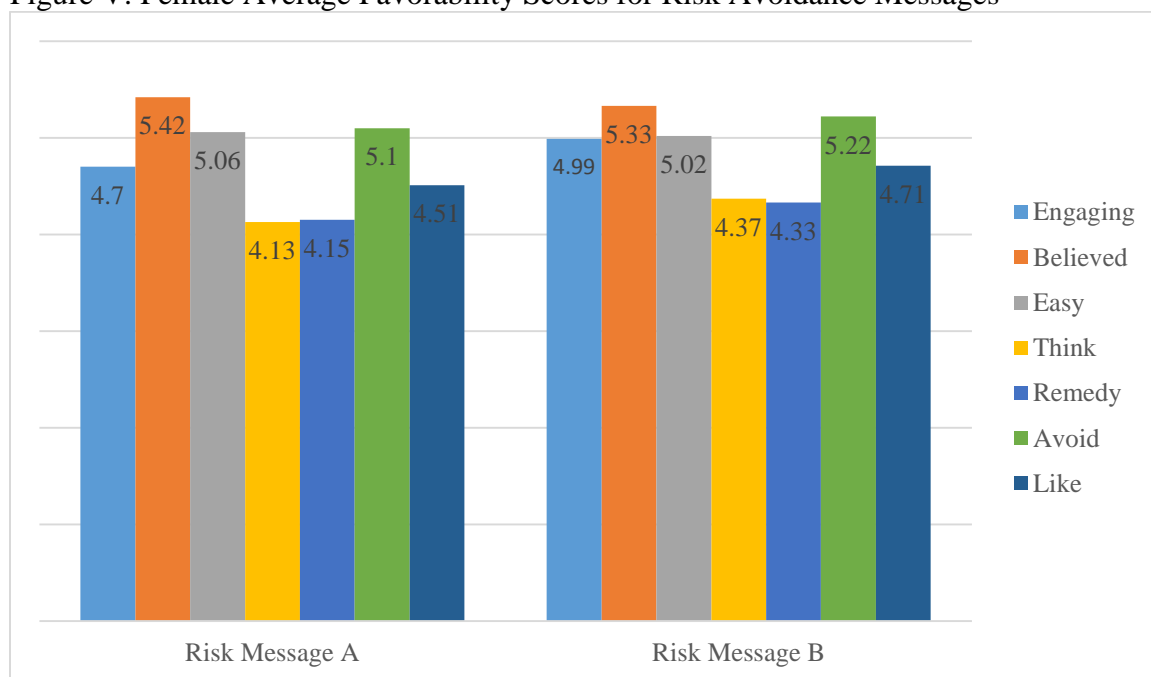


Figure V. Average scores for female favorability scales by risk avoidance message. Scales were on a 7-point continuous scale from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). The questions were worded as follows. Engaging = “This advertisement was engaging (caught my attention)”; Believed = “I believed the information presented in this advertisement”; Easy = “This advertisement was easy to read and understand”; Think = “This advertisement made me think about my own behavior”; Remedy = “This advertisement provides a remedy to the risks of HIV”; Avoid = “This advertisement made it clear that I should avoid the risks of HIV”; Like = “Overall, I liked this advertisement”.

Figure VI. Average Favorability Scores for Remedy and Risk Avoidance Messages

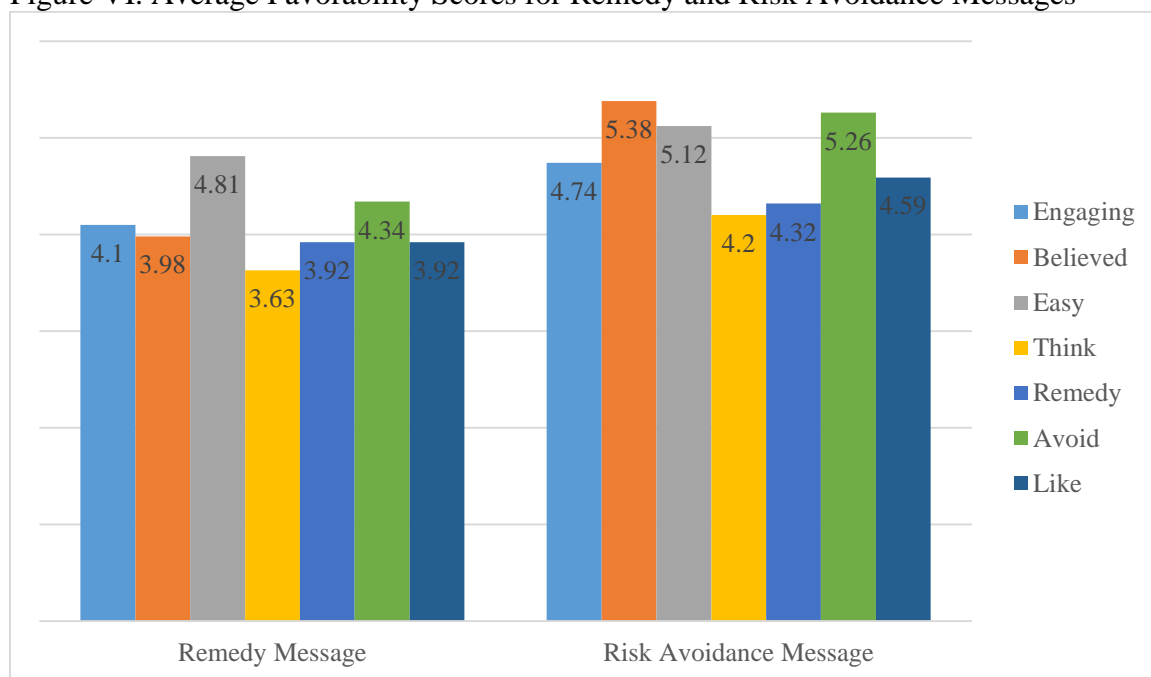


Figure VI. Average favorability scores by remedy and risk avoidance message. Scales were on a 7-point continuous scale from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). The questions were worded as follows. Engaging = “This advertisement was engaging (caught my attention)”; Believed = “I believed the information presented in this advertisement”; Easy = “This advertisement was easy to read and understand”; Think = “This advertisement made me think about my own behavior”; Remedy = “This advertisement provides a remedy to the risks of HIV”; Avoid = “This advertisement made it clear that I should avoid the risks of HIV”; Like = “Overall, I liked this advertisement”.

Figure VII. Flow of Participants into Study II

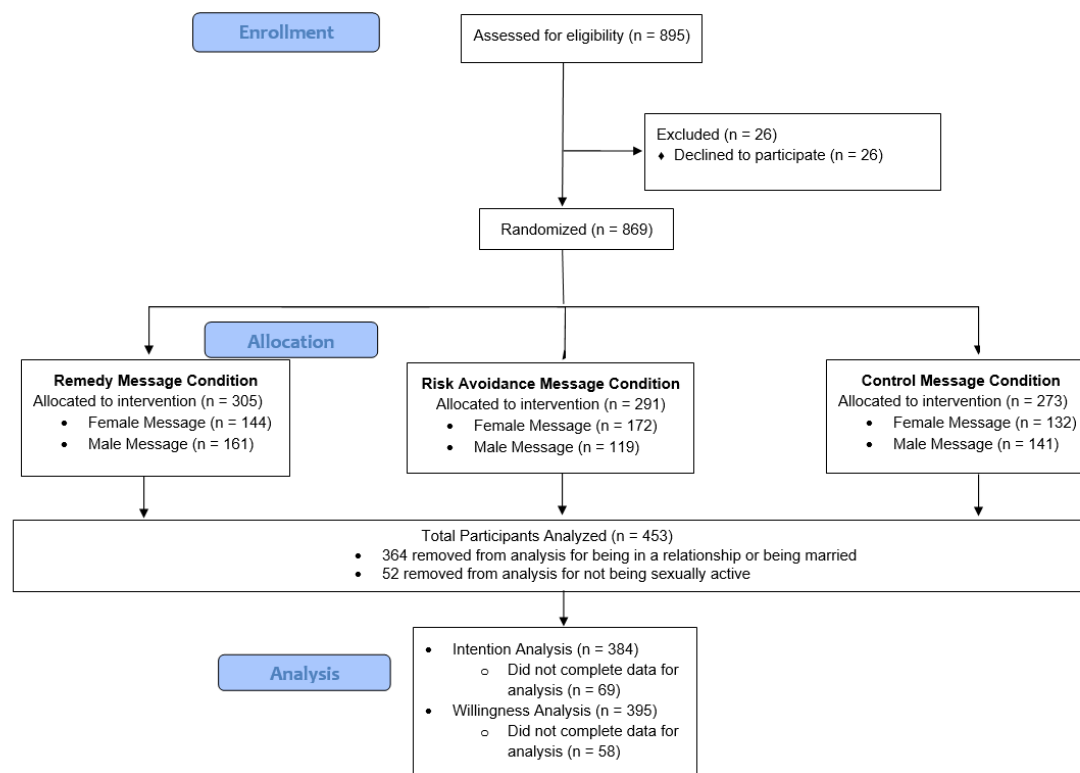


Figure VII. CONSORT flowchart for recruitment and study enrollment

Figure VIII. Interaction Plot for Intentions

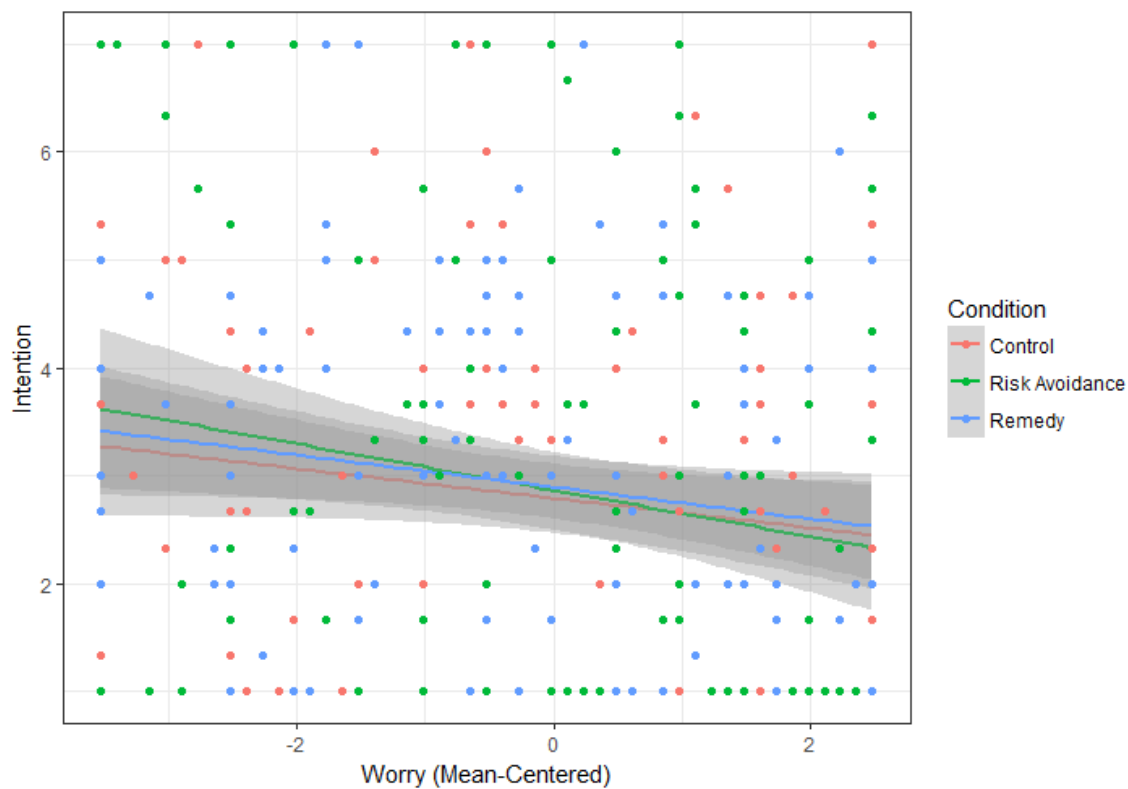


Figure VIII. Plot of the interaction effect of worry and message type on intentions to engage in sex without a condom.

Figure IX. Interaction Plot for Willingness

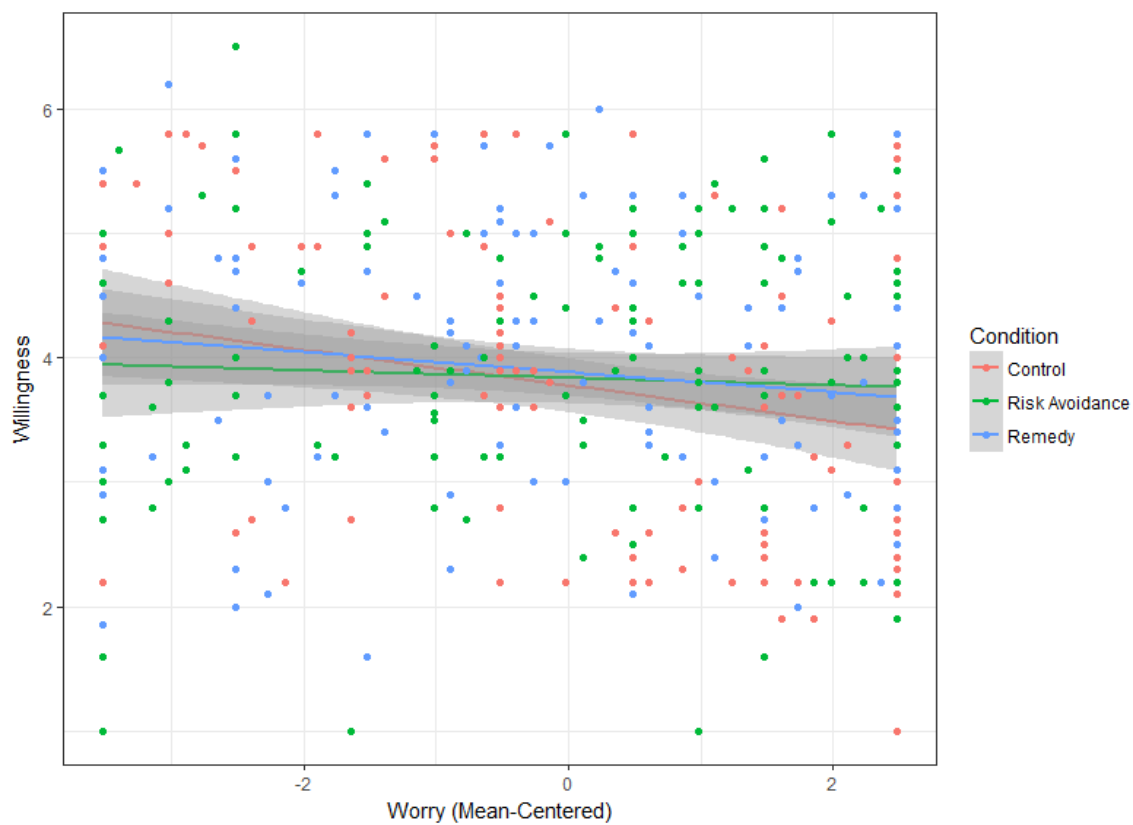


Figure IX. Plot of the interaction effect of worry and message type on willingness to engage in sex without a condom.

Figure X. Interaction Plot for Subjective Norms

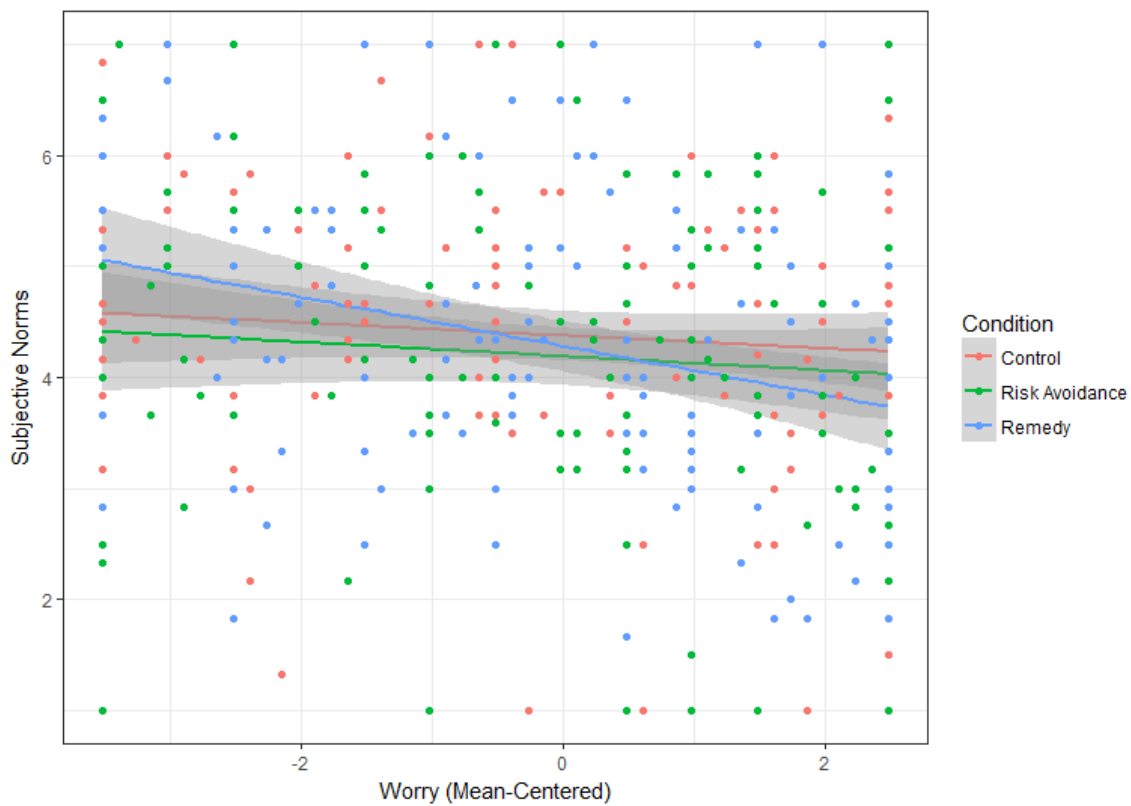


Figure X. Plot of the interaction effect of worry and message type on participants' subjective norms towards risky sexual behavior.

Figure XI. Interaction Plot for Risk Perceptions

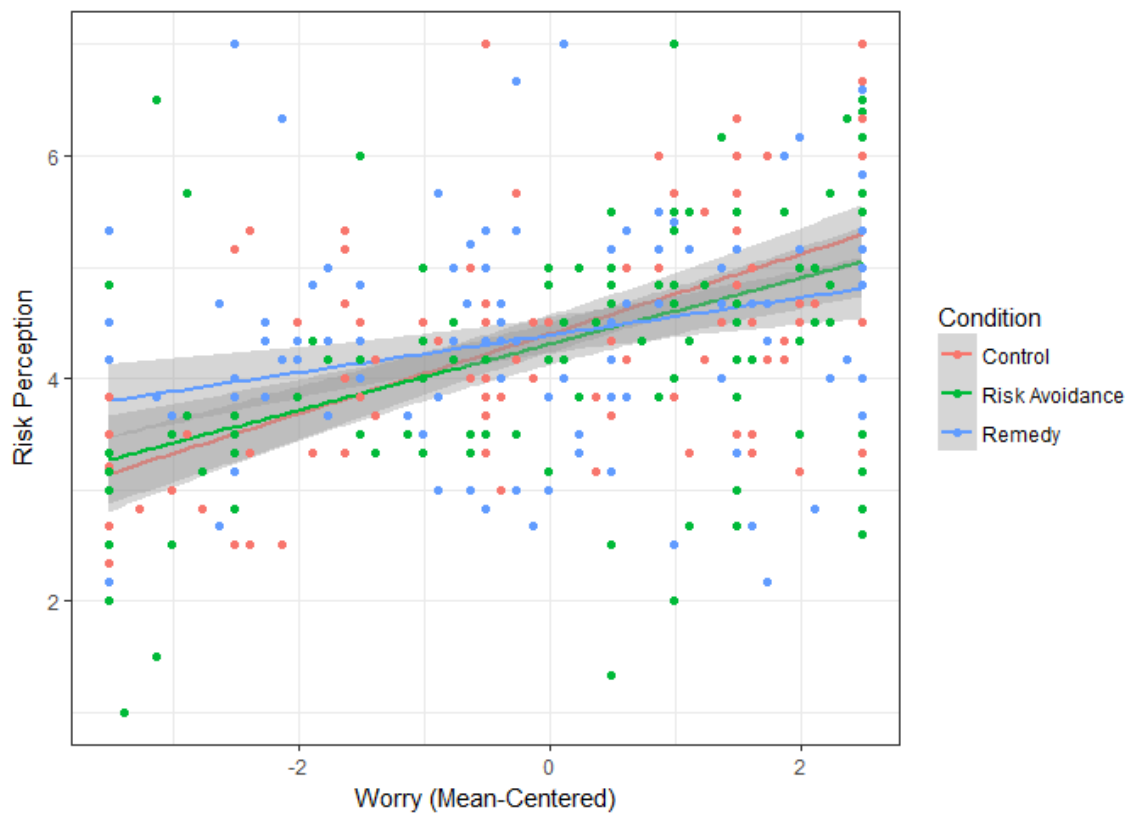


Figure XI. Plot of the interaction effect of worry and message type on participants' perceived risk of contracting an STI or HIV.

Figure XII. Interaction Plot for Prototype Perceptions

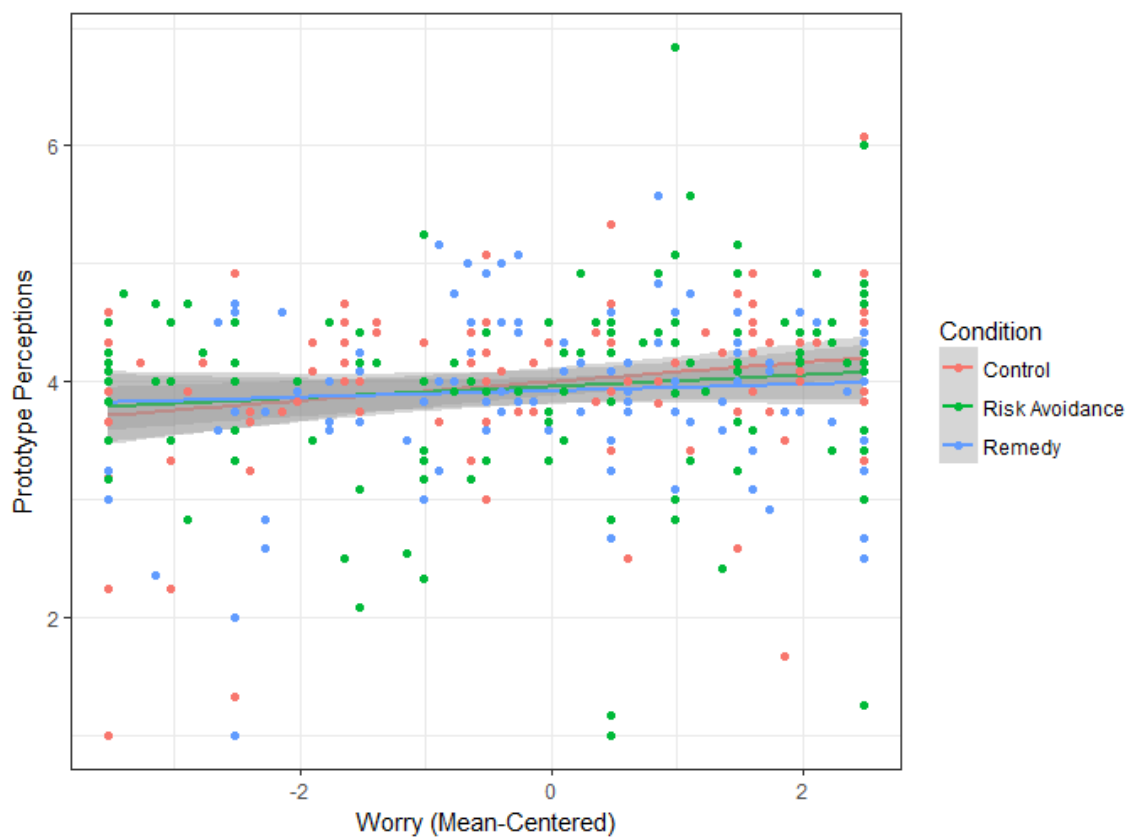
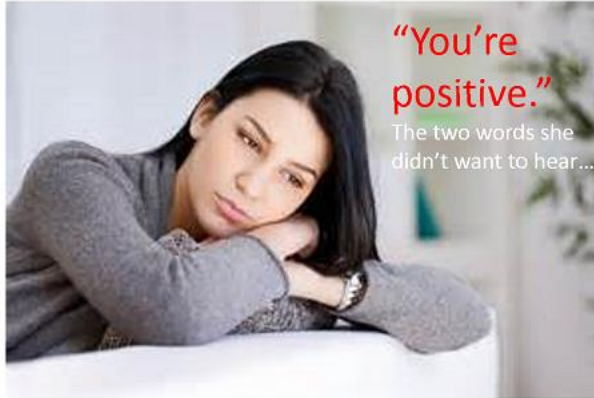


Figure XII. Plot of the interaction effect of worry and message type on participants' prototype perceptions of individuals who engage in risky sexual behavior.

Appendix A: Messages Created for Studies

Risk Avoidance Messages

Message A Female



HIV can affect anyone. Nearly 50,000 new cases of HIV are diagnosed each year in the United States.

Don't be a statistic.

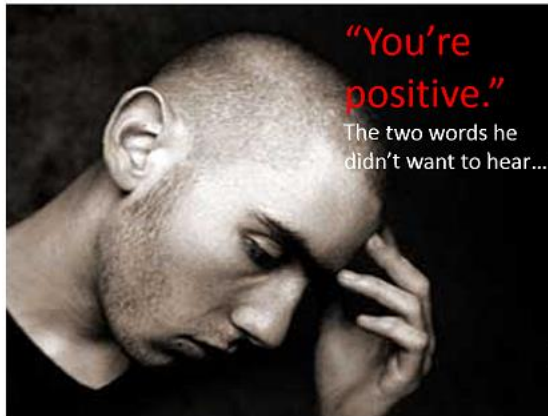


Engaging in risky sexual behavior puts individuals at a higher risk for acquiring HIV. This behavior increases the chances of negative sex-related outcomes including HIV infection and infection with other sexually transmitted infections such as HPV, chlamydia, or gonorrhea.

When it comes to sexual behavior, the bottom line is simple: avoid engaging in risky sexual behavior. Practicing safe sexual behavior is highly effective in reducing the transmission of HIV and other sexually transmitted infections.

This is the only way to achieve an overall healthy sexual lifestyle

Message A Male



HIV can affect anyone. Nearly 50,000 new cases of HIV are diagnosed each year in the United States.

Don't be a statistic.



Engaging in risky sexual behavior puts individuals at a higher risk for acquiring HIV. This behavior increases the chances of negative sex-related outcomes including HIV infection and infection with other sexually transmitted infections such as HPV, chlamydia, or gonorrhea.

When it comes to sexual behavior, the bottom line is simple: avoid engaging in risky sexual behavior. Practicing safe sexual behavior is highly effective in reducing the transmission of HIV and other sexually transmitted infections.

This is the only way to achieve an overall healthy sexual lifestyle

Message B Female (used in Study II)



HIV can affect anyone. Nearly 50,000 new cases of HIV are diagnosed each year in the United States.

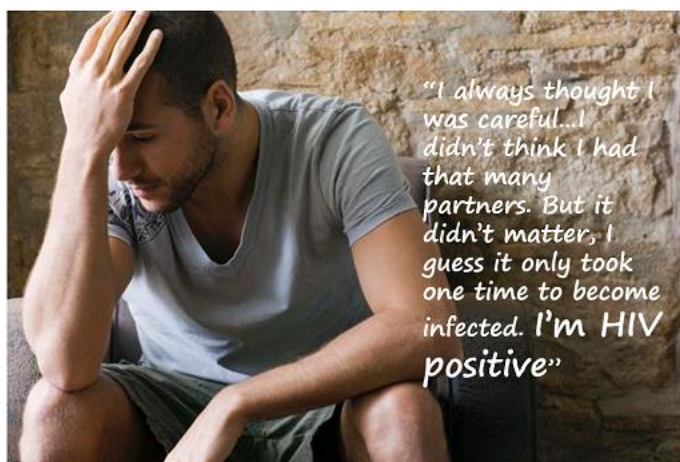
Don't be a statistic.

Engaging in risky sexual behavior puts individuals at a higher risk for acquiring HIV. This behavior increases the chances of negative sex-related outcomes including HIV infection and infection with other sexually transmitted infections such as HPV, chlamydia, or gonorrhea. When it comes to sexual behavior, the bottom line is simple: avoid engaging in risky sexual behavior. Practicing safe sexual behavior is highly effective in reducing the transmission of HIV and other sexually transmitted infections.

This is the only way to achieve an overall healthy sexual lifestyle



Message B Male (used in Study II)



HIV can affect anyone. Nearly 50,000 new cases of HIV are diagnosed each year in the United States.

Don't be a statistic.

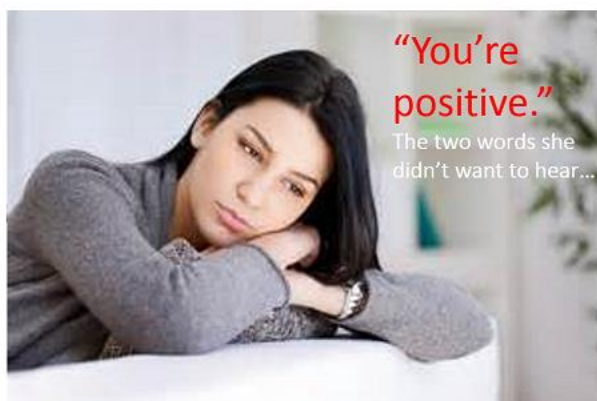
Engaging in risky sexual behavior puts individuals at a higher risk for acquiring HIV. This behavior increases the chances of negative sex-related outcomes including HIV infection and infection with other sexually transmitted infections such as HPV, chlamydia, or gonorrhea. When it comes to sexual behavior, the bottom line is simple: avoid engaging in risky sexual behavior. Practicing safe sexual behavior is highly effective in reducing the transmission of HIV and other sexually transmitted infections.

This is the only way to achieve an overall healthy sexual lifestyle



Remedy Messages

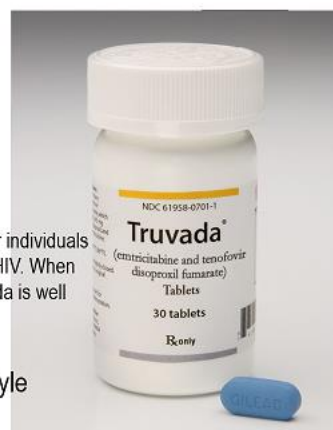
Message A Female



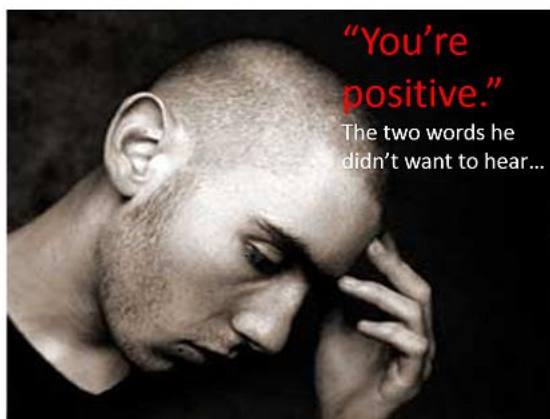
The FDA has approved a pre-exposure prophylaxis, **Truvada**. Truvada is a daily pill for individuals who are not infected with HIV who wish to reduce their risk of becoming infected with HIV. When taken appropriately, Truvada may reduce the risk of HIV infection by up to 90%. Truvada is well tolerated, has low interaction effects with other drugs and has minimal side effects.

This drug is a valuable addition to an overall healthy sexual lifestyle
Ask your physician about Truvada today!

HIV can affect anyone. Nearly 50,000 new cases of HIV are diagnosed each year in the United States.
Don't be a statistic.



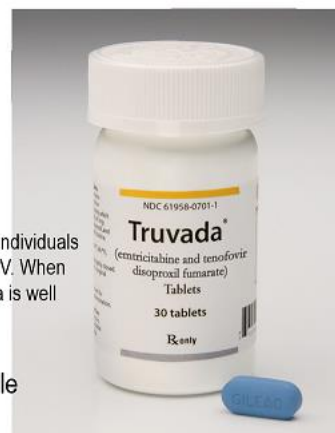
Message A Male



The FDA has approved a pre-exposure prophylaxis, **Truvada**. Truvada is a daily pill for individuals who are not infected with HIV who wish to reduce their risk of becoming infected with HIV. When taken appropriately, Truvada may reduce the risk of HIV infection by up to 90%. Truvada is well tolerated, has low interaction effects with other drugs and has minimal side effects.

This drug is a valuable addition to an overall healthy sexual lifestyle
Ask your physician about Truvada today!

HIV can affect anyone. Nearly 50,000 new cases of HIV are diagnosed each year in the United States.
Don't be a statistic.



Message B Female (used in Study II)



HIV can affect anyone. Nearly 50,000 new cases of HIV are diagnosed each year in the United States.

Don't be a statistic.

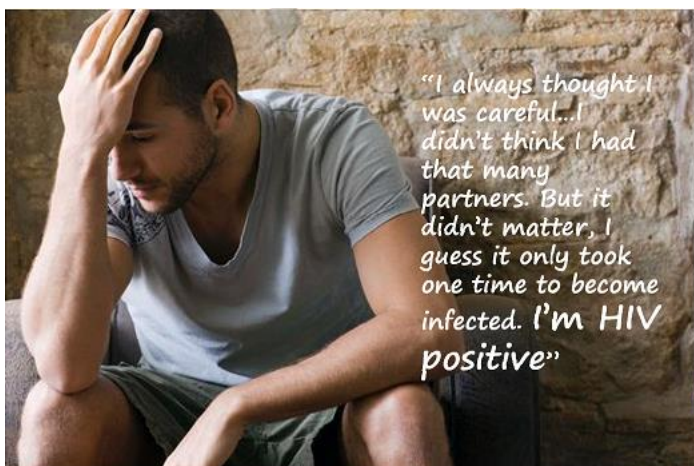
The FDA has approved a pre-exposure prophylaxis, **Truvada**. Truvada is a daily pill for individuals who are not infected with HIV who wish to reduce their risk of becoming infected with HIV. When taken appropriately, Truvada may reduce the risk of HIV infection by up to 90%. Truvada is well tolerated, has low interaction effects with other drugs and has minimal side effects.

This drug is a valuable addition to an overall healthy sexual lifestyle

Ask your physician about Truvada today!



Message B Male (used in Study II)



HIV can affect anyone. Nearly 50,000 new cases of HIV are diagnosed each year in the United States.

Don't be a statistic.

The FDA has approved a pre-exposure prophylaxis, **Truvada**. Truvada is a daily pill for individuals who are not infected with HIV who wish to reduce their risk of becoming infected with HIV. When taken appropriately, Truvada may reduce the risk of HIV infection by up to 90%. Truvada is well tolerated, has low interaction effects with other drugs and has minimal side effects.

This drug is a valuable addition to an overall healthy sexual lifestyle

Ask your physician about Truvada today!



Control Message

Control Message (used in Study II)

“What the best mornings are made of.”



Fill every morning with excitement, every belly with a nourishing breakfast, and send them out the door fueled for another great day.

Are you ready for greatness?

Start your day on the plus side of delicious with Quaker® Oatmeal Real Medleys®. Try new Summer Berry Granola as a delicious snack or topping that's loaded with crunchy clusters plus real fruit. And there's new Banana Walnut Oatmeal+, complete with super grains and packed with bananas and crunchy nuts. Also available from Quaker® Oatmeal is their Instant Oatmeal®, which is a quick and easy way to start your day. The Instant Oatmeal comes in a variety of flavors and nutritional offerings including added protein, high fiber, lower sugar, weight control, and organic.

With Quaker® Oatmeal we are pushing the boundaries of heartiness and showing your morning who's boss!



Appendix References

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Appendix B: Full version of measure items and reliability scores

Sexual Behavior

Prompt: Please answer the following questions about your sexual behavior/sexual history. Please remember, your answers to these questions will be kept confidential. Your identity will never be matched to your answers.

Items:

1. Have you ever had vaginal intercourse? (Vaginal intercourse is when a penis is inserted into a vagina).
 - Yes
 - No
2. Have you ever had oral sex? That is, has a partner ever put his/her mouth on your sex organ or you put your mouth on his/her sex organs.
 - Yes
 - No
3. Have you ever had anal intercourse? (By anal intercourse, we mean when a penis is inserted into some other persons anus or butt hole).
 - Yes
 - No
4. In the past 12 months, did you or your partner(s) use any of these methods for birth control or disease prevention? Select all that apply.
 - Condoms
 - Female condom
 - Birth control pills
 - Shot (Depo-Provera)
 - Emergency contraception or ‘morning after’ pill
 - Norplant
 - Diaphragm, cap or shield
 - IUD (intrauterine device), coil, loop
 - Natural family planning (safe periods by temperature, cervical mucus test)
 - Withdrawal (pulling out)
 - Rhythm or safe period by calendar
 - Vaginal sponge
 - Spermicide foam, jelly, cream, suppositories
 - Ring (NuvaRing)
 - Patch (Ortho Evra)
 - Contraceptive film
 - Emergency IUD insertion
 - Vasectomy
 - Tubal ligation/sterilization
 - Anti-retroviral or HIV/AIDS drugs (PrEP)
 - Some other method

- No method used

Message Favorability Items

Prompt: Below is a potential new advertisement. We are interested in how people feel about it. Please take your time to carefully read and evaluate the advertisement and answer the questions that follow.

Response Scale: Strongly Disagree (1) (2) (3) (4) (5) (6) Strongly Agree (7)

Items:

1. This advertisement was engaging (caught my attention)
2. I believed the information presented in this advertisement
3. This advertisement was easy to read and understand
4. This advertisement made me think about my own behavior
5. This advertisement provides a remedy to the risks of HIV
6. This advertisement made it clear that I should avoid the risks of HIV
7. Overall, I liked this advertisement

Note: Questions 5 and 6 were omitted for individuals in the control condition

Prototype Perceptions (Other)

Reliability—Cronbach's alpha = .660

Prompt: Imagine the average person of your same gender who engages in unprotected sex. On the scale below, please rate how much each characteristic, listed below, refers to that individual who engages in unprotected sex.

Response Scale: Not at all like me (1) (2) (3) (4) (5) (6) Very much like me (7)

Items:

1. Intelligent
2. Confused
3. Dull (boring)
4. Popular
5. Immature
6. Considerate
7. Self-confident
8. Independent
9. Self-centered
10. Careless
11. Unattractive
12. Cool (sophisticated)

Risk Perception

Reliability—Cronbach's alpha = .829

Response Scale: Not at all likely (1) (2) (3) (4) (5) (6) Extremely Likely (7)

Items:

1. If you were to have sex without a condom, how likely is it that you will contract an STI?
2. If you were to have sex without a condom, how likely is it that you will contract HIV/AIDS?
3. If you were to have sex without a condom, what is the likelihood of you contracting an STI compared to that of the average person who also had sex without a condom?
4. If you were to have sex without a condom, what is the likelihood of you contracting HIV/AIDS compared to that of the average person who also had sex without a condom?

Response Scale: Not at all severe (1) (2) (3) (4) (5) (6) Extremely severe (7)

Items:

1. Imagine that you contracted an STI, how severe to you feel the consequences would be?
2. Imagine that you contracted HIV/AIDS, how severe do you feel the consequences would be?

Subjective Norms

Reliability—Cronbach's alpha = .862

Prompt: How many of your friends do you think have engaged in each of the following behaviors?

Response Scale: None (1) (2) (3) (4) (5) (6) Almost All (7)

Items:

1. Unprotected Vaginal Sex
2. Unprotected Anal Sex
3. Unprotected Oral Sex

Prompt: How do you think your friends would react if they thought you were engaging in each of the following behaviors?

Response Scale: Extreme Disapproval (1) (2) (3) (4) (5) (6) Extreme Approval (7)

Items:

1. Unprotected Vaginal Sex
2. Unprotected Anal Sex
3. Unprotected Oral Sex

Behavioral Intentions

Reliability—Cronbach's alpha = .813

Prompt: How likely is it that you will engage in each of the following behaviors, without a way to prevent (without protection) from an STI—including HIV/AIDS—in the next 6 months?

Response Scale: Not at all likely (1) (2) (3) (4) (5) (6) Very Likely (7)

Items:

1. Vaginal Sex
2. Anal Sex
3. Oral Sex

Behavioral Willingness

Reliability—Cronbach's alpha = .745

Prompt: Imagine that you have met a person that you find highly sexually attractive. Over the course of an evening, the two of you have an enjoyable conversation and you come to realize that this person wants to have sex with you. However, neither of you has a condom. Using the scale below, please tell us how willing you would be under these circumstances to...

Response Scale: Not at all willing (1) (2) (3) (4) (5) (6) Very much willing (7)

Items:

1. Go ahead and have sex with this person
2. Go ahead but use a method like withdrawal of the penis before ejaculation
3. Not have sex

Prompt: Imagine that you are with your boyfriend/girlfriend and the two of you want to have sex but neither one of you has a condom. Using the scale below, please tell us how willing you would be under these circumstances to...

Response Scale: Not at all willing (1) (2) (3) (4) (5) (6) Very much willing (7)

Items:

1. Go ahead and have sex anyway
2. Go ahead but use a method like withdrawal of the penis before ejaculation
3. Not have sex

Prompt: How willing would you be to have unprotected sex (sex without a condom) in each of the following scenarios?

Response Scale: Not at all willing (1) (2) (3) (4) (5) (6) Very much willing (7)

Items:

1. Your partner tells you that he or she has very rarely had other unprotected sex
2. You, or your partner, is on the pill
3. If your partner tells you they would rather have sex without a condom
4. If both you and your partner did not have a condom

Worry

Reliability—Cronbach's alpha = .980

Prompt: For each statement below, please show to what extent are you fearful, worried, concerned, or anxious about contracting (getting) a sexually transmitted infection (STI) after having unprotected sex.

Response Scale: Not at all (1) (2) (3) (4) (5) (6) Extremely (7)

Items:

1. Fearful
2. Worried
3. Concerned
4. Anxious

Prompt: For each statement below, please show to what extent are you fearful, worried, concerned, or anxious about contracting (getting) HIV/AIDS after having unprotected sex.

Response Scale: Not at all (1) (2) (3) (4) (5) (6) Extremely (7)

Items:

1. Fearful
2. Worried
3. Concerned
4. Anxious