What are the 'active ingredients' of change in the Theory of Planned Behavior? Evaluating the

relative effectiveness of attitudes, norms, and perceived behavioral control/self-efficacy

by

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Abstract

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What are the 'active ingredients' of change in the Theory of Planned Behavior? Evaluating the

relative effectiveness of attitudes, norms, and perceived behavioral control/self-efficacy

Thesis directed by Angela Bryan, PhD Professor of Psychology and Neuroscience

Health interventions only have small to moderate effects on behavior change. The lack of a solid understanding of how the key theoretical constructs interact to motivate behavior change may be partly to blame. The current study examines the utility of each of the hypothesized determinants of behavior in the TPB (i.e., attitudes, norms, perceived behavioral control (PBC)/self-efficacy, and intentions) and explores the optimal combination of these constructs in an intervention to increase condom use intentions and behavior among college students. 287 participants were randomly assigned to one of seven computer-based interventions. 70 (24.4%) completed behavioral follow-up assessments three-months later. Simple effect analyses revealed that targeting one construct (e.g., norms) had diffuse effects on other constructs in the TPB (i.e., attitudes and intentions). Mediational analyses revealed that theory-based interventions were better at changing intentions than the control condition. Changes in attitudes toward condom use were related to changes in intentions. Finally, as predicted by the TPB, intentions predicted risky sexual behavior at follow-up. Theory-based interventions were superior to the control, but which combination of constructs is most effective at creating behavior change remains to be established.

Keywords: Condom Use, HIV/STD, Intervention, Theory of Planned Behavior

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What are the 'active ingredients' of change in the Theory of Planned Behavior? Evaluating the relative effectiveness of attitudes, norms, and perceived behavioral control

Theory allows researchers to systematically explain and predict health behavior by providing an organized framework from which to approach research questions (Glanz & Maddock, 2000). The importance of theory is particularly supported in meta-analyses demonstrating that interventions designed from the basis of health behavior theory are more successful than those that are not theory-based (Glanz & Bishop, 2010; Noar, 2008). The superiority of theory-based interventions has been established, but these meta-analyses leave important questions unanswered. Which theoretical constructs are the "active ingredients" of change? How do constructs in a particular theory work individually or in combination to produce behavior change? Most importantly, how can we leverage the interrelationships between these components to create the most efficient interventions that yield the greatest amount of behavior change possible?

Health interventions on the whole have only small to moderate effects on behavior change (Webb & Sheeran, 2006). This is partly due to a lack of solid understanding of how key theoretical constructs influence each other to motivate behavior change. Often when a theory is used as the basis for an intervention, only a subset of the constructs seem to produce behavior change (Montanaro & Bryan, 2013; Reid & Aiken, 2011; Godin & Kok 1996), which calls into question the sufficiency and/or accuracy of our current theories. Additionally, a recent meta-analysis by Sheeran, Maki, Montanaro, Bryan, and Rothman (in prep) investigated the extent to which changing attitudes, norms, or PBC/self-efficacy elicits changes in health-related intentions and behavior. Examining each construct separately, they found that increasing PBC/self-efficacy had a small-to-medium effect on behavior, attitudes had a small effect, and norms had a

negligible effect on behavior. These results suggest that some constructs may be more influential at changing behavior than others but, given the non-experimental nature of meta-analytic work, the underlying mechanisms remain unknown. One possible explanation may be that current health behavior theories are really theories of behavior *prediction* and not behavior *change*. In other words, constructs that are highly predictive of behavior may not be constructs that are susceptible to intervention-based change. The meta-analytic work of Sheeran et al. (in prep) provides an example of how this may be the case. While numerous studies have demonstrated that norms associated with a behavior are associated with the frequency of engaging in that behavior, Sheeran et al. showed that in studies that *successfully changed* norms, there was virtually no effect on behavior. Thus, behavior *change* may be driven by different constructs than those that are predictive of behavior.

A careful examination of the extent to which current theoretical constructs successfully produce behavior change individually or in combination will help clarify the optimal theoretical framework that should be utilized in behavior change interventions. Practically, interventions are resource intensive (e.g., time, money) so designing interventions that target the optimal combination of constructs will advance intervention development. Theoretically, understanding distinctions between constructs that account for variance in current behavior versus those that elicit behavior change has implications for further development in our understanding of the process of behavior change. Using the Theory of Planned Behavior (TPB) as the guiding theoretical framework, this study explores one way to experimentally determine how the constructs in the TPB work separately and/or in combination with each other to successfully produce health behavior change.

The Theory of Planned Behavior

There are several health behavior theories that purport to explain/predict health behaviors or behavior change. For example, a review by Noar and Zimmerman (2005) about the current status of health behavior theory identified 3 distinct theoretical models—the Health Belief Model (HBM), the Theory of Reasoned Action/Theory of Planned Behavior (TRA/TPB), and Social Cognitive Theory (SCT)—which comprised 72% of studies that used some kind of theory as an organizing framework for behavior. However, despite the relative popularity of the HBM and SCT, the TPB has become the favored model of the three, guiding a majority of health behavior research (see Armitage & Conner, 2001; Albarracin et al., 2001 for a review of the TPB's successes). Some researchers have even suggested that the TPB be used as the guiding theoretical framework for all future health behavior research (Sutton, 2004).

The Theory of Planned Behavior proposes that attitudes, normative beliefs, and perceived behavioral control (PBC; often used interchangeably with self-efficacy) directly influence an individual's intentions to participate in a behavior. Intentions, and under some circumstances perceived behavioral control, are then the most proximal causes of action (Ajzen & Madden, 1986). Attitudes toward a specific behavior, subjective norms supporting the behavior, and perceived behavioral control over the behavior are related to one another, and are direct predictors of intentions. Perceived behavioral control is the only component that does not necessarily operate only through intentions to influence behavior; rather, there are circumstances where perceived behavioral control has a direct influence on behavior. (See Figure 1.) The TPB originated from the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980). The TRA is simply the TPB without perceived behavioral control. Perceived behavioral control was added to account for non-volitional behavior not addressed by the TRA (Fishbein & Ajzen, 1975).

TPB Constructs

The individual components of the TPB, attitudes, norms, and PBC/self-efficacy, each have a rich history in psychology in their own right. Each has their own unique relationships with behavior that have been established in the literature emphasizing their importance in explaining psychological processes. Understanding each construct's strengths and weaknesses can help to highlight the ways in which they may overlap and influence one another; indeed, these constructs may even reflect some of the same core cognitions. Further, exploring each construct in depth may suggest the best combination of constructs needed to successfully produce behavior change.

Attitudes. The attitudinal beliefs component of the TPB is essentially the degree to which an individual perceives and weighs the importance of the positive and negative consequences of a given behavior. Within the TPB framework, attitudes are generally operationalized using semantic differentials. (e.g., For me, condom use would be….good versus bad, healthy versus unhealthy). Attitudes are assumed to be determined by behavioral beliefs (e.g., condom use will prevent pregnancy, sex doesn't feel as good without a condom). The expectancy-value model lays the foundation for the conceptualization of attitudes in the TPB (Ajzen, 2001; Fishbein, 1963; Fishbein & Ajzen, 1975). This model hypothesizes that evaluation is the key component to attitude formation and that evaluation happens spontaneously (Ajzen & Fishbein, 2000). A person's overall attitude toward an object is then determined by how much they value that object and how accessible that object is in their memory. In other words, TPB general attitudes are assumed to reflect a combination of behavioral beliefs (e.g., condom use will prevent pregnancy) and one's evaluation of that belief (e.g., it is very important to me to prevent pregnancy).

Attitudes assessed by the TPB are frequently very cognitive in nature, and many (Conner et al., 2011; Lawton, Conner, & McEachan, 2009) have argued that this operationalization is

merely half of the attitude construct. Decisions concerning health behaviors often rely on two types of attitudes that influence an individual's decision: affective and instrumental attitudes (Conner et al., 2011). According to French et al. (2005) affective attitudes "refer to emotions and drives engendered by the prospect of performing a behavior" (p.1825). For example, an affective attitude concerning condom use might be that it ruins a romantic moment. By contrast, French et al. (2005) define instrumental attitudes as those that "refer to a more cognitive consideration of the extent to which performing a behavior would be advantageous" (p.1825). For example, an instrumental attitude concerning condom use might be that it will help prevent sexually transmitted infections.

Initially, research investigating the distinction between instrumental (e.g., doing the behavior will help me avoid disease, etc.) and affective attitudes (e.g., I enjoy it, I hate it, etc.) did not yield very promising results (Breckler & Wiggins, 1989). More recently, studies on this topic have begun to support the existence of a qualitative and empirical difference between the two types of attitudes. Frequently, affective attitudes tend to be better predictors of behavioral intentions than instrumental attitudes (Breckler & Wiggins, 1989, French et al., 2005; Lawton, Conner, McEachan, 2009; Trafimow & Sheeran, 1998). The inclusion of affective attitudes into the TPB attitudinal paradigm does indeed help to strengthen the relationship of attitudes to intentions, and may partially fill the gap that exists between attitudes and behavior (Conner et al., 2011; Lawton, Conner, & McEachan, 2009).

Norms. Normative beliefs consist of perceptions that others are supportive of one's attempts to engage or not engage in a particular behavior. The TPB defines normative beliefs as subjective norms (e.g., people who are important to me think I should use condoms during sexual activity) and takes into account perceived social pressure to perform a behavior (e.g., my doctor

thinks I should use condoms) and one's motivation to comply with the pressure (e.g., it's important to me to do what my doctor thinks I should).

Norms hold a precarious relationship with both intentions and behavior in the literature—many researchers find social norms to be a crucial element in the understanding of decision making (Cialdini, Reno, & Kallgren, 1990; Fishbein & Ajzen, 1975; Triandis, 1977), while others find the construct poorly defined and too vague to be of any explanatory or predictive use (Conner & Armitage, 1998; Godin & Kok, 1996; Krebs & Miller, 1985). Cialdini and colleagues have added a needed level of specificity to the norms literature by investigating categories of normative beliefs that may influence behavior. Cialdini et al. (1990) differentiated between two types of norms that could potentially impact behavior: "injunctive norms" (i.e., what others approve or disapprove of, which is much like the traditional TPB norms construct) and "descriptive norms" (i.e., what others do). Cialdini et al. (1990) found that littering behavior was not universally impacted by both norms, but instead only the most salient normative belief predicted behavior. For example, descriptive norms were successful at preventing littering only in environments that were virtually litter free (Cialdini et al., 1990). Further support for the importance of the situation and population in using norms to change behavior can be found in a meta-analytic review of descriptive norms and health behaviors in Rivis and Sheeran (2003a) and littering in Reno, Cialdini, and Kallgren (1993).

In general, the TPB focuses on injunctive norms, leaving some to argue that the inclusion of descriptive norms would add predictive power to the theory (Rivis & Sheeran, 2003a). In their meta-analysis investigating the role descriptive norms play in health behavior decision-making, Rivis and Sheeran (2003a) found that descriptive norms are a particularly important predictor of behavior among young people and when health risk behaviors are the focus. However, this

finding does not hold true for all studies that include both descriptive and injunctive norms. Schmiege, Broaddus, Levin, and Bryan (2009) assessed the impact of descriptive and injunctive norms on risky sexual behavior and alcohol use among criminally-involved adolescents and found that despite the inclusion of descriptive norms, the norms construct was still a weak predictor of safer sex intentions. Furthermore, they were not able to empirically distinguish descriptive versus injunctive norms.

One particularly noteworthy finding in the norms literature is the importance of personalized feedback (Borsari and Carey, 2001). The authors report that normative interventions that provide personalized feedback produce changes in students' perceptions of others' drinking and changes in their own drinking behavior. Other studies highlight the need for personalized normative feedback and suggest that a hierarchy of social comparison groups exists. In other words, normative feedback is more likely to elicit behavior change if the social comparison group is relevant to and valued by the participant (c.f., Borsari & Carey, 2003; Neighbors, Larimer, & Lewis, 2004; Rivis & Sheeran, 2003b).

Perceived Behavioral Control (PBC)/ Self-Efficacy. Self-efficacy, one's belief in their ability to perform a specific behavior, has become an important component of all health behavior theories. Self-efficacy has garnered substantial attention in health behavior research because it often explains a significant amount of variance in both intentions and behavior. Casey, Timmerman, Allen, Krahn, and Turkiewicz (2009) conducted a meta-analysis concerning the connection between condom use and self-efficacy. The authors found a positive correlation between PBC/self-efficacy and condom use intentions. Albarracín et al. (2001) performed a meta-analysis of the TRA/TPB. They concluded that perceived behavioral control, which some argue is theoretically identical to self-efficacy (Ajzen & Madden, 1986, pg. 457), is a significant

predictor of condom use intentions. This semantic issue is worth a side note here. The TPB

identifies the self-efficacy construct as perceived behavioral control (e.g., I believe I can control

whether or not a condom is used when I have sex). The necessity and desirability of

distinguishing between perceived behavioral control and self-efficacy has become a hotly

debated topic within health behavior research. Many, including the creators of the TPB (Ajzen &

Madden, 1986; Ajzen 1991; also see Noar & Zimmerman, 2005), argue that self-efficacy is

largely synonymous with perceived behavioral control. On the other hand, Armitage and Conner

(1999) showed significant differences between self-efficacy and perceived behavioral control.

They define self-efficacy as "confidence in one's own ability to carry out a behavior" (pp. 476),

and note that this involves internal resources such as motivation. In contrast, they define

perceived behavioral control as "the extent to which people perceive control over more external

factors (e.g., availability)" (Armitage & Conner, 1999, pp. 476). To distinguish between the two

concepts, control language is used to assess perceived behavioral control (e.g., how much

personal control do you feel you have over using a condom in the next month). Although the

Armitage and Conner study certainly demonstrates that questions can be written so as to

empirically distinguish self-efficacy and PBC (i.e., using control language versus confidence

language, or specifying external factors), this does not in and of itself establish that the two

constructs are truly conceptually different. This has implications for both theory and intervention

development. If they are conceptually different then which construct should be targeted to

produce behavior change? Or should both be targeted? Is one better at explaining behavior and

another better at creating behavior change? While these are to some degree still open questions,

the available evidence to date suggests that self-efficacy is a better predictor of behavior than

PBC (Schmiege et al. 2009; Armitage & Conner, 1999; Dzewaltowski, Noble, and Shaw, 1990).

Intentions. Intentions are the most proximal and important predictor of behavior, according to the TPB. The TPB assumes that intentions capture the motivational processes necessary to influence behavior, and this hypothesis has largely been borne out—medium-to-large changes in intentions generally produce small-to-medium changes in behavior (Webb & Sheeran, 2006). The TPB states that, to produce changes in intentions, one must first produce changes in attitudes, norms, and PBC/self-efficacy; however, researchers have found that directly targeting intentions can also be a successful approach to producing behavior change. For example, Gollwitzer's (1993, 1996, 1999) implementation intentions technique directly targets intentions, and has a significant effect on behavior. Implementation intentions require an individual to specify a behavior to perform and the context in which they will perform it (e.g., "If I drink, then I will give my car keys to my friend"). Forming implementation intentions increases the likelihood of performing that behavior and achieving a particular goal (e.g., not driving drunk). Implementation intentions have worked to increase cervical cancer screening (Sheeran & Orbell, 2000), increase condom use preparatory behavior (Montanaro & Bryan, 2013), and reduce dietary fat intake (Armitage, 2004).

In some circumstances it is not possible (e.g., assessing condom use among individuals who have not had the opportunity to have sex in the follow-up interval) or practical (e.g., there is not adequate funding to follow participants for long enough to see changes in behavior) to directly assess changes in behavior. Thus intentions often serve as the primary outcome variable for intervention studies whose ultimate goal is behavior change. The logic of this practice rests on the assumption that changes in intentions will produce behavior change (e.g., Gagnon & Godin, 2000; Conner & Graham, 1993; Garcia & Mann, 2003), and while there is an admitted gap between intentions and behavior, to a large extent this assumption appears to be correct

(Webb & Sheeran, 2006). Given the importance of intentions as both the most proximal determinant of behavior and as a *de facto* outcome variable in many behavior change interventions, it is important to determine how attitudes, norms, and PBC/self-efficacy work together to change intentions, as well as behavior.

State of the Art in Theory-Based Interventions

Behavior change interventions are often complex, targeting multiple constructs in hopes of changing behavior. Some interventions are extremely effective in changing behavior, and others fail to do so. Evaluating which constructs are the active ingredients of change necessitates being able to manipulate each one individually. While it would be optimal if there were standard approaches to manipulate the constructs in the TPB, literature on the model itself is silent on what the optimal strategy for increasing each theoretical construct in an intervention context might be. Further, the current state of the art interventions typically doesn't separate components that are targeted into neat theoretical "boxes" (Michie et al., 2011; Michie & Johnston, 2012; Dombrowski, Sniehotta, Avenell, & Coyne, 2007). For example, Jemmott, Jemmott, and Fong (2010) evaluated theory-based abstinence-only vs. safe-sex interventions among 6th and 7th grade African American students. Using the SCT, TRA, and TPB the authors designed interventions to "(1) increase HIV/STI knowledge, (2) enhance behavioral beliefs that support condom use, and (3) increase skills to use condoms and negotiate condom use." This was the extent to which the interventions were described. There is often little or no description of how the constructs in the guiding theories are operationalized. The traditional TPB-based intervention addresses cognitive attitudes (de Ridder & de Wit, 2006), subjective norms, and PBC/self-efficacy. Again, descriptions of intervention content are often glossed over in method sections leaving it unclear how most of the TPB constructs were approached. One exception is PBC/self-efficacy. Because

of its common rooms in the TPB and Bandura's SCT, there is some guidance about the best ways to elicit change in self-efficacy, and these are commonly followed across successful HIV/STI/pregnancy prevention interventions ("Reducing the Risk", 2014; Schmiege et al., 2009; Kirby & Laris, 2009). In Bandura's early work and theorizing on self-efficacy (Bandura, 1977), he discussed the possible sources of efficacy expectations and noted how treatments might increase these efficacy expectations. The two most relevant here are performance accomplishments and vicarious experiences, which are accomplished by participant practice with the behavior and watching the modeling of the behavior, respectively. Interventions that have the goal of increasing condom use self-efficacy thus often incorporate watching a model apply a condom to a penile model (e.g., a banana) and then practicing applying a condom to a penile model themselves. A more recent development is the implementation intentions literature (Gollwitzer & Sheeran, 2006; Webb & Sheeran, 2004) which has given interventionists direct strategies for increasing intentions by having participants set a specific goal and make plans for how they will accomplish that goal. In sum, there is increasing consistency in how self-efficacy and intentions are approached in TPB interventions, however, there is little guidance for how best to change attitudes and norms.

Directional Associations Between Core TPB Constructs

The TPB assumes that causal associations do not exist between the three proximal determinants of intentions (i.e., attitudes, norms, PBC/self-efficacy). Yet literature outside of the TPB framework suggests that such relationships are likely to exist. The relationship between attitudes and norms appears to be the most frequently discussed in the literature. It is clear that there is a significant positive relationship between norms and attitudes, and this can be found in a number of discussions regarding norms. For example, Borsari and Carey (2001) write, "In

reality, peers influence the individual's attitudes and behaviors in several ways." The authors appear to suggest that norms precede attitudes. In fact, there is a long and rich history theorizing and empirically demonstrating the influence of norms on attitudes in social psychology (Asch, 1956; Milgram, 1964; Darley & Latane, 1968). In more recent work, researchers have found that providing participants with in-group members' supposed opinions can actually make the participant's attitude stronger and more resistant to change attempts (Stangor, Sechrist, & Jost, 2001); this is also true for implicit attitudes (Lowery, Hardin, & Sinclair, 2001). But the relationship may not be simply unidirectional. In later work Borsari and Carey (2003) state, "…personal attitudes and behaviors also influence the perception of norms." The authors imply here that attitudes may also be determinants of norms but, thus far, prior work investigating the role of norms in the attitude-behavior relationship has generally failed to support this hypothesis (Ajzen, 1991; Trafimow & Finaly, 1996).

The relationship PBC/self-efficacy has with attitudes and/or norms is rarely explicitly discussed, but it is easy to envision a reciprocal relationship between attitudes and PBC/self-efficacy. A person could dislike condom use and this could lead them to avoid learning any skills related to condom use, which would then translate into negative beliefs about their ability to use condoms. Or, a person could fail at condom application a few times, reducing their perceptions of PBC/self-efficacy, and this would subsequently lead to the formation of negative attitudes about condom use. Both scenarios are equally likely, and in fact Bandura (1989) argues for both. Drawing from the anxiety literature, Bandura (1989) states that negative attitudes are really controlled by perceived PBC/self-efficacy, such that those with high PBC/self-efficacy beliefs in anxiety provoking situations will have fewer negative attitudes than those with lower PBC/self-efficacy beliefs. However, in the realm of depression, Bandura (1989) argues for the opposite

relationship between attitudes and PBC/self-efficacy. He states that depressive, negative attitudes can significantly impair a person's perception of personal efficacy. Which direction is more influential in the health domain is potentially important for intervention development.

The relationship of PBC/self-efficacy to norms is somewhat less clear, and is highlighted by findings reported by Rivis and Sheeran (2003a). For example, an adolescent boy's friends may not use condoms when they engage in sexual acts and, as previously discussed, this may lead the boy to have a negative attitude towards condoms. If Bandura's notions are correct, these negative attitudes could eventually produce decreased levels of perceived behavioral control over condom use. Thus a direct relationship may not exist between the two constructs, since it is difficult to conceptualize a connection without attitudes as a mediating variable. Findings from Rivis and Sheeran's (2003a) meta-analysis are consistent with this supposition, and go even further to suggest that these two constructs may not be related at all (i.e., descriptive norms and PBC/self-efficacy were correlated at $r = .08$). In another study conducted by Rivis and Sheeran (2003b), the authors investigated how subjective (injunctive) and descriptive norms are related to the other TPB constructs and exercise behavior. The authors found that subjective and descriptive norms were weakly correlated with PBC/self-efficacy ($r = .12$, $r = .19$, respectively). These weak correlations further support the idea that the relationship of PBC/self-efficacy to norms is potentially indirect, if it exists at all.

It is assumed by many researchers and policy makers (Peters et al., 2013) that for an intervention to be based on the TPB, it must target all three constructs (i.e., attitudes, norms, and PBC/self-efficacy) to produce intention and behavior change. But is this really necessary? Given the overlap between some of the constructs, potential causal associations, and some evidence of the success of targeting only a single construct (i.e., intentions), might it be that a focused

manipulation of one construct could have diffuse effects on the other two? This is an empirical question that can and should be answered to facilitate optimal intervention development and to inform the progress of theoretical innovations in the behavior change domain. The manipulation of an independent variable (i.e., an intervention condition) meant to change a single construct makes it possible to examine whether *changes* in one construct such as attitudes are actually linked to *changes* in norms or PBC/self-efficacy, and subsequently related to changes in intentions and behavior. Health behavior research is in desperate need of strong experimental designs with a focus on how constructs are causally connected.

Current Study

The current study seeks to determine how the constructs (i.e., attitudes, norms, PBC/self-efficacy) in the TPB influence each other in order to increase condom use intentions and behavior among college students. Young adults are having sex, and often not safely. Adefuye et al. (2009) reported that only 20%-35% of college-aged students use condoms every time they have sex, and while the incidence of HIV and other sexually transmitted infections (STIs) has decreased among many demographic groups in the United States, adolescents and emerging adults remain among the subgroups at relatively higher risk for HIV/STI (CDC, 2012). This population needs theoretically driven interventions to increase condom use.

This dissertation attempts to add to the empirical health behavior literature with three goals and accompanying hypotheses. First, distinct interventions were designed in order to target the core constructs of the TPB, following model development recommendations by Aiken (2010) and West, Aiken, and Todd (1993). Second, we sought to determine which individual TPB constructs and which combinations of these constructs are most successful at changing condom

use intentions among college students. Finally, we examined the impact of changes in the targeted constructs on the other constructs not explicitly targeted by the intervention. The current study intends to empirically test how the constructs (i.e., attitudes, norms, PBC/self-efficacy, intentions) in the TPB influence each other to increase condom use intentions and behavior with college students. Specifically, we propose 3 hypotheses related to this question:

Hypothesis 1: Increases in PBC/self-efficacy will yield greater improvements in condom use intentions and behavior than increases in the other TPB constructs.

Hypothesis 2: The norms only condition will be the least effective at improving condom use intentions and behavior.

Hypothesis 3: The PBC/self-efficacy-only intervention will also improve attitudes toward condom use as much or more than the attitudes-only intervention.

Exploratory Analysis 1: Explore the potential differential effectiveness of the single construct interventions versus the multiple construct interventions.

Exploratory Analysis 2: Explore the optimal number of constructs needed to produce the greatest amount of behavior change.

Method

Participants

A total of 287 participants were recruited from introductory psychology courses at the University of Colorado Boulder. Prior research has indicated that the predictors of condom use are dramatically different in casual versus serious relationships (c.f., Reid & Aiken, 2011) and that condom use is extremely difficult to change among those in established long-term

relationships. Thus, participants were excluded if they indicated that they were "living with" someone or "married".

Demographic and sexual history information for the final sample is included in Table 2. Overall, participants were predominantly female (55.4%) and Caucasian (73.4%; 2.8 % African American; 5.9% Hispanic; 1.7% Native American; 10.1% Asian or Pacific Islander; 5.9% Other). On average, participants were 19.26 year of age ($SD = 1.26$), and they ranged from 18 to 26 years of age. 95.4% of participants reported being heterosexual and 65.5% were *not* currently in a romantic relationship. A majority of participants reported experiencing vaginal or anal intercourse in their lifetime (83.5%). Of those who had experienced sex, only 26.5% reported using condoms 100% of the time they have had sex in the last three months. On average, participants had $M = 5.04$ ($SD = 6.02$) lifetime sexual partners and were $M = 16.63$ ($SD= 1.82$) years of age the first time they had intercourse.

Design

Seven computer-based conditions were developed in which the content was targeted to the constructs in the TPB (i.e., attitudes, norms, PBC/self-efficacy, and intentions). Four single construct conditions (i.e., attitudes only, norms only, PBC/self-efficacy only, intentions only) were designed in order to identify the construct(s) that may have the most diffuse effects on the other constructs and ultimately behavior change. Additionally, these single construct conditions should help to distinguish the active ingredients of change in the TPB. Two multiple construct conditions were also designed. A three construct condition, which included attitudes, norms, and PBC/self-efficacy, and a four construct condition (i.e., attitudes, norms, PBC/self-efficacy, and intentions) were designed to examine the best combination of these constructs to produce

behavior change. Finally, a no-treatment control condition which solely consisted of pretest and posttest assessments was included to investigate the possibility of mere measurement effects. Is it enough to administer a questionnaire about condom use behavior to change behavior? An outline of each condition is provided in Table 1.

Procedure

Participants were recruited using standard introductory psychology procedures via the online Sona System. Participants received course credit for their participation in the first component of this study. Given the sensitive nature of the information gathered during the study, participants were reminded that their responses were confidential, and they were encouraged to answer as honestly as possible. If students agreed to participate they were randomly assigned to one of the seven intervention conditions. Once assigned to an intervention they completed a baseline series of questionnaires, completed the intervention, and concluded with a set of post-test assessments. All procedures were reviewed and approved by the local Institutional Review Board.

Measures

Demographic Variables

Participants answered a series of demographic questions that included age, ethnicity, year in school, sexual history, and condom use history.

Attitudes Towards Behavior

All constructs contained in the TPB were measured using the same techniques as Ajzen and Madden (1986).Participants were asked seven questions regarding their attitudes toward

condoms. Each item was assessed using a seven-point scale. Sample items include: "For me, using a condom would be unhealthy (1) versus healthy (7)" and "For me, using a condom would be bad (1) versus good (7)." Items were averaged to form a scale score ($\alpha = .91$). Note that we chose here to include the direct measure as opposed to the indirect measure that is the multiplicative index of behavioral beliefs and importance of each belief. Though these are significant precursors to direct attitudes (Reid & Aiken, 2011), the interventions are not targeted to and would be unlikely to change the importance of each belief for participants. Thus, for simplicity, we assessed only direct attitudes.

Subjective Norms

Eleven items were rated on a seven-point Likert scale from 1 (disagree strongly) to 7 (agree strongly). Participants were asked what their sexual partners, friends, family, and most people think about condom use. This scale consisted of items such as "Most of my friends use condoms" and "Most people who are important to me think I should not use condoms" that were averaged ($\alpha = .86$). These items assessed norms as traditionally specified by the TPB that tap into how strongly the individual believes that various individuals want him/her to take a certain action. Consistent with Cialdini and colleagues (e.g., Cialdini, Reno, & Kallgren, 1990), the term "injunctive norms" was used for the norms traditionally included in the TPB and "descriptive norms" was used for the perceived behavioral norms. Injunctive norm were included for consistency with the TPB, and descriptive norms because of evidence that they are a particularly important predictor of behavior among young people (Rivis & Sheeran, 2003).

Similar to our decision about attitudes, we chose here to include the direct normative measure as opposed to the indirect measure that is the multiplicative index of normative beliefs

of particular referents and motivation to comply with those referents. First, a review and comparative test of the TRA and TPB (Sutton et al., 1999) found only very weak support for the multiplicative assumption of the models, and in Reid and Aiken's (2011) recent model comparison work these multiplicative normative indices were not retained in the final integrated model, with the exception of partner norms, and then only for women in serious relationships. Thus, for simplicity, we also assessed only direct normative support.

PBC/*Condom Use Self-Efficacy Scale*

Brien and Thombs' (1994) Condom Use Self-Efficacy Scale (CUSES) was used to assess individuals' perceptions of his or her ability to use condoms. The CUSES was developed using a young adult population. This measure includes fifteen items and uses a five-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). The CUSES addresses four domains of condom use: the mechanics of putting on a condom, partner disapproval, assertiveness, and the influence of intoxicants on a person's ability to use condoms. Sample items from the CUSES include: "I feel confident in my ability to use a condom correctly" and "I feel confident that I would remember to use a condom even after I have been drinking." Items were averaged to form a scale score ($\alpha = .88$).

Intentions

The final questions relating to the TPB concern participants' intentions to use a condom within the next three months. Sample items include: "How likely is it that you will buy condoms in the next three months?" and "How likely is it that you will use a condom the next time you have intercourse?" Four items were rated on a seven-point Likert scale from 1 (not at all likely) to 7 (very likely) and averaged to form a scale score ($\alpha = .84$).

Lifetime Sexual History

Questions querying participants' sexual history included age of first sexual intercourse, number of lifetime sexual partners, and average frequency of intercourse (responses ranging from "once a month or less" to "almost every day"). Contraceptive/condom use was also assessed. Frequency of contraceptive use was asked with responses ranging from "never" to "always". Participants were also asked if they have ever contracted a sexually transmitted infection (yes/no), and whether they had ever been pregnant (if female) or gotten someone pregnant (if male). Risky sexual behavior was calculated using how frequently a participant had sex in the past 3 months X how often they used a condom when having sex during those 3 months (reverse coded).

Conditions

Seven computer-based conditions were developed in which the content was targeted to the proposed mechanisms of change in the TPB (i.e., attitudes, norms, and PBC/self-efficacy). All content was presented entirely via computer. In a meta-analysis assessing the efficacy of computer-based HIV interventions Noar, Black, and Pierce (2009) and Kiene and Barta (2006) concluded the most efficacious internet-based interventions were conducted with young highly educated college students. College students could benefit most from computer-delivered interventions because they have higher-level cognitive skills and are familiar with the internet-based format. Noar et al. (2009) concluded that computer-based interventions are just as efficacious as many in-person interventions in increasing condom use and decreasing STI rates. This is a promising form of intervention delivery more generally, as it has the potential to reach wider audiences who are not motivated to utilize in-person care, requires lower delivery cost

than human-delivered interventions, allows for the standardization of delivery content, as well as permits greater dissemination flexibility (i.e., smart phones).

Attitudes Only Condition

In order for attitudes to be an agent of behavior change participants must have positive attitudes towards a given behavior—condom use in this case. Following prior attitudes' literature different kinds of attitudes were targeted in hopes of producing behavior change.

Cognitive and Affective Attitudes. Cognitive, or instrumental, attitudes were first targeted using written messages and corresponding pictures (Conner et al., 2011). For example, participants were presented with the cognitive message "regular condom use reduces your risk of an unplanned pregnancy," and this was paired with a picture of crying baby. The same method was used to target affective attitudes (Conner et al., 2011). A sample affective message is "not using a condom can lead to feelings of guilt," and this was paired with a picture of a couple in bed with the man asleep and the woman looking worried after sex.

Evaluative Conditioning. Prior implicit attitude work has shown that pairing a particular object with a positive stimulus creates more positive implicit evaluations of the object (Hofmann et al., 2010). An evaluative conditioning task was used to create an association between condoms and the most positive pictures from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005). Participants were presented with the following instructions: "Next, we are interested in how quickly you recognize unexpected figures or images. You will see a slideshow of different images. Please pay attention. A black circle will appear periodically throughout the slideshow. Please press the space bar on your computer keyboard as quickly as possible when you see the black circle appear." A series of words and pictures were then

presented as stimuli to participants: 6 pictures of a condom and 6 positive pictures (e.g., kittens, puppies, etc.). Each image was shown 20 times in random order. Each trial, which consisted of one pairing of a condom with a positive picture, lasted a total of 2.5 seconds. The condom image appeared for one second, followed by the presentation of a positive picture for one second. The interval between trials was 500 ms. The black circle randomly appeared 6 times between trials.

Norms Only Condition

In order to elicit a relevant social comparison, participants were asked to perform three tasks. First, participants were asked to complete a group-affirmation exercise. Affirming what is important to a valued group should prompt even more affiliation with that group (Sherman et al., 2007). First, participants were asked to rank the three groups they most identified with at CU Boulder ("Many students at CU identify with the groups listed below. Please pick three groups that you most identify with and place them at the top of the list). A list of 22 groups was proved (e.g., sorority member, student athlete, in-state student, etc.) Participants then ranked the importance of 10 values (e.g., sense of humor, religion, etc.) for their most important groups. Next, participants wrote three reasons that their group value was important to the group and one example of something they have do to demonstrate the importance of that value. This exercise was designed to reinforce the importance of a particular group membership to the participants.

Once group membership was made salient, participants received two types of feedback: personalized feedback and group norms. Participants were provided feedback comparing them to the group identified before the group-affirmation exercise. They received a statement comparing them to their important group "87% of CU Boulder *athletes* think condoms are effective and should be used every time with every sexual partner. 80% of CU Boulder *athletes* use a condom

every time they have sex. You use a condom *40*% of the time." Statements such as "Most CU

Boulder students who are involved in the *Greek system* feel condoms are necessary" and "Most

CU Boulder students who are involved in the *Greek system* think condoms help make sex last

longer" were used to demonstrate group norms. The group affirmation exercise was designed to

enhance participants' needs to conform to group norms, particularly condom use norms, to

preserve their group identity.

Perceived Behavior Control/Self-Efficacy Only Condition

A video was shown to all participants that included two friends—one male and one

female college student—discussing concerns about condom use. One friend taught the other how

to correctly put a condom on, and they discussed proper places to store condoms. Participants

were then asked to correctly place the steps of condom application in order.

Condom negotiation skills were also discussed. Participants watched one "good"

negotiation clip, one "bad" negotiation clip, and two "advice" clips. After each clip participants

were asked to rate how good or bad the negotiation was and whether it depicted a realistic

situation. Open-ended responses were also collected asking participants what they liked about

each clip and what they did not like.

Lubrication instructions and options for purchasing condoms were also provided. Each of

these skills is frequently addressed in condom use research to increase condom use self-efficacy

among college students in particular (Bryan et al., 1996; French & Holland, 2013; Baele,

Dusseldorp, & Maes, 2001; Joffe & Radius, 1993).

Intentions Only Condition

This condition attempted to increase participants' motivation to use condoms. Instructions included: "One of the best ways to protect yourself from STIs and unwanted pregnancies is to have good intentions and a specific plan to keep safe. By creating your own goals and trying to achieve those goals, you develop more control over your life. Next, you will be asked to create a series of goals that target using condoms in different situations." Participants then set four goals: a "condom use" goal, a "purchasing condom" goal, a "discussing with your partner" goal, and a "partner dissatisfaction" goal. They were also asked to make a plan to achieve this goal within the next three months. These prompts followed the following format: "Please set a specific goal addressing purchasing condoms./My "purchasing condom" goal is:/In the next three months, to achieve my goal, I will:". This technique follows the idea that the formation of general implementation intentions creates a commitment to the behavior (Ajzen, Czasch, & Flood, 2005). This is done by identifying a potential opportunity to perform a behavior and a response, or plan, to that opportunity to accomplish the larger goal (Webb & Sheeran, 2008).

Remaining Condition

The three remaining conditions included a three-construct condition (attitudes + norms + PBC/self-efficacy), a four-construct condition (attitudes + norms + PBC/self-efficacy + intentions), and a control condition. These conditions used combinations of the techniques described above and did not include new material. The control condition included only pre- and post-test assessments. Additionally, participants in the active conditions, but not in the control condition, received a list of area resources for testing and other sexual health services.

Immediate Posttest Outcomes

Following prior research (e.g., Bryan, Aiken, & West, 1996; Schmiege, Broaddus, Levin, & Bryan, 2009), assessments of each of the theoretical constructs were completed by participants a second time immediately following the end of each program. This provided an assessment of the extent to which levels of those constructs were impacted by the condition program and allowed for an assessment of the degree to which changes in those constructs were associated with changes in intentions and/or behavior.

Follow-Up Analyses

Three months after a participant's intervention date, they received an email from the experimenter. This email included instructions directing the student to a website to answer questions regarding their sexual activity and condom use over the past three months. Participants received $15 for completion of the follow-up assessment via PayPal. We also included questions about intentions to use condoms and preparatory condom use behaviors in order to assess intervention efficacy for those participants who had not been sexually active over the intervening three months (Bryan, Fisher, & Fisher, 2002).

Results

Data Analysis Plan

First, we replicated prior cross-sectional work by regressing condom use at baseline onto the full set of constructs from the TPB. Repeated measures ANOVAs allowed for the assessment of which constructs were significantly changed by the conditions. Second, the TPB constructs

were included in a mediational structural equation model (Bryan et al., 2007) to explore the 'active ingredients' of condition effects on risky sexual behavior at follow-up.

Pretest Equivalence of Conditions

Pretest construct means are given in table 3 for all seven conditions, along with tests of pretest equivalence. Several differences were found between conditions at pretest. Attitudes towards condom use were significantly lower in the intentions only condition as opposed to the attitudes only condition, $F (6, 268) = 3.11, p < .01$. Norms were significantly different across the seven intervention conditions, $F (6, 258) = 2.18, p < .05$, though post hoc analyses did not show any pairwise differences across conditions. There were not any pretest differences for PBC/self-efficacy, $F (6, 256) = .82, p = .56$. Intentions were significantly lower in the intentions only condition as opposed to the three construct condition (i.e., attitudes + norms + PBC/self-efficacy), $F (6, 275) = 2.93, p < .01$. Additionally, risky sexual behavior at baseline was not significantly different across conditions, $F (6, 271) = 1.44, p = .20$. Given the significant pretest differences, difference scores were used in the remaining analyses.

In general, condom use self-efficacy was quite high (overall $M = 4.26, SD = .61$ on a five-point scale) creating the possibility of a ceiling effect and leaving very little room for participants to improve their condom use self-efficacy.

Accounting for Variability in Condom Use at Baseline

Correlations between pretest TPB constructs, past risky sexual behavior, and condom use at baseline are displayed in Table 4. These indices suggest the relative strength of the individual predictors. All of the TPB constructs, except for PBC/self-efficacy, were significantly related to

risky sexual behavior at baseline; all of the TPB constructs were significantly associated with condom use at baseline.

Condom use at baseline was used as the dependent variable in the regression model instead of risky sexual behavior because risky sexual behavior at baseline was not significantly correlated to PBC/self-efficacy at the bivariate level. When risky sexual behavior at baseline was used as the dependent variable in the model PBC/self-efficacy was significantly related to risky sexual behavior suggesting a suppression effect was occurring. Condom use at baseline (In the past 3 months, how much of the time have you used condom when you've had sex?) was regressed on the set of TPB constructs (i.e., attitudes, norms, PBC/self-efficacy, and intentions). The linear combination of TPB constructs, collapsing across condition, was significantly related to condom use at baseline, $R^2 = .341$, $F (4, 214) = 29.21$, $p < .001$. Only two predictors were significantly uniquely associated with condom use at baseline: norms, $B = .169$, $t (214) = 2.39$, $p < .05$, and intentions, $B = .418$, $t (214) = 6.26$, $p < .001$, were positively related to condom use at baseline. Higher scores on these constructs were associated with more condom use. Attitudes and PBC/condom use self-efficacy, on the other hand, were not uniquely related to condom use at baseline, $p's > .10$.

Pretest and Posttest Differences by Condition

Pretest and posttest means by intervention condition are presented in Table 4, along with repeated measures ANOVAs for program efficacy. There was an effect of time for attitudes, $F (1, 256) = 114.80$, $p < .001$, and intentions, $F (1, 263) = 31.65$, $p < .001$. Attitudes toward condom use were more positive and intentions to use condoms were higher at posttest. Significant time effects were found for risky sexual behavior, $F (1, 68) = 6.65$, $p < .05$, such that

participants reported more risky sexual behavior at the three month follow-up. There were no effects of time for norms or PBC/self-efficacy (p's > .150).

Mixed model ANOVAs where condition was the between subjects variable and time was the within subjects variables were utilized to examine condition X time interactions. A significant condition X time interaction existed for attitudes towards condom use (F (6,250) = 2.15, p < .05). In order to determine which condition had the largest effect on positive attitudes and intentions, while controlling for baseline differences, difference scores (posttest – pretest scores) were examined. Pairwise Bonferroni post hoc comparisons revealed that the greatest differences existed between the attitudes only condition (MD = .13, SD = .45) and the attitudes + norms + PBC/self-efficacy + intentions condition (MD = .65, SD = .91. The greatest difference in attitudes from pretest to posttest occurred in the four construct condition. There was also a significant condition X time interaction for intentions, F (6,257) = 3.40, p < .01, such that condition differences existed between the attitude only condition (MD = .38, SD = .61) and the attitudes + norms + PBC/self-efficacy + intentions condition (MD = .85, SD = 1.10). Additionally, differences were found between the attitudes + norms + PBC/self-efficacy + intentions condition and the control condition (MD = .08, SD = .57). The greatest difference in intentions from pretest to posttest occurred in the four construct intervention. No other condition X time interactions were significant (p's > .20).

Simple effects of time within condition were investigated to determine in which condition pretest-posttest differences existed. These analyses sought to test hypothesis 2 (i.e., the norms only condition will be the least effective at improving condom use intentions and behavior). Attitudes significantly increased in all conditions except for the attitudes only condition (p's < .001; see Table 3 for means). Intentions were not as ubiquitously changed as attitudes.

Specifically, intentions were significantly increased in the norms only, PBC/self-efficacy only, and the attitudes + norms + PBC/self-efficacy + intentions conditions (*p's* < .001; see Table 3 for means). In sum, hypothesis 2 was largely not supported. Specifically, the norms only condition did indeed improve condom use intentions but not condom use behavior—it was not the least effective condition as predicted.

Gender and Relationship Status

The next set of analyses explored likely moderators of intervention effects. A second set of mixed model ANOVAs were conducted where gender was added as a moderator in the tests of treatment effects on each construct and behavior, and a final set of ANOVAs was conducted where relationship status (in a relationship = 1, not in a relationship = 0) was added as a moderator. Gender was investigated as a potential moderator given prior research suggesting condom use behavior change may occur differently for males and females. Specifically, men report higher condom use self-efficacy and greater control over condom use than women (Black et al., 2011l; Meekers & Klein, 2002). Women, on the other hand, report greater troubles negotiating condom use with their partners (Lorber, 2009). Prior research has also indicated that the predictors of condom use are dramatically different in casual versus serious relationships (c.f., Reid & Aiken, 2011) and that condom use is extremely difficult to change among those in established long-term relationships. Couples in serious relationships often switch to hormonal birth control as their main form of pregnancy prevention (Bauman, Karasz, & Hamilton, 2007) and do not worry about STD/HIV contraction. For these reasons gender and relationship status were included as potential moderators of the constructs targeted in the interventions.

A repeated measures ANOVA revealed a significant gender X condition X time interaction for attitudes (F (6,256) = 2.39, p < .05). Figure 2 has a graphical representation of the three-way interaction. The simple effects suggested that men in the four construct condition (i.e., attitudes + norms + PBC/self-efficacy + intentions) showed the greatest change in attitudes towards condom use. Specifically, for men, attitudes toward condom use were most positive at posttest in the four construct condition (MD = 1.23), attitudes increased from pretest to posttest for all other conditions as well, F (1,242) = 79.43, p < .001, In contrast, for women, the magnitude of change across all seven conditions was similar, an overall effect of time existed for women (F (1,242) = 48.53, p < .001). There was a main effect of time, F (1,242) = 127.50, p < .001, such that attitudes towards condom use were most positive at posttest. No other main effects existed. No other effects were significant. The three-way interactions were not significant for any of the other constructs. Further, none of the three-way interactions between relationship status X condition X time were significant for any of the constructs.

Three Month Follow-Up

At the time of analysis 115 participants were eligible for the three month follow-up assessment. 71 of the 115 (61.7%) eligible for the follow-up completed the follow-up assessment at the time of data analysis. Participants were contacted once a day for 10 days prior to data analysis. A series of ANOVAs on relevant pretest measures of condition and retention (retained or not retained) were conducted to test for differential attrition (Jurs & Glass, 1971). Significant condition X retention interactions indicate variables on which differential attrition may have occurred. There were no condition X retention interactions (ps > .20) for any of the constructs examined.

Of the 71 participants who completed the follow-up 64.4% (n = 45) had had sex in the past three months, 50.7% (n = 36) had purchased condoms, 49.3% (n = 49.3) had talked to their significant other about condom use, and 19.8% (n = 14) sometimes carried condoms with them when they went out in the past three months. A repeated measures ANOVA was used to investigate possible risky sexual behavior at follow-up condition differences. Condition X time effects did not exist for risky sexual behavior at follow-up, F (1, 62) = .721, p = .63. Additionally, there were no significant differences among conditions for purchasing condoms, χ^2 (6, 70) = 3.22, p = .78, discussing condom use with a significant other, χ^2 (6, 70) = 7.54, p = .27, or carrying condoms, F (6, 63) = .47, p = .83, at follow-up.

The same behavioral outcomes were assessed to examine the role gender and relationship status might play in condom use behaviors. There was not a significant effect of gender on risky sexual behavior at follow- up, t (67) = 1.69, p = .10. A significant condition X time X gender interaction did not exist (F (6, 55) = .261, p = .95). There were no significant gender differences for discussing condom use with a significant other, χ^2 (1, 70) = .78, p = .78, or carrying condoms, t (68) = -1.84, p= .07, at follow-up. However, significant gender differences did exist for purchasing condoms, χ^2 (1, 70) = 8.60, p < .01, such that 82.4% of males reported purchasing condoms while only 41.5% of females reported doing so. There were no condition X gender interactions (p's > .40). There was a significant difference based on relationship status (in a relationship vs. not in a relationship) for risky sexual behavior at follow-up, t (67) = -3.27, p < .01. Those in a relationship reported riskier sexual behavior (M = 14.83, SD = 9.27) than those not in a relationship (M = 8.31, SD = 6.83). There were no differences based on relationship status for purchasing condoms (χ^2 (1, 70) = .48, p = .49), discussing condom use with a

significant other (χ^2 (1, 70) = .93, p = .33), or carrying condoms (t (68) = -.68, p = .50). There were no condition X relationship status interactions ($p's$ > .15).

Which Constructs are 'Active Ingredients' of Change?

We estimated a series of mediational models via path analysis (c.f., Bryan et al., 2007) using EQS 6.1, wherein the exogenous variable in each model represented one of a series of planned contrasts described below. Risky sexual behavior at the three month follow-up was used as the ultimate outcome variable. Given the significant differences at baseline between conditions, difference scores were used as the mediators within the context of the model. To account for missing data at follow-up, maximum likelihood estimation of missing data was utilized (c.f., Schafer and Graham, 2002) and thus robust estimation of standard errors was conducted for tests of fit and significance of the paths. The missing data at follow-up can be considered missing at random (MAR) given the results of the condition X retention interactions (i.e., no significant interactions were found). Simulation studies suggest that maximum likelihood estimation allows for unbiased estimates of treatment effects in the presence of missing data up to as much as 25% (Schafer & Graham, 2002).

Exploratory Analysis 1: Explore the potential differential effectiveness of the single construct interventions versus the multiple construct interventions. The first mediational model examined two planned comparisons (theory-based conditions vs. control and single construct conditions vs. multiple construct conditions). The fit of the model was adequate, Santorra-Bentler χ^2(2, N = 287) = .84, p = .83, CFI=.933, RMSEA=.072 (90% CI .000-.154). Paths from the theory-based condition vs. control contrast were related to a change in intentions, such that the theory-based conditions resulted in a greater change in intentions than the control conditions.

The path from single vs. multiple construct conditions was not significantly related to any of the mediators in the model, meaning that there was no difference in the change to the mediators in the single versus multiple construct interventions. Change in attitudes was related to a change in intentions, which was then associated with risky sexual behavior at follow-up (see figure 3). Note that the relationships between attitudes, intentions, and risky sexual behavior are identical in each subsequent model. Only the exogenous variables/contrasts of interest change with each model.

Exploratory Analysis 2: Explore the optimal number of constructs needed to produce the greatest amount of behavior change. This mediational model examined a potential linear effect of the number of TPB constructs addressed by the interventions by recoding the conditions in the following manner: control (0) vs. single construct (1) vs. three construct (2) vs. four construct (3); see figure 4). The fit of this model was adequate, Santorra- Bentler χ^2(2, $N = 287$) = .323, *p* = .85, CFI=.932, RMSEA=.035 (90% CI .000-.150). In general, the theory-based conditions were significantly related to a greater amount of change in intentions.

Next, a series of meditational models were estimated to examine potential differences between single construct conditions of interest (e.g., attitudes only vs. PBC/self-efficacy only). Note that an appropriate set of orthogonal contrasts was utilized in each case, but only the focused contrast of interest is interpreted below. The single construct conditions of interest were attitudes vs. PBC/self-efficacy (i.e., hypothesis 3) and PBC/self-efficacy vs. intentions (i.e., hypothesis 1) are presented.

Hypothesis 3: The PBC/self-efficacy-only intervention will improve attitudes toward condom use as much or more than the attitudes-only intervention. The fit of this model was

adequate, Santorra- Bentler χ^2(17, $N = 287$) = 10.93, p = .86, CFI=.969, RMSEA=.042 (90% CI .000-.074). There were not any differences between the attitudes only condition and PBC/self-efficacy only condition (see figure 5). These findings were not consistent with the hypothesis related to the effectiveness of the PBC/self-efficacy only intervention.

Hypothesis 1: Increases in PBC/self-efficacy will yield greater improvements in condom use intentions and behavior than increases in the other TPB constructs. Finally, the potential differences between the PBC/self-efficacy only vs. intentions only were modeled. The fit of this model was adequate, Santorra- Bentler χ^2(17, $N = 287$) = 9.15, p = .94, CFI=.985, RMSEA=.032 (90% CI .000-.066). There were not any differences between the PBC/self-efficacy only condition and the intentions only condition (see figure 6).

Forty-seven participants reported never having had sex at baseline. These participants were removed from the mediational model analyses to examine their potential impact on the models. The same patterns exist for all models when those who reported never having had sex at baseline were removed. Given the lack of differences between models that included the full data set and those that did not include participants who had never had sex, models with the full data set were presented and discussed.

Discussion

In this study we attempted to create seven computer-based interventions to increase condom use intentions and subsequent behavior among a college student population. Four conditions were designed to target a single construct in the Theory of Planned Behavior (i.e., attitudes only, norms only, PBC/self-efficacy only, and intentions only). Two conditions were designed to target different combinations of constructs in the Theory of Planned Behavior (i.e..,

attitudes + norms + PBC/self-efficacy and attitudes + norms + PBC/self-efficacy+intentions).

Only two constructs were related to condom use at baseline in the predicted direction at the

bivariate level and the full TPB accounted for 34.1% of the variance in condom use at baseline.

Interestingly, in some conditions the targeted construct was not changed, but diffuse effects of

that intervention condition were associated with changes in other constructs. For example, the

norms-only intervention did not influence norms, yet it did influence attitudes and intentions.

Making condom use norms salient for participants increased positive attitudes towards condom

use and increased condom use intentions. This speaks to the interconnectedness of the constructs,

such that addressing one does indeed influence the others. However, in the case of norms

particularly, a *change* in the construct itself (i.e., norms) was apparently not necessary to change

the other constructs (i.e., attitudes and intentions).

When investigating intervention effects on theoretical mediators (e.g., attitudes, norms,

PBC/self-efficacy), we found that the theory-based interventions, as compared to the no-

treatment control, increased intentions to use condoms. A direct comparison of the effectiveness

of the single construct versus multiple construct interventions revealed that there was no

difference in the change to the mediators in the single versus multiple construct interventions. An

examination of a potential linear effect of the number of TPB constructs addressed by the

interventions revealed again that theory-based interventions were better than the control

condition. Additionally, contrary to my hypotheses, the PBC/self-efficacy only condition did not

change attitudes toward condom use, intentions to use condoms, or condom use behavior more

so than any of the other single construct conditions. Finally and most importantly, in the context

of the mediational models, changes in attitudes were associated with changes in condom use

intentions, which then predicted decreased risky sexual behavior at follow-up.

Implications for Health Behavior Theory

My results suggest that an examination of the relationships between the cognitive

mechanisms hypothesized to underlie behavior in the TPB (e.g., attitudes, norms, etc.) is

important to facilitate an understanding of behavior change. Indeed, this study follows a long line

of work within social psychology (Asch, 1956; Milgram, 1964; Stangor, Sechrist, & Jost, 2001)

demonstrating that normative information may strengthen attitudes. Perhaps the work done by

Terry, Hogg, and McKimmie (2000) which supported a moderating role of normative beliefs on

the attitude-behavior relationship may truly be the case. It is puzzling, however, that a change in

norms was not necessary to change attitudes and intentions. Part of the norms manipulation

included in these interventions asked participants to choose from twenty-two groups on campus

that could believably be surveyed about condom use (e.g., sorority member, out-of-state student).

The four most popular groups chosen were freshman ($n = 23$), sorority member ($n = 16$),

fraternity member ($n = 11$), and science major ($n = 11$). While chosen as groups whose

membership was important to participants, these groups may not be appropriate comparisons

regarding condom use. Specific and personally relevant norms are most often linked to behavior

change (Borsari & Carey, 2001). This suggests that researchers should focus more on what a

college female's best friend or significant other thinks and does instead of what fellow college

students or freshman at CU think about condom use. However, we did not have access to what a

participant's best friend thought and furthermore could not change what a participant's best

friend thought or did in the context of the intervention. In other words, we did not have the

capacity to "correct" personal norms for condom use. Furthermore, participants were asked at the

three-month follow-up assessment how often they thought each group listed during the norms

intervention used condoms, and none were close to the 80% condom use (falsely) reported

during the intervention. For example, when asked "how much of the time do you think sorority members use condoms when they have sexual intercourse" (responses ranged from 0% of the time to 100% of the time), but the mean response rate was 56% of the time. It is possible that the norms manipulation was not effective because it provided participants with personalized feedback comparing them to a standard that they did not believe to be true. It was, however, enough to facilitate improvement in attitudes and intentions. Perhaps the norms only condition allowed participants to reflect on their condom use which was all that was needed to change attitudes and intentions. These results further highlight the need to examine the capacity of these constructs in producing change in the others.

The conclusions that can be drawn from this study about the efficacy of targeting PBC/self-efficacy are seriously limited, given that PBC/condom use self-efficacy was universally and unusually high (overall mean 4.27 on a 1-5 scale) at baseline. In general, there is a significant relationship between PBC/self-efficacy and intentions. A number of condom use intervention studies have shown that behavior change occurs chiefly through PBC/self-efficacy (Schmiege et al., 2009; Bryan, Aiken, & West, 1996), and meta-analytic data support that across behaviors PBC/self-efficacy has the strongest effects on behavior change (Sheeran et al., in prep). PBC/self-efficacy change did not occur in this study, and perhaps it was due to ceiling effects occasioned by universally high PBC/condom use self-efficacy, leaving very little room for change. The open-ended responses collected during the condom negotiation portion of the PBC/self-efficacy manipulation may also shed light on the ceiling effects found for PBC/self-efficacy. Participants were asked what they liked and disliked about each video clip, and for the most part provided thoughtful responses for what they liked about the clip, such as "I liked how she seemed to make these tips seem very easy, not stressful and natural to do when applying

them in real life situations." When asked what they disliked about the video clips participants

often responded [that proper use of condoms was]"not a problem of mine" suggesting many

believed they did not need to improve their condom negotiation skills.

While ceiling effects are a possible contributor to the null effects of the PBC/Self-

efficacy intervention, it could also be the online modality of the interventions. Both the Bryan,

Aiken, and West (1996) and the Schmiege et al. (2009) interventions were held in-person, while

this study involved computer-based interventions. In-person interventions allow for impromptu,

guided discussions that may make PBC/self-efficacy changes more relevant and personally

tailored than computer-based interventions that are largely one-size-fits-all. Additionally, as

noted in the introduction, one tenet held by Bandura is that in order to change PBC/self-efficacy

both modeling and *performance* of the behavior are required (Bandura, 1977). Conditions in this

study that included PBC/self-efficacy provided modeling, but due to the online delivery, they

were unable to provide a performance experience.

Our inability to change attitudes in the attitudes only condition and intentions in the

intentions only condition suggests that the manipulations used were not sufficient to change the

targeted constructs. Participants who received an attitudes manipulation were asked the extent to

which they disagreed (*1*) or agreed (*5*) with the cognitive and affective messages presented, and

while the averages for each statement were above the midpoint, cognitive messages were more

strongly endorsed than the affective messages. For example, participants reported a mean of 4.60

(*SD* = .59) strongly agreeing with the statement "regular condom use reduces your risk of

unplanned pregnancy" but reported a mean of 3.62 (*SD* = 1.06) of agreement with the statement

"using condoms during sex can allow you to relax and fully enjoy the experience". A substantial

amount of variability is expressed for the affective attitudes, suggesting perhaps these were not the "correct" affective attitudes to highlight.

In order to manipulate intentions participants were asked to create a goal and then a plan to achieve the goal. While some participants provided thoughtful responses such as a goal to "…refuse to have sex without a condom or before he gets tested," others provided vague goals and action plans such as "Just talk about it!!/ Just talk about it no matter how awkward it is." The required level of specificity needed for implementation intentions to change intentions and subsequently behavior was likely not achieved by with this manipulation (Gollwitzer 1993; 1996; 1999). Again, an in-person manipulation where goals and action plans can be shared and discussed (and made more specific in the case that they are too vague) would likely be more impactful. Interestingly, however, the norms intervention was able to change both of these constructs. This again emphasizes the importance of investigating the relationships between the constructs in the TPB and understanding more about exactly one goes about intervening on the construct to produce change.

The TPB is often criticized for not providing guidance on changing the constructs discussed in the theory (McEachan et al., 2011). However, we tried to optimally target the individual constructs using techniques discussed in both the condom use intervention literature and in individual constructs' literature. For example, the attitudes component of the interventions was guided primarily by Conner et al. (2011) in which they presented participants with cognitive and affective attitudes to change exercise behavior. The normative beliefs component of the interventions was largely directed by Sherman et al.'s (2007) work to make group membership salient for participants. Nevertheless, it is possible that the very small changes that were achieved across constructs were due to weak or ineffective operationalizations of the intervention content.

The mediational models support prior work suggesting theory-based interventions are superior to non-theory based intervention, but which combination of the constructs is optimal in changing behavior is still unknown. Meta-analytic work (Sheeran et al., in prep) suggesting that changing two constructs at a time were more successful at creating health-related behavior change than an intervention that changed just attitudes or just norms indicates a need for future research to compare pairs of the constructs in the TPB. Future work should examine the effectiveness of the full set of two construct interventions possible in the TPB (e.g., attitudes/norms, PBC/intentions) to provide further evidence about the optimally effective combination of constructs that should be targeted in order to create behavior change.

Results of this study speak to a larger and potentially more important concern in health behavior theory research—current recommendations for the development of theory-based interventions to change behavior suggest that each construct of a particular theory ought to be targeted in an intervention (Peters et al., 2013; Williams, Freedman, & Deci, 1998). Although this study sought to answer this question, it remains largely unanswered. Individually the TPB constructs had somewhat diffuse effects and it is clear that targeting one construct in an intervention did not successfully change all of the constructs or behavior. It is unclear which combination of constructs is needed to produce the optimal amount of behavior change.

Implications for the Future

While we know that theory-based interventions are superior to those not guided by theory (Glanz & Bishop, 2010; Noar, 2008), there is still a tremendous amount to be learned about the optimal theory or the optimal combination of constructs from across theories that will most strongly influence behavior change.

This study addressed one important question regarding behavior *change* theory: many of the constructs manipulated here are conceptually and empirically interconnected. In at least some cases, addressing one construct (e.g., norms) influenced others (e.g., attitudes) even when the construct itself was unchanged. One of the questions at issue in this dissertation was whether it might be possible to change all of the TPB constructs by intervening on only one. The results of this study do not support this hypothesis. Perhaps the changes in constructs not targeted in an intervention suggest necessary integration of information, which is provided more explicitly when targeting other TPB constructs, to produce behavior change. For example, attitudes were changed in the PBC/self-efficacy only condition. A participant could have reviewed the steps to correctly apply a condom, realize they already know how to properly apply a condom, and subsequently form more positive attitudes about condom use. This finding supports Bandura's claim (1989) that attitudes are controlled by PBC/self-efficacy. The field, though, has a long way to go to understand the mechanisms of change that drive these cross-construct changes.

Limitations

Individuals in a serious committed relationship comprised nearly 40% of the study sample. Research has indicated that the predictors of condom use are dramatically different in casual versus serious relationships (c.f., Reid & Aiken, 2011) and that condom use is extremely difficult to change among those in established long-term relationships. Couples in serious relationships often switch to hormonal birth control as their main form of pregnancy prevention (Bauman, Karasz, & Hamilton, 2007) and concern about STD/HIV is reduced in the context of a monogamous relationship with an uninfected partner. This may have made the intervention inappropriate for a large portion of the study sample. A stronger test of my hypotheses would therefore have been to conduct the work exclusively in single individuals as opposed to including

those in relationships.

Another limitation of this study was that assessment methods relied on self-report measures; this limitation is shared with much safer-sex intervention research. Finally, perhaps the largest limitation was the possible ceiling effect of condom use PBC/self-efficacy making it practically impossible to improve PBC/self-efficacy within this sample. It is difficult to examine the relative contributions of PBC/self-efficacy to behavior change with so little room to change and so little variability among participants.

Conclusions

Interventions require a substantial amount of time and money, so it is incredibly important that theories guiding intervention development be accurate regarding the production of behavior change. Meta-analytic work has shown that interventions that focus on only one construct versus two constructs at a time produce larger effects on behavior change (Sheeran et al., in prep). A major difference between the design of this study and the meta-analytic findings was the comparison of some two construct versus one construct interventions and may account for differences in findings. The next step in behavior change work may focus on examining every potential pairing of two constructs of the TPB constructs in order to elucidate the best combination of constructs in the TPB.

For both theory and intervention development, a comprehensive and nuanced understanding of the relationships between attitudes, norms, PBC/self-efficacy, and intentions in affecting behavioral change is required. Researchers have the tools to elucidate these relationships via the development and testing of focused intervention content and implementing these novel interventions in experimental designs. A better understanding of the

interconnectedness, causal ordering, necessity, and sufficiency of each of these constructs has the potential to alter the way health behavior change is accomplished.

References

Adefuye, A. S., Abiona, T. C., Balogun, J. A., & Lukobo-Durrell, M. (2009). HIV sexual risk behaviors and perception of risk among college students: implications for planning interventions. *BMC Public Health, 9*, 281-294.

Aiken, L. S. (2010). Advancing health behavior theory: the interplay among theories of health behavior, empirical modeling of health behavior, and behavioral interventions. In Howard Friedman (Ed.), *Oxford Handbook of Health Psychology* (1-39).

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179-211.

Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology*, *52*(1), 27-58.

Ajzen, I., Czasch, C., & Flood, M. G. (2009). From Intentions to Behavior: Implementation Intention, Commitment, and Conscientiousness1. *Journal of Applied Social Psychology*, *39*(6), 1356-1372.

Ajzen, I. F., & Fishbein, M. M. (1980). Understanding attitudes and predicting social behavior. *Eaglewood Cliffs*.

Ajzen, I., & Fishbein, M. (2000). Attitudes and the attitude-behavior relation: reasoned and automatic processes. *European Review of Social Psychology*, *11*(1), 1-33.

Ajzen, I., & Madden, T. J. (1986). Prediction of goal-directed behavior: Attitudes, intentions, and

   perceived behavioral control. *Journal of Experimental Social Psychology*, *22*(5), 453–474.

   doi:10.1016/0022-1031(86)90045-4

Albarracín, D., Johnson, B. T., Fishbein, M., & Muellerleile, P. A. (2001). Theories of reasoned

   action and planned behavior as models of condom use: A meta-analysis. *Psychological

   Bulletin*, *127*(1), 142–161. doi:10.1037//0033-2909.127.1.142

Asch, S. E. (1956). Studies of independence and conformity: I. A minority of one against a

   unanimous majority. *Psychological Monographs: General and Applied*, *70*(9), 1-70.

Armitage, C. J., & Conner, M. (1999). Distinguishing perceptions of control from self-efficacy:

   predicting consumption of a low-fat diet using the theory of planned behavior. *Journal of

   Applied Social Psychology, 29*, 72-90.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: a meta-

   analytic review. *The British Journal of Social Psychology*, *40*, 471–499. Retrieved from

   http://www.ncbi.nlm.nih.gov/pubmed/11795063

Baele, J., Dusseldorp, E., & Maes, S. (2001). Condom use self-efficacy: Effect on intended and

   actual condom use in adolescents. *Journal of Adolescent Health*, *28*(5), 421-431.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological

   Review*, *84*(2), 191.

Bandura, A. (1989). Human agency in social cognitive theory. *The American Psychologist*,

   44(9), 1175–1184. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/2782727

Bauman, L. J., Karasz, A., & Hamilton, A. (2007). Understanding Failure of Condom Use Intention Among Adolescents Completing an Intensive Preventive Intervention. *Journal of Adolescent Research*, *22*(3), 248-274.

Borsari, B., & Carey, K. B. (2003). Descriptive and injunctive norms in college drinking: a meta-analytic integration. *Journal of Study on Alcohol*, *64*(3), 331–341.

Borsari, B., & Carey, K. B. (2001). Peer influences on college drinking : A review of the research. *Journal of Substance Abuse*, *13*, 391–424.

Breckler, S. J., & Wiggins, E. C. (1989). Affect versus evaluation in the structure of attitudes. *Journal of Experimental Social Psychology*, *25*(3), 253-271.

Brien, T. M. & Thombs, D. L. (1994). Dimensions of self-efficacy among three distinct groups of condom users. *Journal of American College Health, 42*.

Bryan, A. D., Aiken, L. S., & West, S. G. (1996). Increasing condom use: evaluations of a theory-based intervention to prevent sexually transmitted diseases in young women. *Health Psychology, 15*, 371-382.

Bryan, A. D., Fisher, J. D., & Fisher, W. A. (2002) Tests of the mediational role of preparatory safer sexual behavior in the context of the theory of planned behavior. *Health Psychology, 21*, 71-80.

Bryan, A., Schmiege, S. J., & Broaddus, M. R. (2007). Mediational analysis in HIV/AIDS research: estimating multivariate path analytic models in a structural equation modeling framework. *AIDS and Behavior*, *11*(3), 365-383.

Casey, M. K., Timmermann, L., Allen, M., Krahn, S., & Turkiewicz, K. L. (2009). Response and self-efficacy of condom use: a meta-analysis of this important element of AIDS education and prevention. *Southern Communication Journal*, *74*(1), 57–78. doi:10.1080/10417940802335953

CDC. (2012). *STDs in adolescents and young adults.* Retried from

http://www.cdc.gov/std/stats11/adol.htm

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, *58*(6), 1015–1026. doi:10.1037//0022-3514.58.6.1015

Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: a review and avenues for further research. *Journal of Applied Social Psychology*, *28*(15), 1429–1464. doi:10.1111/j.1559-1816.1998.tb01685.x

Conner, M., & Graham, S. (1993). Situational and attitudinal influences upon students' intentions to use condoms. In Schroeder, H., Reschke, K., Johnston, M., &Maes, S. (Eds.), *Health Psychology: Potential in Diversity* (91-100). S. Roderer, Regensburg.

Conner, M., Rhodes, R. E., Morris, B., McEachan, R., & Lawton, R. (2011). Changing exercise through targeting affective or cognitive attitudes. *Psychology and Health*, *26*(2), 133-149.

Darley, J. M., & Latane, B. (1968). Bystander intervention in emergencies: diffusion of responsibility. *Journal of Personality and Social Psychology*, *8*, 377.

De Ridder, D. T., & de Wit, J. B. (2006). Self-regulation in health behavior: Concepts, theories, and central issues. *Self-regulation in Health Behavior*, 1-23.

Dombrowski, S. U., Sniehotta, F. F., Avenell, A., & Coyne, J. C. (2007). Towards a cumulative science of behaviour change: do current conduct and reporting of behavioural interventions fall short of best practice. *Psychology & Health*, *22*, 869-874.

Dzewaltowski, D. A., Noble, J. M., & Shaw, J. M. (1990). Physical activity participation: Social cognitive theory versus the theories of reasoned action and planned behavior. *Journal of Sport & Exercise Psychology*, *12*(4).

French, S. E., & Holland, K. J. (2013). Condom negotiation strategies as a mediator of the relationship between self-efficacy and condom use. *Journal of Sex Research*, *50*(1), 48-59.

Fishbein, M. (1963). An investigation of the relationship between beliefs about an object and the attitude toward that object. *Human Relations*.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: an introduction to theory and research*. Reading, MA: Addison-Wesley.

French, D. P., Sutton, S., Hennings, S. J., Mitchell, J., Wareham, N. J., Griffin, S., Hardeman, W., & Kinmonth, A. L. (2005). The importance of affective beliefs and attitudes in the theory of planned behavior: predicting intention to increase physical activity1. *Journal of Applied Social Psychology*, *35*(9), 1824-1848.

Gagnon, M. P., & Godin, G. (2000). Young adults and HIV vaccine: determinants of the intention of getting immunized. *Canadian Journal of Public Health*, *91*(6), 432.

Garcia, K., & Mann, T. (2003). From "I Wish" to "I Will": social-cognitive predictors of behavioral intentions. *Journal of Health Psychology*, *8*(3), 347–360. doi:10.1177/13591053030083005

Glanz, K., & Bishop, D. B. (2010). The role of behavioral science theory in the development and implementation of public health interventions. *Annual Review of Public Health, 31*, 399-418.

Glanz, K., & Maddock, J. (2000). On judging models and theories: research and practice, psychology and public health. *Journal of Health Psychology*, *5*(2), 151–154. doi:10.1177/135910530000500203

Godin, G., & Kok, G. (1996). The theory of planned behavior: a review of its applications to health-related behaviors. *American Journal of Health Promotion, 11*, 87-98.

Gollwitzer, P. M. (1993). Goal achievement: the role of intentions. In W. Stroebe & M. Hewstone (Eds.), *European review of social psychology* (41-185).

Gollwitzer, P. M. (1996). The volitional benefits of planning. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (287-312).

Gollwitzer, P. M. (1999). Implementation intentions: strong effects of simple plans. *American Psychologist*, *54*, 493-503.

Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A

    meta-analysis of effects and processes. *Advances in Experimental Social Psychology*, *38*,

    69-119.

Hofmann W, De Houwer J, Perugini M, Baeyens F, Crombez G. 2010. Evaluative conditioning

    in humans:a meta-analysis. *Psychological Bulletin, 136*, 390–421

Jemmott, J. B., Jemmott, L. S., & Fong, G. T. (2010). Efficacy of a theory-based abstinence-only

    intervention over 24 months: a randomized controlled trial with young

    adolescents. *Archives of Pediatrics & Adolescent Medicine,164*(2), 152-159.

Joffe, A., & Radius, S. M. (1993). Self-efficacy and intent to use condoms among entering

    college freshmen. *Journal of Adolescent Health*, *14*(4), 262-268.

Kiene, S. M., & Barta, W. D. (2006). A brief individualized computer-delivered sexual risk

    reduction intervention increases HIV/AIDS preventive behavior. *Journal of Adolescent*

    Health, 39, 404-410.

Kirby, D., & Laris, B. A. (2009). Effective Curriculum-Based Sex and STD/HIV Education

    Programs for Adolescents. *Child Development Perspectives*, *3*(1), 21-29.

Krebs, D. L., & Miller, D. T. (1985). Altruism and aggression. *The Handbook of Social*

    Psychology, *2*, 1-71.

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1999). International affective picture system

    (IAPS): Instruction manual and affective ratings. *The Center for Research in*

    psychophysiology, University of Florida.

Lawton, R., Conner, M., & McEachan, R. (2009). Desire or reason: predicting health behaviors from affective and cognitive attitudes. *Health Psychology*, *28*(1), 56.

Lowery, B. S., Hardin, C. D., & Sinclair, S. (2001). Social influence effects on automatic racial prejudice. *Journal of Personality and Social Psychology*, *81*(5), 842–55. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11708561

McClelland, G. H., & Judd, C. M. (1993). Statistical difficulties of detecting interactions and moderator effects. *Psychological Bulletin*, *114*(2), 376.

McEachan, R. R. C., Conner, M., Taylor, N. J., & Lawton, R. J. (2011). Prospective prediction of health-related behaviours with the theory of planned behaviour: A meta-analysis. *Health Psychology Review*, *5*(2), 97-144.

Michie, S., Ashford, S., Sniehotta, F. F., Dombrowski, S. U., Bishop, A., & French, D. P. (2011). A refined taxonomy of behaviour change techniques to help people change their physical activity and healthy eating behaviours: the CALO-RE taxonomy. *Psychology & Health*, *26*(11), 1479-1498.

Michie, S., & Johnston, M. (2012). Theories and techniques of behaviour change: Developing a cumulative science of behaviour change. *Health Psychology Review*, *6*(1), 1-6.

Milgram, S. (1964). Group pressure and action against a person. *The Journal of Abnormal and Social Psychology*, *69*(2), 137.

Montanaro, E. A., & Bryan, A. D. (2013). Comparing theory-based condom interventions: health belief model versus theory of planned behavior. *Health Psychology*.

Neighbors, C., Larimer, M. E., & Lewis, M. A. (2004). Targeting misperceptions of descriptive

   drinking norms: efficacy of a computer-delivered personalized normative feedback

   intervention. *Journal of Consulting and Clinical Psychology*, *72*(3), 434–47.

   doi:10.1037/0022-006X.72.3.434

Noar, S. M., Black, H. G., & Pierce, L. B. (2009). Efficacy of computer technology-based HIV

   prevention interventions: a meta-analysis. *AIDS, 23*, 107-115.

Noar, S. M. (2008). Behavioral interventions to reduce HIV-related sexual risk behavior: review

   and synthesis of meta-analytic evidence. *AIDS Behavior, 12*, 335-353.

Noar, S. M., & Zimmerman, R. S. (2005). Health behavior theory and cumulative knowledge

   regarding health behaviors: are we moving in the right direction? *Health Education

   Research*, *20*(3), 275–290. doi:10.1093/her/cyg113

Peters, E., Klein, W., Kaufman, A., Meilleur, L., & Dixon, A. (2013). More is not always better:

   intuitions about effective public policy can lead to unintended consequences. *Social Issues

   and Policy Review*, *7*(1), 114–148. doi:10.1111/j.1751-2409.2012.01045.x

Reducing the risk. (2014) Retrieved April 14, 2014, from

   http://advocatesforyouth.org/publications/1127

Reid, A. E., & Aiken, L. S. (2011). Integration of five health behaviour models: Common

   strengths and unique contributions to understanding condom use. *Psychology &

   Health*, *26*(11), 1499-1520.

Reno, R. R., Cialdini, R. B., & Kallgren, C. A. (1993). The transsituational influence of social

    norms. *Journal of Personality and Social Psychology*, *64*(1), 104–112. doi:10.1037//0022-

    3514.64.1.104

Rivis, A., & Sheeran, P. (2003a). Social influences and the theory of planned behaviour:

    evidence for a direct relationship between prototypes and young people's exercise

    behaviour. *Psychology & Health*, *18*(5), 567–583. doi:10.1080/0887044032000069883

Rivis, A., & Sheeran, P. (2003b). Descriptive norms as an additional predictor in the theory of

    planned. *Current Psychology: Developmental, Learning, Personality, Social*, *22*(3), 218–

    233.

Schafer, J. L., & Graham, J. W. (2002). Missing data: our view of the state of the

    art. *Psychological Methods*, *7*(2), 147.

Schmiege, S. J., Broaddus, M. R., Levin, M., & Bryan, A. D. (2009). Randomized trial of group

    interventions to reduce HIV / STD risk and change theoretical mediators among detained

    adolescents. *Journal of Consulting and Clinical Psychology*, *77*(1), 38–50.

    doi:10.1037/a0014513

Sheeran, P. (2002). Intention—behavior relations: A conceptual and empirical review. *European

    Review of Social Psychology*, *12*(1), 1-36.

Sheeran, P., Maki, A., Montanaro, E. A., Rothman, A. J., Bryan, A. D. (In Prep). The effect of

    changing attitudes, norms, or self-efficacy on health intentions and behavior: a meta-

    analysis.

Sheeran, P., & Orbell, S. (1999). Augmenting the theory of planned behavior: roles for anticipated regret and descriptive norms. *Journal of Applied Social Psychology*, *29*(10), 2107–2142.

Sherman, D. K., Kinias, Z., Major, B., Kim, H. S., & Prenovost, M. (2007). The group as a resource: Reducing biased attributions for group success and failure via group affirmation. *Personality and Social Psychology Bulletin*, *33*(8), 1100-1112.

Stangor, C., Sechrist, G. B., & Jost, J. T. (2001). Changing racial beliefs by providing consensus information. *Personality and Social Psychology Bulletin*, *27*(4), 486–496. doi:10.1177/0146167201274009

Sutton, S. (1998). Predicting and explaining intentions and behavior: How well are we doing? *Journal of Applied Social Psychology*, *28*(15), 1317-1338.

Sutton, S. (2004). Determinants of Health-Related Behaviours: Theoretical and Methodological Issues. *The Sage Handbook of Health Psychology. London: Sage*, (94–126).

Terry, D. J., Hogg, M. A., & McKimmie, B. M. (2000). Attitude-behaviour relations: the role of in-group norms and mode of behavioural decision-making. *British Journal of Social Psychology*, *39*(3), 337-361.

Trafimow, D., & Finlay, K. A. (1996). The importance of subjective norms for a minority of people: between subjects and within-subjects analyses. *Personality and Social Psychology Bulletin*, *22*(8), 820-828.

Trafimow, D., & Sheeran, P. (1998). Some tests of the distinction between cognitive and

    affective beliefs. *Journal of Experimental Social Psychology*, *34*(4), 378-397.

Triandis, H. C. (1977). *Interpersonal Behavior*. Monterey, CA: Brooks/Cole Publishing

    Company.

Webb, T. L., & Sheeran, P. (2004). Identifying good opportunities to act: Implementation

    intentions and cue discrimination. *European Journal of Social Psychology*, *34*(4), 407-419.

Webb, T. L., & Sheeran, P. (2006). Does changing behavioral intentions engender behavior

    change? A meta-analysis of the experimental evidence. *Psychological Bulletin*, *132*(2),

    249–268. doi:10.1037/0033-2909.132.2.249

West, S. G., Aiken, L. S., & Todd, M. (1993). Probing the effects of individual components in

    prevention programs. *American Journal of Community Psychology, 21*, 571-605.

Williams, G. C., Freedman, Z. R., & Deci, E. L. (1998). Supporting autonomy to motivate

    patients with diabetes for glucose control. *Diabetes Care*, *21*(10), 1644-1651.

Table 1.

Constructs Targeted in Each Intervention Condition

Intervention	Constructs Targeted
Intervention 1	Attitudes Only
Intervention 2	Norms Only
Intervention 3	PBC/Self-Efficacy Only
Intervention 4	Intentions Only
Intervention 5	Attitudes + Norms + PBC/Self-Efficacy
Intervention 6	Attitudes + Norms + PBC/Self-Efficacy + Intentions
Intervention 7	Control

Table 2

Demographic and Sexual History Characteristics

Characteristic	M							Test Statistic
	Attitudes Only	Norms Only	PBC/Self-Efficacy Only	Intentions Only	Att + Norms + PBC/SE	Att + Norms + PBC/SE + Intentions	Control	
N	41	48	42	40	34	41	40	
Gender (% Female)	56.1	58.3	54.8	55.0	32.4	72.4	55.0	$\chi^2(6, N = 285) = 12.23$, *n.s.*
Age	19.55 (1.47)	19.00 (.97)	19.33 (1.46)	19.48 (1.52)	19.24 (1.16)	19.15 (1.08)	19.13 (1.09)	$F(6,285) = 1.02$, *n.s.*
% Caucasian	68.3	70.8	73.8	82.5	73.5	73.2	72.5	$\chi^2(30, N = 285) = 28.35$, *n.s.*
% Freshman	63.4	62.5	59.5	47.5	61.8	46.3	57.5	$\chi^2(6, N = 285) = 12.23$, *n.s.*
% Heterosexual	97.4	97.9	95.2	92.3	97.1	97.5	90.0	$\chi^2(12, N = 285) = 8.77$, *n.s.*
% in Relationship	38.5	27.7	31.0	45.0	23.6	32.5	43.6	$\chi^2(6, N = 285) = 6.74$, *n.s.*
% Had Sex	75.0	87.5	90.5	82.5	79.4	87.5	80.0	$\chi^2(6, N = 285) = 5.39$, *n.s.*
Age at First Sex	16.19 (3.44)	16.60 (1.62)	16.78 (1.32)	16.64 (1.58)	16.22 (1.19)	17.09 (1.25)	16.74 (1.53)	$F(6,285) = .948$, *n.s.*
# of Lifetime Partners	5.45 (7.30)	4.67 (4.18)	4.83 (4.41)	5.08 (7.74)	6.16 (7.93)	4.68 (5.47)	4.68 (4.89)	$F(6,285) = .286$, *n.s.*
% Used Condoms 100% of the Time	17.6	32.6	25.6	20.6	32.3	25.7	29.4	$\chi^2(60, N = 285) = 61.69$, *n.s.*

Note. Standard deviations are in parentheses.

Table 3

Pretest and Posttest Means on Program Components, Test for Program Effects on Mediators

Construct	Cell Mean and SD by Condition								
	ATT Only	Norms Only	PBC/SE Only	INT Only	Att + Norms + PBC/SE	Att + Norms + PBC/SE + INT	Control	Effect of Time (*F*-tests)	Condition by Time (*F*-test)
Attitudes[a]								114.8***	2.149*
Pretest	5.62 (1.16)	5.16 (1.18)	4.81 (1.22)	4.54 (1.62)	5.47 (1.07)	5.23 (1.33)	5.25 (1.39)		
Posttest	5.73 (1.20)	5.71 (1.13)	5.29 (1.39)	4.91 (1.59)	5.92 (1.23)	5.71 (1.27)	5.82 (1.32)		
Simple Effects of Time (*F*-test)	1.33	32.44***	13.51***	12.81***	12.72***	34.02***	23.95***		
Norms[a]								2.67	.85
Pretest	5.78 (1.08)	5.36 (1.01)	5.25 (1.07)	5.24 (1.15)	5.85 (.88)	5.68 (.98)	5.48 (1.02)		
Posttest	5.99 (1.09)	5.53 (.99)	5.27 (1.07)	5.12 (1.13)	5.81 (1.09)	5.68 (1.06)	5.59 (.91)		
Difference Score	.55 (.63)	.19 (.66)	.11 (.48)	.424(.98)	.06 (.77)	.042 (.72)	.070 (.36)		
PBC/Self-Efficacy[b]								1.13	1.345
Pretest	4.37 (.58)	4.35 (.52)	4.18 (.56)	4.31 (.66)	4.34 (.54)	4.24 (.51)	4.18 (.59)		
Posttest	4.41 (.60)	4.14 (.57)	4.27 (.62)	4.24 (.67)	4.41 (.55)	4.24 (.60)	4.19 (.61)		
Intentions[a]								31.65***	3.4**
Pretest	4.11 (1.81)	4.26 (1.62)	3.85 (1.84)	3.39 (1.88)	4.96 (1.55)	4.16 (1.59)	4.50 (2.02)		
Posttest	4.13 (1.96)	4.66 (1.82)	4.48 (1.90)	3.65 (1.95)	5.25 (1.58)	5.00 (1.35)	4.53 (2.12)		
Simple Effects of Time (*F*-test)	.09	9.14**	12.81***	1.93	.98	28.59***	.23		
Condom Use								5.89*	.58
Baseline	3.25 (4.50)	4.73 (4.20)	3.20 (4.34)	2.38 (4.10)	0.00 (0.00)	6.14 (4.71)	3.71 (4.65)		
Three Month Follow-Up	2.88 (1.46)	2.67 (1.54)	2.20 (1.55)	1.75 (1.17)	2.50 (.71)	4.14 (1.57)	1.86 (1.57)		
Risky Sex								6.65*	.72
Baseline	7.87 (14.75)	7.96 (11.88)	10.66 (14.56)	11.88 (15.53)	5.62 (10.90)	6.58 (9.72)	5.59 (9.96)		
Three Month Follow-Up	9.50 (5.02)	9.60 (6.36)	12.92 (11.03)	13.55 (10.10)	13.00 (7.00)	6.00 (6.21)	13.90 (11.80)		

Note. ATT Only = Attitudes only condition. Norms Only = Norms only condition. PBC/SE Only = PBC/self-efficacy only condition. INT Only = Intentions only condition. Att + Norms + PBC/SE = Attitudes + norms + PBC/self-efficacy condition. Att + Norms + PBC/SE + INT = Attitudes + norms + PBC/self-efficacy + intentions condition. Control = Control condition. Risky sexual behavior was calculated using how frequently a participant had sex in the past 3 months X how often they used a condom when having sex during those 3 months (reverse coded). a. Scored on a 1-7 scale, with higher scores representing higher levels of the construct, b. Scored on a 1-5 scale, with higher scores representing higher levels of the construct; ***p <.001, two-tailed,**p < .01, two-tailed.,* p < .05, two-tailed.

Table 4

Intercorrelation Matrix

	1	2	3	4	5	6
1. Condom Attitudes	__					
2. Subjective Norms	.548***	__				
3. PBC/Self-Efficacy	.177***	.254***	__			
4. Intentions	.479***	.433***	.236***	__		
5. Risky Sex	.584***	.521***	.010	-.499***	__	
6. Past 90 Day Condom Use	.429**	.417**	.142*	.579**	-.536**	__
Mean	5.14	5.50	4.26	4.16	8.09	4.47
sd	1.32	1.05	.57	1.80	12.75	4.502

Note. *** p<.001, two-tailed.** p < .01, two-tailed. * p < .05, two-tailed

Table 5. *Pretest and Posttest Means by Contrast*

Contrast	Cell Mean and SD by Contrast									
	Attitudes		Norms		PBC/Self-Efficacy		Intentions		Risky Sexual Behavior	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
Theory-Based Interventions	5.12 (1.31)	5.53 (1.34)	5.51 (1.05)	5.55 (1.10)	4.28 (.56)	4.27 (.61)	4.10 (1.76)	4.50 (1.84)	8.50 (13.13)	10.68 (8.19)
Control	5.25 (1.39)	5.82 (1.32)	5.48 (1.02)	5.59 (.91)	4.18 (.59)	4.19 (.61)	4.50 (2.02)	4.53 (2.12)	5.59 (9.96)	13.90 (11.80)
Single Construct Conditions	5.02 (1.35)	5.42 (1.37)	5.40 (1.09)	5.47 (1.10)	4.28 (.58)	4.26 (.62)	3.91 (1.80)	4.25 (1.92)	9.56 (14.14)	11.31 (8.40)
Multiple Construct Conditions	5.34 (1.21)	5.81 (1.24)	5.76 (.93)	5.74 (1.06)	4.28 (.52)	4.32 (.58)	4.52 (1.61)	5.12 (1.46)	6.14 (10.22)	7.91 (6.89)
Three Construct Condition	5.47 (1.07)	5.92 (1.23)	5.85 (.88)	5.81 (1.09)	4.34 (.54)	4.41 (.55)	4.96 (1.55)	5.25 (1.58)	5.62 (10.90)	13.00 (7.00)
Four Construct Condition	5.23 (1.33)	5.71 (1.27)	5.68 (.98)	5.68 (1.06)	4.24 (.51)	4.24 (.60)	4.16 (1.59)	5.00 (1.35)	6.58 (9.72)	6.00 (6.21)

Note. Single Construct Conditions = attitudes only, norms only, PBC/self-efficacy only, and intentions only conditions. Multiple Construct Conditions = attitudes + norms + PBC/self-efficacy condition & attitudes + norms + PBC/self-efficacy + intentions condition. Three Construct Condition = attitudes + norms + PBC/self-efficacy condition. Four Construct Condition = attitudes + norms + PBC/self-efficacy + intentions condition Risky sex behavior was calculated using how frequently a participant had sex in the past 3 months X how often they used a condom when having sex during those 3 months (reverse coded). Condom use was not included because it was not examined as an outcome in the mediational models.
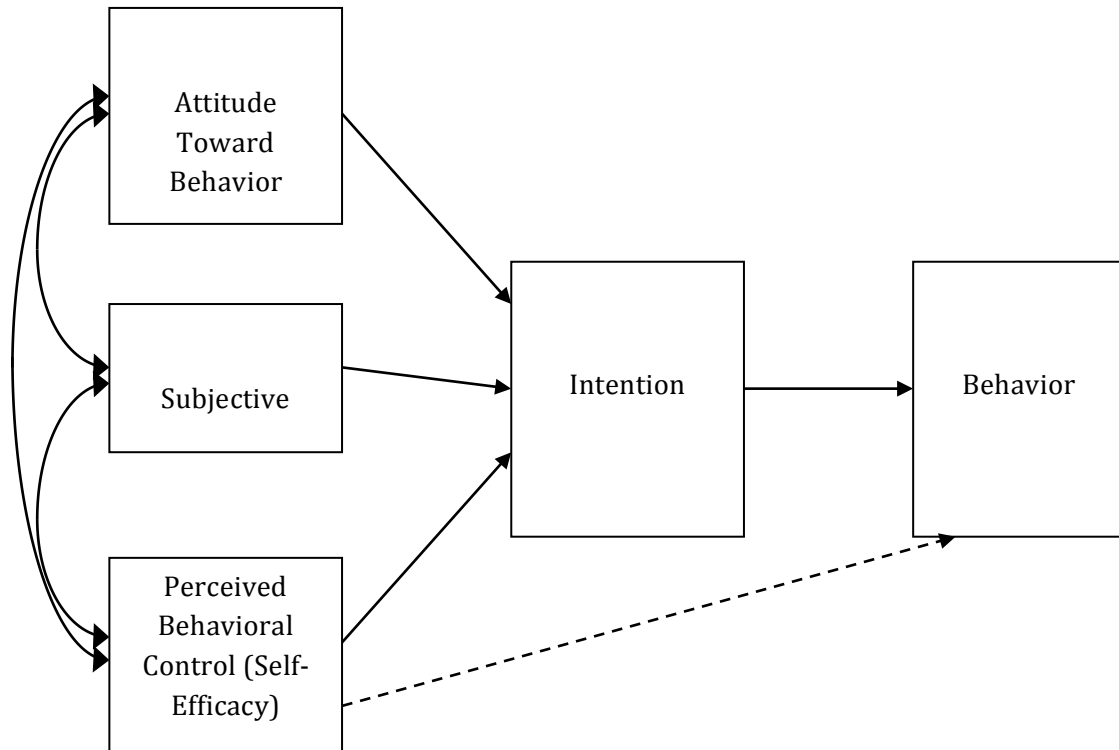
Figure 1. The Theory of Planned Behavior
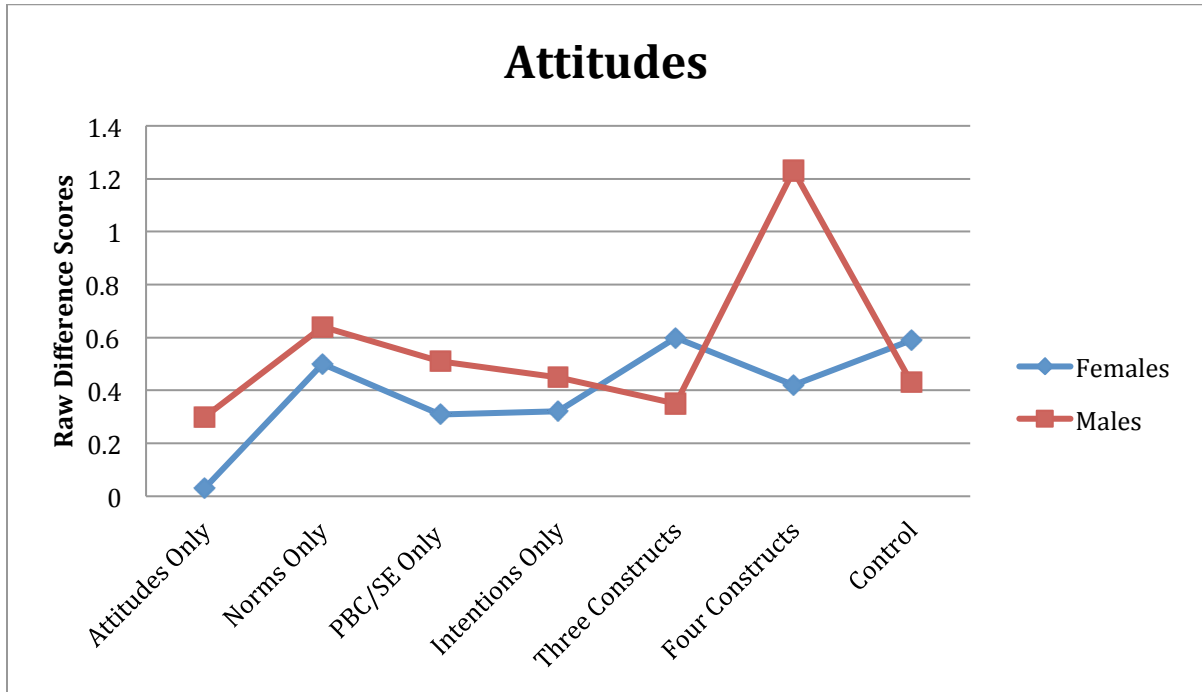
Figure 2. Gender X Condition X Time for attitudes toward condom use.
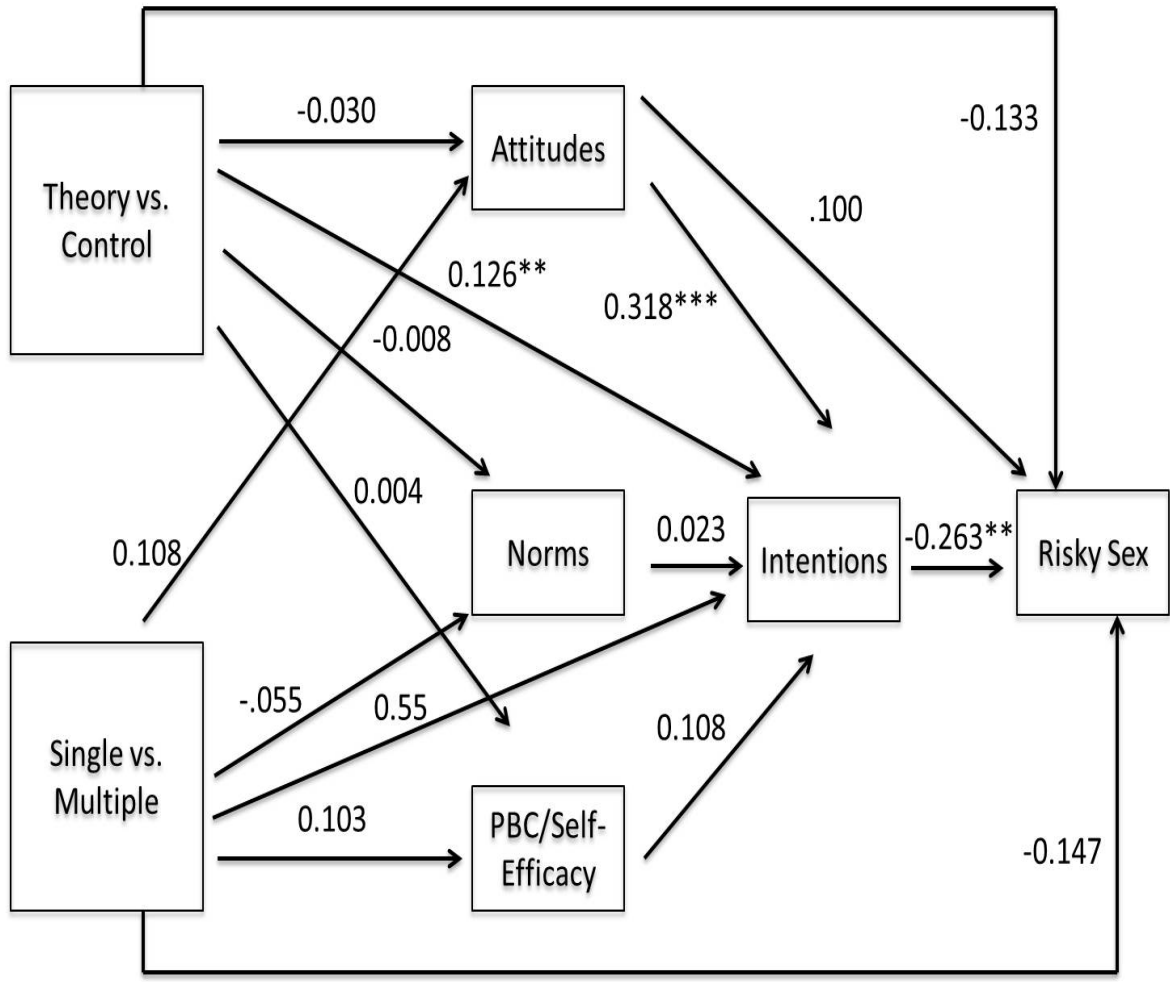
χ^2(2, N=287)=.84, p=0.83; CFI=0.933; RMSEA,0.072(CI 90% 0.000-0.154)

Figure 3. Coefficients are standardized path coefficients. *Note.* The contrast was coded as such: Theory vs. Control: Control = -1, Single = 1/2 and Multiple = 1/2. Single vs. Multiple: Control = 0, Single = -1 and Multiple = 1. *$p<.05$, two-tailed. **$p<.01$, two-tailed. ***$p<.001$, two-tailed.

-0.194

Attitudes

0.076

0.158**

0.307***

0.099

Intervention
Type

-0.053

Norms

0.031

Intentions

-0.258**

Risky Sex

0.062

PBC/Self-
Efficacy

0.102
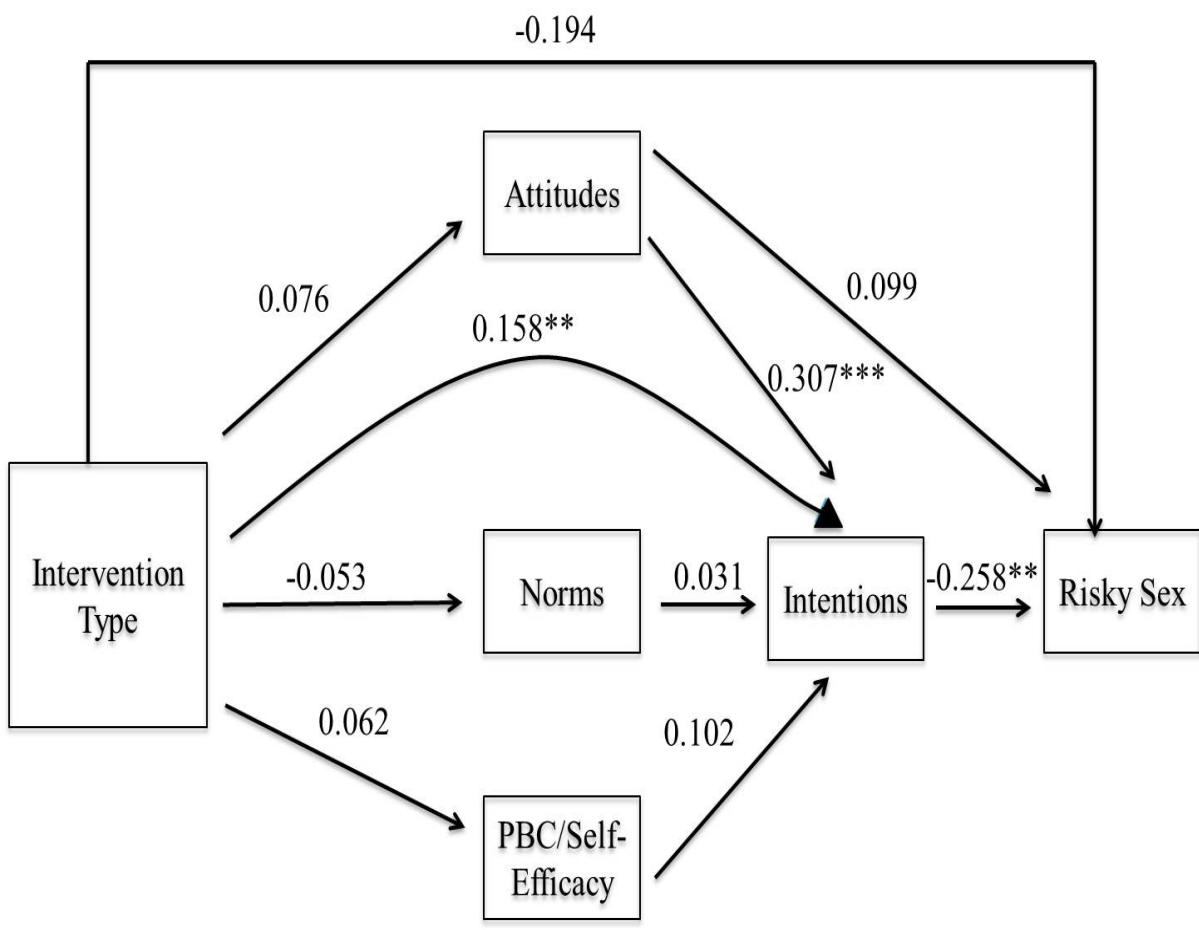
χ^2(2, N=287)=.323,p=0.85, CFI=0.932, RMSEA=0.035 (CI 90% 0.000-0.150)

Figure 4. Coefficients are standardized path coefficients. *Note.* The contrast was coded as such: Control = 0, Single Construct = 1, Three Constructs = 2, and Four Constructs = 4. *p*<.05, two-tailed. **p*<.01, two-tailed. ***p*<.001, two-tailed.
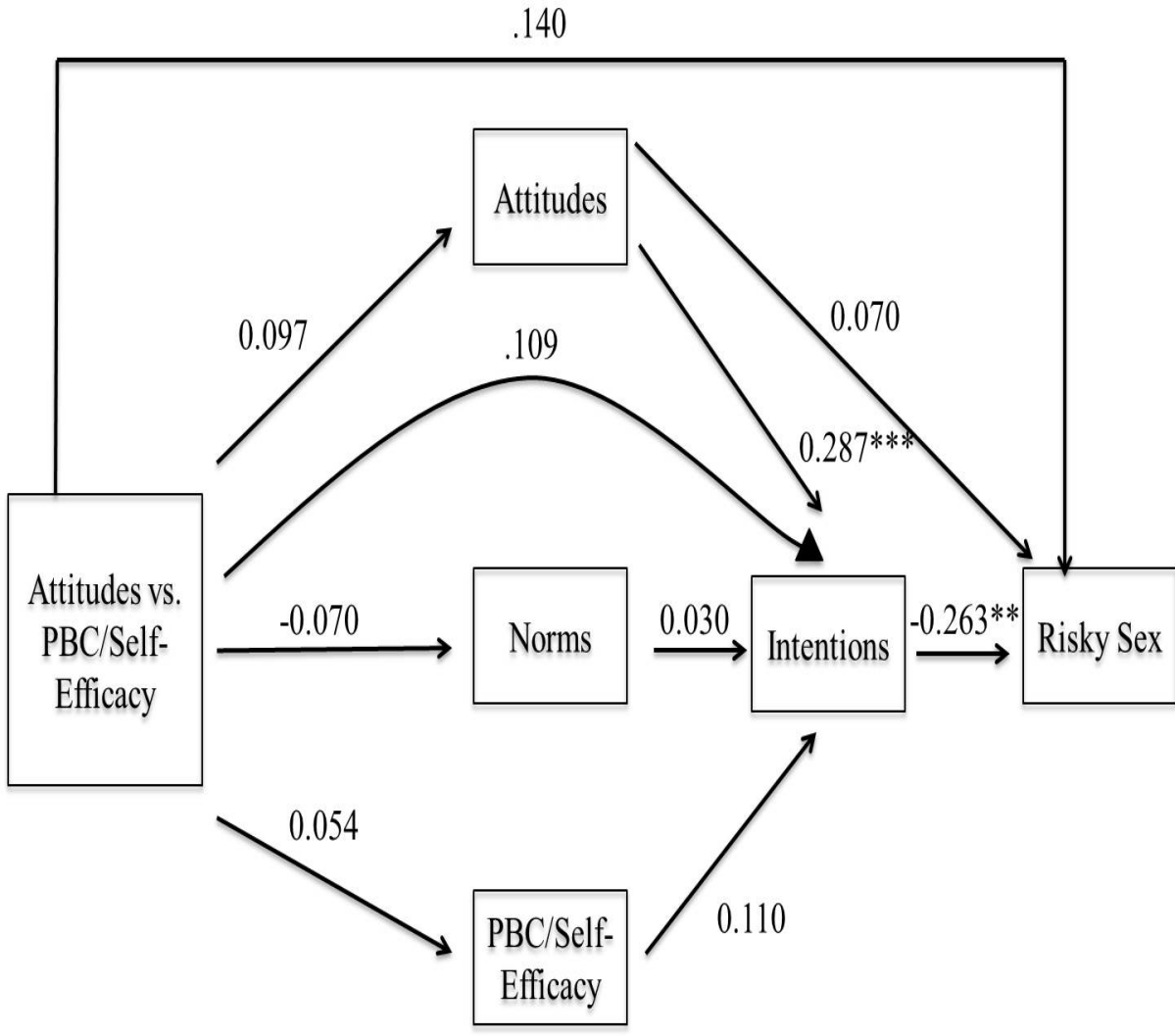
χ^2(17, N=287)=10.93,p=.86, CFI=0.969, RMSEA=0.042 (CI 90% 0.000-0.074)

Figure 5. A full set of orthogonal contrasts were used to estimate the model. Coefficients are standardized path coefficients. *Note.* The contrast was coded as such: Attitudes = -1 and PBC/Self-Efficacy = 1. *p<.05, two-tailed. **p<.01, two-tailed. ***p<.001, two-tailed.
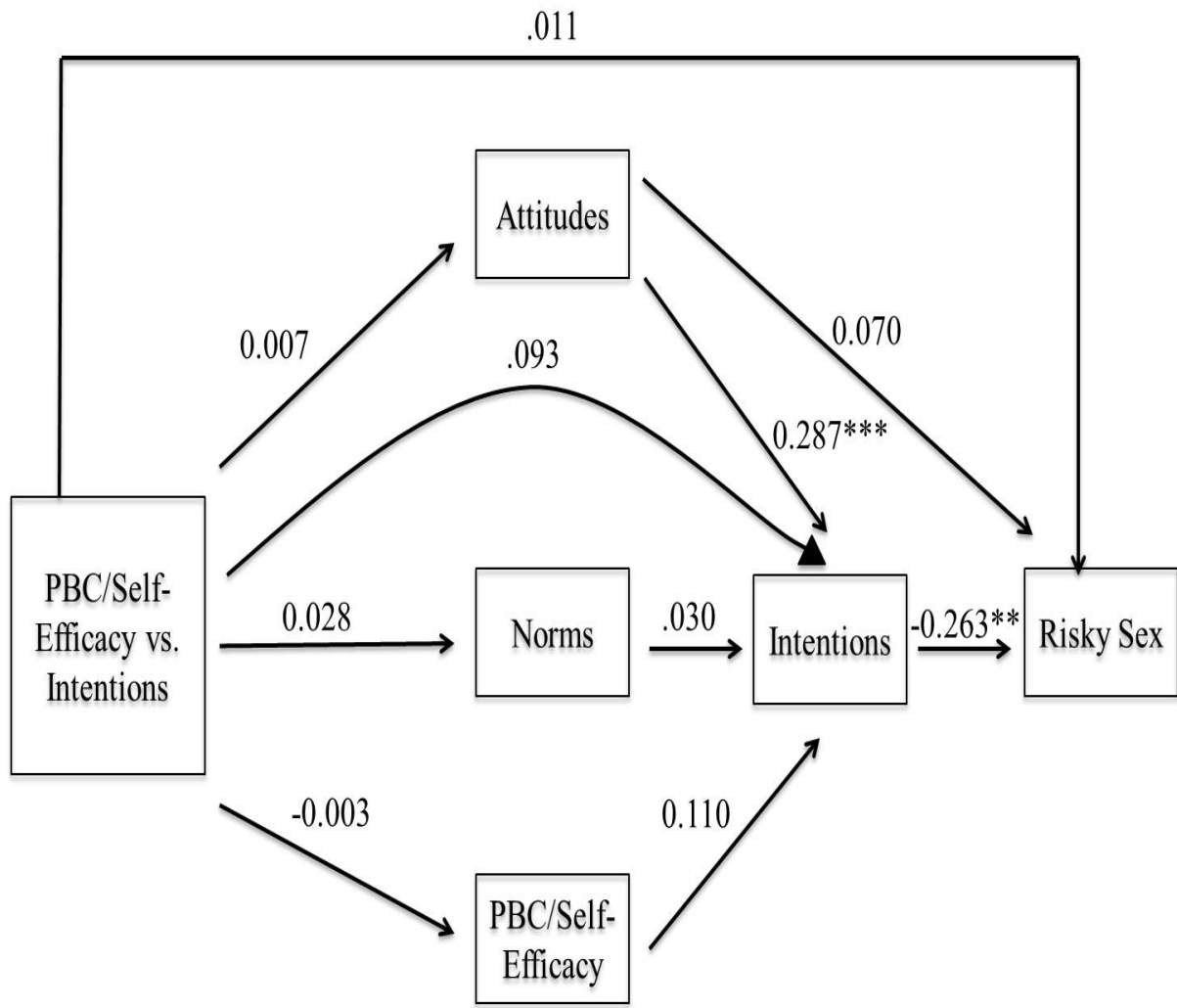
$\chi^2(17, N=287)=9.15p=0.94$, CFI=0.985, RMSEA=0.032 (CI 90% 0.000-0.066)

Figure 6. A full set of orthogonal contrasts were used to estimate the model. Coefficients are standardized path coefficients. *Note.* The contrast was coded as such: PBC/Self-Efficacy = 1 and Attitudes = -1. *p<.05, two-tailed. **p<.01, two-tailed. ***p<.001, two-tailed.

Appendices

Demographic Information

1. Are you male or female? **GENDER 0 = Female   1=Male**

2. How old are you? **AGE**

3. What is your ethnic background (check all that apply)? **HETHNIC**

| White =**1** | African-American =**2** | Hispanic-American =**3** | American Indian/Native American =**4** | Asian or Pacific Islander =**5** | Other =**6** |

4. What year in college are you? **YEAR**

| Freshman =**1** | Sophomore =**2** | Junior =**3** | Senior =**4** | Graduate/Professional School =**5** |

5. What is you CU Boulder e-mail address? **EMAIL** _____

Sexual Behavior Measures

> Remember, when we talk about "sexual intercourse" we mean penis in vagina intercourse or penis in anus intercourse, unless the question specifically asks about a different behavior (e.g., oral sex).

1.   Have you ever had sexual intercourse?   **SBM1**   Yes =**1** No =**2**

2.   Have you ever had oral sex? **SBM2**   Yes=**1** No=**2**

3.   How old were you the first time you had sexual intercourse? **SBM3** _____years

4.   Did you use a condom the first time you had sexual intercourse? **SBM4** Yes=**1**   No=**2**

5.   Which of the following is true for you? **SBM5**

The first time   The first time   The first time

I had sex   **=1**   I had sex   **=2**   I had sex **=3**   I

wanted to   I wasn't sure I wanted to   I didn't want to

6.   How many sexual partners have you had in your lifetime?   **SBM6** _____partners

7.   How much of the time have you used condoms when you've had sexual intercourse?
        SBM7

0   1   2   3   4   5   6   7   8   9   10

0%----10%----20%----30%----40%----50%----60%----70%----80%----90%----100%

 0% of   50% of   100% of the time

                the time   of the time

8.   How much of the time have you used some other form of birth control when you've had
        sexual intercourse? **SBM8**

0   1   2   3   4   5   6   7   8   9   10

0%----10%----20%----30%----40%----50%----60%----70%----80%----90%----100%

 0% of   50% of   100% of the

time   the time   of the time

9.   In the past 3 months, how often have you had sexual intercourse? **SBM9**

Once a month =**1**   Once a week =**2** 2-3 times a week =**3**   4-5 times a week=**4** Almost

Everyday =**5**   I have not had sex in the past 3 months = **6**

10.   *In the past 3 months only,* how much of the time have you used condoms when you've

        had sexual intercourse? **SBM10**

0   1   2   3   4   5   6   7   8   9   10

0%----10%----20%----30%----40%----50%----60%----70%----80%----90%----100%

  0% of   50% of   100% of the

time   the time   of the time

11.   *In the past 3 months only,* how much of the time have you used some other form of birth

        control when you've had sexual intercourse? **SBM11**

0   1   2   3   4   5   6   7   8   9   10

0%----10%----20%----30%----40%----50%----60%----70%----80%----90%----100%

  0% of   50% of   100% of the

time   the time   of the time

12.   Please think about the <u>most recent</u> time you had sexual intercourse.

        Did you and your partner use a condom? **SBM12**   Yes =**1** No =**2**

13.   Again, please think about the <u>most recent</u> time you had sexual

      intercourse. Did you and your partner use any form

      of birth control? **SBM13**   Yes =**1** No =**2**

14.   The <u>most recent</u> time you had sexual intercourse, were you

      drinking alcohol? **SBM14**   Yes =**1** No =**2**

15.   The <u>most recent</u> time you had sexual intercourse, was your

      partner drinking alcohol? **SBM15**   Yes =**1** No =**2**

16.   The <u>most recent</u> time you had sexual intercourse, were you

      smoking marijuana?   **SBM16**   Yes =**1** No =**2**

17.   The <u>most recent</u> time you had sexual intercourse, was your

      smoking marijuana?   **SBM17**   Yes =**1** No =**2**

18.   Still thinking about the <u>most recent</u> time you had sexual

      intercourse, was this the FIRST time you had had intercourse

      with THIS partner? **SBM18**   Yes =**1** No =**2**

19.   How would you describe the relationship between you and your most recent sexual

      partner? (circle one answer only) **SBM19**

      a.   Someone I just met =**1**

b. Someone who is a casual sexual partner =**2**

c. Someone I'm casually dating =**3**

d. Someone I'm seriously dating, but not in a monogamous relationship with =**4**

e. Someone I'm in a serious monogamous relationship with (includes being engaged or married) =**5**

20. What is your sexual orientation? **SBM20**

Heterosexual =**1**	Bisexual =**2**	Homosexual =**3**

21. Have you ever been pregnant (if female) or gotten someone

pregnant (if male)? **SBM21**   Yes =**1** No =**2**

22. Have you ever had a sexually transmitted disease? **SBM22**

Yes =**1** No =**2**

23. Are you currently in a romantic relationship? **SBM23**   Yes =**1** No =**2**

 (if NO, please skip to next section)

24. How long have you been in this relationship (in months)? **SBM 24**

_____

25. How would you describe this relationship (circle one)? **SBM25**

a.   We are casually dating =**1**

b.   We are steadily dating =**2**

c.   We are in a serious committed relationship, but not living together =**3**

d.   We are in a serious committed relationship and living together =**4**

e.   We are married =**5**

f.   I am not currently in a relationship =**6**

Theory of Planned Behavior Measures

We are interested in how you feel about condom use. There are many different kinds of sexual activity, but for the following questions, when we talk about "sex" or "sexual activity" we mean penis in vagina intercourse or penis in anus intercourse.

For me, using a condom would be… **TPB1**

Unhealthy   1   2   3   4   5   6   7   Healthy

TPB2

Harmful   1   2   3   4   5   6   7   Beneficial

TPB3

Unpleasant   1   2   3   4   5   6   7   Pleasant

TPB4

Bad   1   2   3   4   5   6   7   Good

TPB5

Worthless   1   2   3   4   5   6   7   Valuable

TPB6

Unenjoyable   1   2   3   4   5   6   7   Enjoyable

TPB7

Punishing   1   2   3   4   5   6   7   Rewarding

We'd like to know how your friends and the people who are important to you feel about condom use.

1   **2**   **3**   **4**   **5**   **6**   **7**

Disagree	Neither	Agree
Strongly	agree or	Strongly
	disagree	

1. Most of my friends use condoms during sexual activity. **TPB8**

2. Most of my family thinks that I should use condoms. **TPB9**

3. Most of my family thinks that I should not use condoms during intercourse. **TPB10**

4. My friends think that I should use condoms. **TPB11**

5. My friends think that I should not use condoms during sex. **TPB12**

6. My doctor thinks that I should use condoms. **TPB13**

7. My doctor thinks that I should not use condoms during intercourse. **TPB14**

8. Most people who are important to me think I should use condoms. **TPB15**

9. Most people who are important to me think I should not use condoms during sex. **TPB16**

10. My partner thinks that we should use condoms. **TPB17**

11. My partner thinks we should not use condoms during sex. **TPB18**

These next questions ask about your confidence in your ability to obtain and use a condom

properly.

1	2	3	4	5	6	7
Disagree			Neither			Agree
Strongly			agree or			Strongly
			disagree			

1. I feel confident that I could purchase condoms without being embarrassed. **TPB19**

2. I feel confident that I could talk to my partner about condom use. **TPB20**

3. I feel confident that I could put a condom on properly. **TPB21**

4. I feel confident that I could refuse to have sex if my partner did not want to use a condom.

TPB22

5. I feel confident that both my partner and I could achieve orgasm while using a condom.

TPB23

These next questions ask about your plans to use condoms over the next three months

---

1	2	3	4	5	6	7
Not at all			Neither			Very likely
			likely nor			

likely   unlikely

1. How likely is it that you will buy condoms in the next three months? **TPB24**

2. How likely is it that you will carry condoms with you in the next three months? **TPB25**

3. How likely is it that you will talk to a potential sex partner about using condoms in the next three months? **TPB26**

4. How likely is it that you will use a condom the next time you have intercourse? **TPB27**

Perceived Behavioral Control Measures

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

1. Whether or not I use a condom in the next month is entirely up to me. **PBC1**

1	**2**	**3**	**4**	**5**	**6**	**7**
Very Little Control						Complete Control

2. How much person control do you feel you have over using a condom in the next month?
   PBC2

1	2	3	4	5	6	7

Not at all   Very much

                                                                              so

3. How much do you feel that whether you use a condom in the next month is beyond your
   control? **PBC3**

1	2	3	4	5	6	7

Definitely   Definitely

 Do Not   Do

4. I believe I have the ability to use a condom in the next month. **PBC4**

1	2	3	4	5	6	7

 Very   Very likely

unlikely to   to use a

 use a   condom

condom

5. To what extent do you see yourself as being capable of using a condom in the next month? **PBC5**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Very unsure   Very sure

6. How confident are you that you will be able to use a condom in the next month? **PBC6**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Strongly   Strongly

disagree   agree

7. If it were entirely up to me, I am confident that I would be able to use a condom in the next month. **PBC7**

Condom Use Self-Efficacy Scale

1	2	3	4	5
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

Mechanics

1. I feel confident in my ability to put a condom on myself or my partner **CUSE1**

2. I feel confident in my ability to use a condom correctly **CUSE2**

3. I feel confident I could gracefully remove and dispose of a condom when we have intercourse **CUSE3**

4. I feel confident in my ability to put a condom on myself or my partner quickly **CUSE4**

Partner's Disapproval

1. If I were to suggest using a condom to a partner, I would feel afraid that he or she would reject me **CUSE5**

2. If I were unsure of my partner's feelings about using condoms, I would not suggest using one **CUSE6**

3. I would not feel confident suggesting using condoms with a new partner because I would be afraid he or she would think I've had a past homosexual experience **CUSE7**

4. I would not feel confident suggesting using condoms with a new partner because I would be afraid he or she would think I have a sexually transmitted disease **CUSE8**

5. I would not feel confident suggesting using condoms with a new partner because I would be afraid he or she would think I thought they had a sexually transmitted disease **CUSE9**

Assertive

1. I feel confident in my ability to discuss condom usage with any partner I might have **CUSE10**

2. I feel confident in my ability to suggest using a condom with a new partner **CUSE11**

3. I feel confident that I could suggest using a condom without my partner feeling

  "diseased" **CUSE12**

Intoxicants

1. I feel confident that I would remember to use a condom even after I have been drinking

  CUSE13

2. I feel confident that I would remember to use a condom even if I were high **CUSE14**

3. I feel confident I could stop to put a condom on myself or my partner even in the heat of

  passion **CUSE15**

FS_Condom Use During **FSCUdur**

Please choose the number that best describes how you think you would feel *WHILE* using a

condom during sexual intercourse (vaginal or anal sex).

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Bad		Bad		Fairly Bad	Neutral	Fairly Good		Good		Very Good
= -5	= -4	= -3	= -2	= -1	= 0	=1	=2	=3	=4	=5

FS_Condom Use Immediately After **FSCUaft**

Please choose the number that best describes how you think you would feel *IMMEDIATELY*

AFTER using a condom during sexual intercourse (vaginal or anal sex).

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5

| Very | | Bad | | | Fairly | Neutral | Fairly | | Good | | Very |
| Bad | | | | | Bad | | Good | | | | Good |

FS_Condom Use 1 Week Post   FSCU1wp

> Please choose the number that best describes how you think you would feel ***ONE WEEK*** after
>
> using a condom during sexual intercourse (vaginal or anal sex).

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5

| Very | | Bad | | | Fairly | Neutral | Fairly | | Good | | Very |
| Bad | | | | | Bad | | Good | | | | Good |

Perceived Benefits_Condom Use   BENCUinst

> Below are statements that relate to how you might think or feel about using a condom during
>
> sexual intercourse (vaginal or anal sex).

1. To what extent do you agree that using a condom during sexual intercourse will help you

   stay healthy? **BENCU01**

   1 =**1**   2 =**2**   3 =**3**   4 =**4**   5 =**5**   6 =**6**   7 =**7**

			Neither			Strongly
Strongly						Strongly
disagree			agree nor			agree
			disagree			

2. How beneficial do you believe using a condom during sexual acts would be for you? **BENCU02**

1 =**1**	2 =**2**	3 =**3**	4 =**4**	5 =**5**	6 =**6**	7 =**7**

Not at all   Extremely

beneficial   beneficial

3. To what extent do you agree that condoms are effective for preventing the spread of STDs among sexually active people? **BENCU03**

1 =**1**	2 =**2**	3 =**3**	4 =**4**	5 =**5**	6 =**6**	7 =**7**

Strongly			Neither			Strongly
disagree			agree nor			agree
			disagree			

4. To what extent do you agree that condoms would be effective for preventing you from getting an STD? **BENCU04**

1 =**1**	2 =**2**	3 =**3**	4 =**4**	5 =**5**	6 =**6**	7 =**7**

		Neither			Strongly
Strongly		agree nor			agree
disagree		disagree			

5. To what extent do you agree that condoms are effective at preventing the spread of

HIV/AIDS among sexually active people? **BENCU05**

| 1 =**1** | 2 =**2** | 3 =**3** | 4 =**4** | 5 =**5** | 6 =**6** | 7 =**7** |

Strongly
disagree

Neither
agree nor
disagree

Strongly
agree

6. To what extent do you agree that condoms would be effective for preventing you from

getting HIV/AIDS? **BENCU06**

| 1 =**1** | 2 =**2** | 3 =**3** | 4 =**4** | 5 =**5** | 6 =**6** | 7 =**7** |

Strongly
disagree

Neither
agree nor
disagree

Strongly
agree

7. To what extent do you agree that condoms are effective for preventing pregnancy among

sexually active people? **BENCU07**

| 1 =**1** | 2 =**2** | 3 =**3** | 4 =**4** | 5 =**5** | 6 =**6** | 7 =**7** |

Strongly	Neither	Strongly
disagree	agree nor	agree
	disagree	

8. To what extent do you agree that condoms would be effective for preventing pregnancy

   for you (if you are a female) or for your partner (if your partner is a female)? **BENCU08**

| 1 =**1** | 2 =**2** | 3 =**3** | 4 =**4** | 5 =**5** | 6 =**6** | 7 =**7** |

Strongly	Neither	Strongly
disagree	agree nor	agree
	disagree	

I am not in a heterosexual relationship and this question does not apply to me

   = **999**

How <u>hard</u> or <u>easy</u> would it be for you to make sure you use a condom every time you engage in

sexual activities? **HvECU**

Very easy to do = 1	Fairly easy to do = 2	Neither hard nor easy to do = 3	Fairly hard to do = 4	Very hard to do = 5

Conditional Risk – Condom Use (CRCUinst)

For the following questions, please indicate how likely you think it is that you will experience negative consequences (*e.g., sexually transmitted diseases or infections*) if you DO NOT use condoms during sexual activities AND ALSO how likely you think it is that you will experience negative consequences (*e.g., sexually transmitted diseases or infections*) if you DO use condoms during sexual activities.

If you ***DO NOT*** use condoms during sexual activities, how likely do you think it is that you will eventually experience negative consequences (*e.g., sexually transmitted diseases or infections*) from unprotected sex? **CRCU01**

1 =**1**	2 =**2**	3 =**3**	4 =**4**	5 =**5**	6 =**6**	7 =**7**
Not at all			Neither			Extremely
likely			likely nor			likely
			unlikely			

Conversely, if you ***DO*** use condoms during sexual activities, how likely do you think it is that you will eventually experience negative consequences (*e.g., sexually transmitted diseases or infections*)? **CRCU02**

1 =**1**	2 =**2**	3 =**3**	4 =**4**	5 =**5**	6 =**6**	7 =**7**
Not at all			Neither			Extremely
likely			likely nor			likely
			unlikely			

*Note. The same measures are used for the post-test survey and the follow-up survey.